Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies	)	ET Docket No. 13-84 (Termination order remanded)
	)	
Targeted Changes to the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields	)	ET Docket No. 19-226
	)	
Human Exposure to Radiofrequency Electromagnetic Fields	)	ET Docket No. 03-137

JOINDER IN ENVIRONMENTAL HEALTH TRUST PETITION TO IMPLEMENT D.C. CIRCUIT JUDGMENT AND MANDATE, REOPEN *NOTICE OF INQUIRY* AND PERFORM TASKS ORDERED BY THE COURT, AND REQUEST FOR PROMPT ADMINISTRATIVE ACTION

AND

RENEWED SEPARATE MOTION FOR SIMILAR RELIEF

Introduction

Children's Health Defense ("CHD") joins in and supports the Petition filed by Environmental Health Trust ("EHT") dated August 6, 2025 and posted on August 7, 2025.[1] CHD hereby also renews its prior petition and requests that the Commission promptly comply with the judgment and mandate issued by the United States Court of Appeals for the District of Columbia Circuit in No. 20-1025, *Environmental Health Trust, et al v. Federal Communications*

[1] *See* https://www.fcc.gov/ecfs/search/search-filings/filing/10806965028484. This filing was in Dockets 13-84 and 19-226. The same document (along with a cover letter) was also lodged in Docket 03-137, *Human Exposure to Radiofrequency Electromagnetic Fields* on August 19, 2025 and posted on August 19, 2025. *See* https://www.fcc.gov/ecfs/search/search-filings/filing/10813050220585.

Commission, et al.[2] CHD's prior separate motion was filed and posted on April 4, 2023[3] but no action has been taken on that motion for over two years.[4]

Executive Summary

- The Commission has refused to obey the D.C. Circuit remand for four years and is heedlessly dedicating tremendous effort toward "eliminating barriers to wireless deployment." The plain intent is to ensure the entire population is continually overdosed with electromagnetic radiation, a known, harmful pollutant and toxin to all life. The FCC is acting with deliberate indifference to an obvious and pressing public health matter, all to serve, protect and advance industry rather than the people. It must stop these misadventures and instead focus on tending to the court's mandate before it even thinks about removing perceived "barriers."
- The current limits are for "human exposures." There are no limits for non-human species. This glaring gap must be filled.
- EMR "interferes" with natural biological processes. Interference between emitters and living things is far more important than interference between devices and equipment.
- The current exposure rules and testing protocols improperly ignore pulsation and modulation, employ extensive averaging using incorrect measurement windows, disregard cumulative, and long-term exposures and still do not take account of many simultaneous exposures from all sources. They do not reliably capture, measure and mitigate all health effects.

[2] Children's Health Defense was a named Petitioner and is therefore entitled to the relief granted by the court.

[3] *See* https://www.fcc.gov/ecfs/search/search-filings/filing/104040414904765.

[4] CHD acknowledges that the second part of its April 4, 2023 motion is functionally moot due to recission of the CEQ rules. The Commission is also separately assessing its NEPA rules and procedures in WT Docket No. 25-217 but as noted below the NPRM for that proceeding says there is no plan to address the exposure rules there.

Real world testing and a full risk analysis are required. Children and those with special sensitivities must receive special attention and protection.

- Efficient communications are possible with far lower limits.
- The FCC does not have jurisdiction over non-licensees. It cannot compel that anyone suffer exposure without informed consent. It cannot authorize licensees to seize or use people's property by directing EMR across private lands without due process and a negotiated easement.
- The Commission should expressly hold that its exposure rules do not preempt traditional state law rights and remedies.
- The Commission and Health and Human Services ("HHS") share jurisdiction over "emissions" but only HHS has statutory authority over "exposures." The two agencies should collaborate and properly implement the regulatory regime envisioned by Congress in the relevant laws.

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1. D.C. Circuit Judgment and Mandate

The D.C. Circuit opinion and judgment in *Environmental Health Trust, et al v. Federal Communications Commission, et al*, 9 F.4th 893 (D.C. Cir. 2021) was released on August 13, 2021. The mandate issued on October 5, 2021. The judgment is that the "petitions for review be granted in part and the case be remanded to the Commission to provide a reasoned explanation for its determination that its guidelines adequately protect against harmful effects of exposure to radiofrequency radiation unrelated to cancer, in accordance with the opinion of the court."

The judgment is now four years old, but despite multiple requests by the court petitioners and others the Commission has refused to obey the mandate. The FCC plainly has no intention of complying with the judicial direction to "provide a reasoned explanation for its determination that its guidelines adequately protect against harmful effects of exposure to radiofrequency radiation unrelated to cancer" or do anything else related to its human exposure guidelines. The Commission's "Unified Agenda" published at 90 Fed. Reg. 45888-45642 (Sept. 22, 2025) does not list anything related to "exposure," nor does the list of Executive Order Submissions under Review published at https://www.reginfo.gov/public/do/eoReviewSearch. The FCC has not done anything in response to the decision and its evident intent is to continue to do nothing.

Nonetheless, CHD concurs in and joins the latest EHT motion and supplements CHD's prior separate petition, motion and request. CHD, like EHT, also specifically reiterates and once again requests a prompt ruling on these submissions.

The Court of Appeals remanded the Commission's December 4, 2019 Order[5] terminating the Docket 13-84 *Notice of Inquiry* that was established "to determine whether there is a need for

[5] *Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies*, Resolution of Notice of Inquiry, ET Docket 13-84, FCC 19-126, 34 FCC Rcd 11687, 11692-11697, ¶¶ 10-16 (2019).

reassessment of the Commission radiofrequency (RF) exposure limits and policies."[6] Most significantly, the D.C. Circuit held that the Commission's 2019 Order failed to provide reasoned decision-making and was arbitrary and capricious with respect to its determination that the existing guidelines for radiofrequency radiation emissions adequately protect against harmful effects of exposure to radiofrequency radiation unrelated to cancer. More specifically, the D.C. Circuit ruled:

> [W]e grant the petitions in part and remand to the Commission to provide a reasoned explanation for its determination that its guidelines adequately protect against harmful effects of exposure to radiofrequency radiation unrelated to cancer. It must, in particular, (i) provide a reasoned explanation for its decision to retain its testing procedures for determining whether cell phones and other portable electronic devices comply with its guidelines, (ii) address the impacts of RF radiation on children, the health implications of long-term exposure to RF radiation, the ubiquity of wireless devices, and other technological developments that have occurred since the Commission last updated its guidelines, and (iii) address the impacts of RF radiation on the environment.

9 F.4th at 914.

The Circuit Court emphatically concluded that the Commission's Order was "arbitrary and capricious in its failure to respond to record evidence that exposure to RF radiation at levels below the Commission's current limits may cause negative health effects unrelated to cancer." *Id.* at 903. The Court continued:

> That failure undermines the Commission's conclusions regarding the adequacy of its testing procedures, particularly as they relate to children, and its conclusions regarding the implications of long-term exposure to RF radiation, exposure to RF pulse or modulation, and the implications of technological developments that have occurred since 1996, all of which depend on the premise that exposure to RF radiation at levels below its current limits causes no negative health effects. Accordingly, we find those conclusions arbitrary and capricious as well. Finally, we find the Commission's order arbitrary and capricious in its complete failure to respond to comments concerning environmental harm caused by RF radiation.

Id.

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[6] *Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies,* Notice of Inquiry, ET Docket 13-84, 205-252, 28 FCC Rcd 3498, 3501-3503, 3570-3589, ¶¶ 5-9 (2013).

2. Commission Action is Legally Required

The Commission cannot sit on this any longer. Doing nothing to reopen the matter is functionally no different than the termination of the Notice of Inquiry – the outcome found unlawful and remanded by the Court. Any continued non-action will violate the judgment and mandate and expose the Commission to further judicial review and, ultimately, an order requiring prompt compliance.

The Court of Appeals decision was based on record evidence that went through the end of November 2019.[7] It is now November 2025 – five years and eleven months after the remanded docket termination order. Even more scientific evidence has been published, and it further validates that exposures at and under the FCC's emissions guidelines in 47 C.F.R. §§ 1.1307, 1.1310 and 2.1091 lead to significant adverse effects. EHT and others have been assiduously lodging copies of the scientific developments in ET Docket Nos. 13-84 and 19-226 so the FCC is fully aware of these developments. The Commission cannot responsibly ignore this science any longer. The science now conclusively shows the current emissions and exposure regulations ***do not*** protect human health or the rest of the human environment. It is past the time to act, yet the Commission doggedly refuses to address the problem in favor of inaction even though it was ordered to re-evaluate or at least better explain its failure and refusal by the D.C. Circuit more than four years ago. The reason is obvious. The industry that has long controlled the FCC is opposed to even a hint of change or recognition because it might impact or slow their

[7] The *NOI* termination decision was released on December 4, 2019. For all practical purposes, however, the determination had already been made three months earlier or around August 8, 2019 when the then-Chairman proposed to maintain current RF exposure limits. *See* FCC Daily Digest, Chairman Pai Proposes to Maintain Current Radiofrequency Exposure Safety Standards, https://www.fcc.gov/edocs/daily-digest/2019/08/09, DOC-358968A1.docx, DOC-358968A1.pdf, DOC-358968A1.txt.

remorseless drive to deploy and operate their infrastructure everywhere without constraint or oversight. The industry's interests predominate over the public's health and well-being and that has been so for decades. There is, however, no discretion and no legal basis for further delay. The Commission must reopen the *Inquiry* and then take rulemaking action regarding its emissions and exposure regulations.[8] EHT has suggested several things that can be done, but CHD asserts additional issues must be addressed as well. Those are described below.

The main takeaway is that the FCC should relinquish its grip on exposures and focus on limiting emissions to "the minimum amount of power necessary to carry out the communication desired." 47 U.S.C. § 324. The Commission can also continue its work on interference between emitters. That is what the Communications Act contemplates and authorizes. Regulation of exposures, however, should be handled by the Secretary of Health and Human Services, consistent with the authority in 21 U.S.C. Ch 9 Subch. V Part C. The two agencies can and should collaborate to ensure each does not undercut the other. There is no reason to believe that a *proper* balance between the two missions – exploiting spectrum to provide efficient communications while still protecting humans and the entire human environment – is not possible. All that is needed is genuine desire, something clearly lacking at the Commission.

3. The Guidelines Are Human-Specific And Do Not Address or Govern Non-Human Living Things

The *EHT* court remanded for a reasoned explanation regarding "the impacts of RF radiation on the environment." 9 F.4th at 914. The opinion explains at 9 F.4th at 908-909:

> … the Commission also completely failed even to acknowledge, let alone respond to, comments concerning the impact of RF radiation on the environment. That utter lack

[8] The Commission recently opened an NPRM to "update" its NEPA rules. Note 153 states that "we do not propose changes to [the radiofrequency radiation exposure limit] rule sections as part of this proceeding." *In re Modernizing the Commission's Nat'l Env'tl. Policy Act Rules*, FCC 25-47, ¶51, n. 153, 2025 FCC LEXIS 1825, *64 (Aug., 2025).

> of a response does not meet the Commission's obligation to provide a reasoned explanation for terminating the notice of inquiry. The record contains substantive evidence of potential environmental harms. Most relevantly, the record included a letter from the Department of the Interior voicing concern about the impact of RF radiation from communication towers on migratory birds, *see* J.A. 8,379, 8,383-86. In the Department of the Interior's expert view, the Commission's RF radiation limits "continue to be based on thermal heating, a criterion now nearly 30 years out of date and inapplicable today." J.A. 8,383. "The [current environmental] problem," according to the Department of the Interior, "appears to focus on very low-level, non-thermal electromagnetic radiation." *Id.* Although the Commission has repeatedly claimed that it considered "inputs from [its] sister federal agencies[,]" *2019 Order*, *34 FCC Rcd. at 11,689*, the Commission entirely failed to address the environmental harm concerns raised by the Department of the Interior. To be sure, the Commission could conclude that the link between RF radiation and environmental harms is too weak to warrant an amendment to its RF radiation limits. All we hold now is that the Commission should have said something about its sister agency's view rather than ignore it altogether. That lack of any reasoned explanation as to environmental harms does not satisfy the requirements of the APA.

EHT's August 2025 Petition pages 64-67 recommend several actions that can be taken to address the remand requirement regarding "the impacts of RF radiation on the environment." CHD concurs in those recommendations, but we qualify that support by saying the Commission cannot and should not assume the Commission's "human radiation standards" (*c.f.* EHT Petition page 66, bullet point (i)[9]) apply or are appropriate to use as a starting point. That is because, as the Interior Department letter cited by the Court said, the existing guidelines are based on "thermal heating" and therefore do not address the other well-demonstrated biological responses to RF radiation that occur in animals and plants. *See* EHT Petition at pages 60-64.

The human exposure limits address human exposures. They do not expressly or impliedly apply to non-human species. The Commission has never directly held that the human exposure limits logically, legally or in any other way apply to anything other than human exposures. There are ***no*** guidelines for non-human species, and one cannot just assume the exposure limits apply

[9] CHD does not believe EHT was referring to the FCC Guidelines but instead other approaches, including ALARA and "minimum necessary."

or are properly applied to anything other than human exposures. Humans, animals and vegetation all respond to exposure at the biological level and many of the underlying mechanisms of harm are that same but that does not means the same limits make sense for all three.

This issue has only been addressed once in the entire history of the Commission's NEPA-related rulemakings. *See Responsibility of the Federal Communications Commission to consider biological effects of radiofrequency radiation when authorizing the use of radiofrequency devices; Potential effects of a reduction in the allowable level of radiofrequency radiation on FCC authorized communications services and equipment*, FCC 82-47, Notice of Proposed Rulemaking, 89 FCC 2d 214, 245, ¶¶147-149 (1982). The previous Notice of Inquiry sought comments in Question 19: "Does a health risk to animals have to be considered? What if the species being threatened is on the endangered species list?" The EPA opined that health risks to animals should be considered, but that issue "would not be expected to be a controlling factor in the development of a standard." This was similar to the opinion of SBS, which said it is "probably impossible to impose a single standard applicable to all living creatures." GTE argued that they knew of "no studies showing harm to animals at RF levels stated in the recent ANSI proposal." Paragraph 149 went on to note that "Raytheon pointed out that a health risk to animals would be a secondary consideration to health effects in humans. They were of the opinion that a decision as to whether a species would be threatened by a particular operation should be handled on a case-by-case basis and should not be used in the development of a standard."

The subsequent Report and Order, FCC 85-90, 100 FCC 2d 543 (1985) did not resolve the question and the topic has not come up again in any Commission decision or order.[10] There

[10] The difference between humans and other living things also played into the 1992 ANSI/IEEE deliberations. There was a frog study looking at responses to exposure. The ANSI/IEEE committee majority concluded "not only is there an uncertainty inherent in measurements of the

has never been an agency decision on the question, but the text of the guidelines themselves are clear and unambiguous. The exposure guidelines are only about human exposures.[11] There is no agency promulgated regulation that applies to non-human species exposures. The human exposure guidelines are flawed and must be reassessed and changed, but the complete lack of any limits for non-human species is entirely unacceptable. This must be remedied through appropriate regulations to the extent and in whatever context the FCC has authority over exposures.

4. The Current Human Exposure Limits, As Interpreted and Applied, Exceed The Commission's Statutory Jurisdiction, Authority And Limitations And Are Contrary to The Constitutional Rights, Powers And Privileges Of Those That Have Not Given Informed Consent[12]

A. Humans And All Living Things Depend on Electron Movement. Commission-Authorized Emitters Interfere With Fundamental Biological Processes

Living entities use self-generated electrical currents to activate all manifestations of life. Whereas industry has always held that telecommunication signals need to be ionizing to interfere with biology, all living entities spontaneously generate the ionization that makes them vulnerable to electromagnetic radiation from the environment. The distinction between living and inert

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responses of animals, but extrapolation of these measurements to human beings may be difficult." *See* Respondents Brief, *Cell Phone Task Force*, No. 97-4328 (and consolidated cases), before the Second Circuit (1998) at p. 28, discussing the ANSI/IEEE 1992 Report at 27. Similarly, an April, 2019 letter from FDA CDRH Director Dr. Shuren to the Commission's OET Chief suggesting that "no changes to the current standards are warranted at this time" contended that the NTP study analyzed rodents and the results and "should not be applied to human cell phone usage." If animal studies cannot be carried over to human beings, then logic demands that human exposure limits cannot be carried over to animals. The Commission and industry irrationally want it both ways.

[11] As explained below, there are significant legal issues about the reach and legal effect of the guidelines.

[12] Section 4 relies on the Statement in Support by Dr. Paul Héroux, Ph.D, Attachment 1.

materials is that life has an obligation to maintain electrical currents flowing within itself to avoid death. These obligatory electrical currents are generated by *metabolism*.

Metabolism is the fundamental set of chemical reactions that occur within all living organisms to sustain life. This network of biochemical processes is essential for energy production,[13] biosynthesis[14] and waste elimination.[15] Every known living organism relies on metabolism to maintain its structure, grow, respond to stimuli, and reproduce. Metabolism is maintained by the movement of electrons from food to oxygen within mitochondria, an oxido-reduction process called the electron transport ("ETC") chain. Oxidation and reduction usually occur together so these are called "redox" reactions. Redox is involved in all important biological processes, such as cellular respiration and photosynthesis. As electrons are passed from an electron donor (food) to an electron acceptor (oxygen) in the body, the energy difference is used to stock a pool of protons, and these protons are used to produce molecules of adenosine triphosphate (ATP). ATP carries releasable energy and diffuses throughout the cell to power its reactions.

The electrons of metabolism and the protons and ions energized by them generate electric and magnetic fields that can be measured on the surface of the body as electrocardiograms (EKG) and electroencephalograms (EEG). Endogenous bioelectric fields play key roles in development, regeneration, wound healing and cell migration. All these electrical activities occur over various time frames that can be displayed to occur over a range of frequencies.

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[13] Converting nutrients from the environment into usable energy (ATP) that powers cellular activities.

[14] Building complex molecules (like proteins, nucleic acids, and lipids) from simpler precursors, which are necessary for growth, repair, and reproduction.

[15] Breaking down and removing toxic byproducts of these chemical reactions.

Electrons are charged particles and generate an electric field. Moving electrons generate an electric field and a magnetic field. Accelerating electrons produce an electric field, magnetic field and electromagnetic radiation. Every cell in the body generates weak electromagnetic fields due to the movement of charged particles (ions). Humans and other living things therefore naturally generate electromagnetic fields. These fields govern cellular processes, interactions and signaling pathways.[16] Endogenous bioelectric fields play key roles in development, regeneration, wound healing and cell migration. Voltage gradients guide axon growth or influence stem cell differentiation. They affect processes like cell proliferation, apoptosis, and extracellular matrix organization.

Cells communicate through biochemical signals, but the electromagnetic fields modulate these signals, thereby affecting cellular responses and molecular interactions within cells. These biologically based electromagnetic fields also affect the orientation and behavior of polar molecules, which in turn leads to energy transfer processes. Certain biological molecules resonate at specific frequencies and/or have tissue level effects due to gradients and metabolic coordination, facilitating energy transfer or communication at the molecular level.

These natural, biological processes therefore could reasonably be said to involve a rudimentary form of "communication" and energy transfer via frequencies the FCC purports to control.[17] Biological processes employ chemical and electromagnetic "signals." But Congress

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[16] The interaction of these electric and magnetic fields is described by Maxwell's equations.

[17] Generally speaking, biologically based electromagnetic fields occur in low frequency bands (3-300 Hz). To take brainwaves as an example, Gamma waves associated with higher cognitive functioning operate at 30-100 Hz, Beta waves linked to alertness, concentration and active thinking operate at 12-30 Hz and Alpha waves (prominent during relaxed meditative states) operate at 8-12 Hz. Electroencephalograms and electrocardiograms look for electrical activity between 0.05 Hz and 150 Hz. The Commission has already acknowledged that external artificial electromagnetic radiation can lead to instantaneous electrostimulation of internal biological fields, and this effect cannot rationally be dealt with using SAR or MPE averaging methods.

most certainly did not intend to subject every living thing to Commission regulation notwithstanding the sweeping wording in 47 U.S.C. §§ 152(a)[18] and 301.[19]

B. The Communications Act And FCC Rules Apply Only To Exploitation Of The Electromagnetic "Spectrum" Via Emission Of Artificially Generated Energy

The Communications Act and the current regulatory system is based on the notion of scarcity – that the electromagnetic spectrum is "a valuable and limited public resource."[20] The spectrum, however, is not "scarce" in the sense of a commodity or resource that can be "used up." Even so, the *public* airwaves (spectrum) can admittedly support only so many channels of

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Resolution of Notice of Inquiry, Second Report and Order, Notice of Proposed Rulemaking, and Memorandum Opinion and Order, *Targeted Changes to the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields*, 34 FCC Rcd. 11,687, 11,689-90 (2019), 11743-11745, ¶¶122-124 and associated notes (2019).

[18] Humans and other living things emit and radiate electromagnetic energy, so they are indeed "incidental," "intentional" or "unintentional" "emitters" or "radiators" in the scientific sense. But the Communications Act and Commission rules do not treat them as such. Living things are not "devices" (or an "apparatus" for purposes of 47 U.S.C. § 301) so they do not fit the definition of a "radiofrequency device" in 47 C.F.R. 2.801. Since they not "devices" living things are also not "intentional" or "incidental" radiators as defined in 47 C.F.R. 15.3(n) or (o). The operational rules simply do not cover living things. The problem, however, is that living things are impacted by artificial radiation and as a practical matter the Commission believes it has the power to require humans to "accept" exposures up to a certain level. This means the FCC *is claiming the exclusive and preemptive power and authority to regulate humans as biological beings by limiting their rights and remedies as such* even though Congress has never hinted any intent to allow that result.

[19] "It is the purpose of this chapter, among other things, to maintain the control of the United States over all the channels of radio transmission; and to provide for the use of such channels, but not the ownership thereof, by persons for limited periods of time, …"

[20] *Columbia Broad. Sys., Inc. v. Democratic Natl. Comm*., 412 U.S. 94, 101 (1973); *see also FCC v. League of Women Voters*, 468 U.S. 364, 376 (1984). The Communications Act does not claim "government" ownership of the spectrum, just "control." The Act and FCC rules explicitly preclude private ownership of "spectrum" as part of any license. *See In re NextWave Personal Communications, Inc*., 200 F.3d 43, 50 (2d Cir. 1999) ("The radio (or electromagnetic) spectrum belongs to no one. It is not property that the federal government can buy or sell. It is no more government-owned than is the air in which Americans fly their airplanes or the territorial waters in which they sail their boats. Although not owned by the federal government, the radio spectrum is subject to strict governmental regulation.").

information at any one time. The total number of available channels in any area continually grows as technology progresses but it is still finite, so use is rivalrous because two simultaneous signals at the same frequency will "interfere." Thus, the need for exclusion, at least as between potentially competing sources of artificially generated radiation.

Physics is the study of the fundamental forces of *nature* and the interactions between them. In 1864, James Clerk Maxwell demonstrated that electricity, magnetism and electromagnetic radiation are each manifestations of the electromagnetic force, a fundamental force of nature. Maxwell's theory predicted that coupled electric and magnetic waves travel through space as "electromagnetic waves." Heinrich Hertz later proved the existence of the waves predicted by Maxwell's equations. He created the first radio transmitter in 1886 and, through experimentation, validated Maxwell's equations. Hertz did not see any practical application for his discoveries, but others soon did. Marconi developed wireless telegraphy, with the first working model in 1894. Marconi was able to transmit Morse Code for 3 miles in 1897. He is often called the "Father of long-distance radio" because he proved the commercial utility of artificially generated radiation using Maxwell's and Hertz's theoretical work on natural radiation.

The Commission regulates those involved in artificially generated radiation. It has no role or authority over nature itself, however. The FCC has no control over the Sun, the stars or other "natural" radiators or receivers – including all living things.[21] Nor could it, especially as to people and their natural biological processes. Try as they might, neither Congress nor the Commission have the power of command over naturally occurring electromagnetic "waves" any

[21] In physics anything that is conductive is a "receiver." Many structures are conductive. One example is a power line, which can gather and propagate RF and electrical energy from external sources including lightning strikes. Living things are also conductive so they too are "receivers."

more than did King Canute for those in the ocean. This is practically so, but it is also legally out of bounds. People, for example, cannot be constitutionally regulated as to their own biological processes,[22] nor is there any constitutional principle that would permit the Commission to issue "licenses" that "permit" a person to forcibly expose someone else to artificially generated radiation.

C. Emissions And Exposures Are Two Different Things

The Commission has statutory authority to set "emissions limits" for equipment that radiates artificial electromagnetic energy to provide a communications service. But no provision in the Communications Act expressly grants exclusive authority over ***exposure*** [23] to electromagnetic energy, nor does it expressly or implicitly provide that citizens must accept nonconsensual exposure. The word "exposure" in relation to radiofrequency and electromagnetic related issues appears nowhere in the Act. Congress knows how to grant authority over both "emissions" and "exposures" when it wants since it expressly delegated both to the HHS Secretary. *See* 21 U.S.C. §§ 360hh, 360jj(a)(3) (emission); 360ii(a)(2), (4), (5) (exposure). So as a matter of statutory interpretation the lack of "exposure" authority in the Communications Act is

[22] If the Commission issued a regulation commanding that the biological ATP chain stop being bothered by external artificial EMR it would have no effect. The bother would doggedly persist for so long as there is any remaining "life spark." The rule could not be practically or legally enforced other than through government-sanctioned execution.

[23] The Commission often cites to Telecommunications Act of 1996, Pub. L. No. 104-104, § 704(b), 101 Stat. 56, 152 (directing Commission to "prescribe and make effective rules regarding the environmental effects of radio frequency emissions") and 47 U.S.C. § 332(c)(7)(B)(iv) (prohibiting zoning authority "regulat[ing] the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the Commission's regulations concerning such emissions." Both of those provisions, however, speak to "*emissions*" not "exposures." The FCC chose to promulgate "exposure" limits for NEPA purposes but there is no provision in Communications Act itself that expressly grants the power to regulate "exposures" for any substantive purpose.

significant and limiting. Even if the Commission does somehow have jurisdiction over "exposure" the Constitution would not allow the vast elimination of liberty, autonomy and individual rights wrought by the Commission's and industry's position that people have no right to object to involuntary exposure to FCC-authorized emissions or any remedy for harms they suffer.

47 C.F.R. 2.1 defines "emission" as "[r]adiation produced, or the production of radiation, by a radio transmitting station." The Commission, however, has apparently never defined the term "exposure"; it has merely set out how "exposure" is measured using SAR and MPE. The basic meaning should be uncontroversial: "Exposure" refers to the condition of being subjected to an influencing agent, such as one or more electromagnetic fields. Common dictionary definitions confirm:

> Black's Law Dictionary Definition of "emission":[24]
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> EMISSION STANDARD: Maximum amount of a specific pollutant from a single fixed or mobile source allowed to be discharged into the atmosphere or water.
>
> Black's Law Dictionary Definition of "Exposure":[25]
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> EXPOSURE LEVEL: The concentration of a dangerous substance that an organism can handle over a period of time.
>
> EXPOSURE LIMIT: How much a person can be exposed to a hazardous substance without affecting health. Each country has their own limits and standards.
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> Marriam-Webster Definition of "emissions":[26]
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> Emission, noun
> 1a: an act or instance of emitting: EMANATION
> c: a putting into circulation
> 2a: something sent forth by emitting: such as
> (1): electromagnetic radiation from an antenna or a celestial body
> (2): usually emissions: substances discharged into the air (as by a smokestack or an automobile engine)

[24] https://thelawdictionary.org/?s=emission.

[25] https://thelawdictionary.org/page/2/?s=exposure.

[26] https://www.merriam-webster.com/dictionary/emissions.

Mirriam-Webster Definition of "exposure"[27]
exposure, noun
1: the fact or condition of being exposed: such as
a: the condition of being presented to view or made known
a politician seeks a lot of exposure
b: the condition of being unprotected especially from severe weather
died of exposure
c: the condition of being subject to some effect or influence
risk exposure to the flu
2B: the treating of sensitized material (such as film) to controlled amounts of radiant energy
also: the amount of such energy or length of such treatment
a 3-second exposure
3a: the manner of being exposed

"Emission" is the output from sources; "exposure" is the input for "receivers."[28] Energy absorption is a function of the exposure. It is the exposure that has consequences to living things.

"Transmitters emit energy that can cause interference,[29] and receivers can experience interference by processing such energy." Policy Statement, *FCC States Spectrum Mgmt.*

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[27] https://www.merriam-webster.com/dictionary/exposures.

[28] As noted above anything conductive is a receiver in the general sense. CHD is not aware of a Commission approved generally applicable definition for "receiver." There are some context specific definitions, such as in broadcast matters. 47 C.F.R. 15.3(v) purports to define a "scanning receiver" but it is ultimately circular: it says a scanning receiver is a "receiver" with certain characteristics but never tells us what a receiver is. Commission rules treat receivers as a kind of "station." *See* 47 C.F.R. 2.1 ("Station. One or more transmitters or receivers or a combination of transmitters and receivers, including the accessory equipment, necessary at one location for carrying on a radiocommunication service, or the radio astronomy service."); *see also* 47 U.S.C. §153(49) (definition of station license, referring to an instrument or apparatus "for transmission of energy, or communications, or signals by radio.") CHD would define a "receiver" for FCC regulatory purposes as an electronic device that receives radio frequency signals and converts those signals into usable information or electrical energy.

[29] 47 C.F.R. 2.1 defines "Interference" as [t]he effect of unwanted energy due to one or a combination of emissions, radiations, or inductions upon reception in a radiocommunication system, manifested by any performance degradation, misinterpretation, or loss of information which could be extracted in the absence of such unwanted energy." 47 C.F.R. 101.3 defines "harmful interference" as "Interference that endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunication service operating in accordance with these regulations." The definitions plainly do not extend to living things because they are not a "radiocommunication system" or "radiocommunication service" but the concept clearly applies by analogy and meets the

Principles for Transmitters & Receivers, 38 FCC Rcd 3682, 3686 (Apr. 2023). The Commission has always dedicated tremendous resources and attention to minimizing interference "between stations" but it has exhibited a complete lack of curiosity, indeed a manifest indifference, to the kind of interference Commission-authorized transmitting "stations" can cause to biological systems that "receive" the transmitted energy emissions through exposure. The Commission is intensely interested in the electromagnetic compatibility (EMC) between electronics systems, but it has steadfastly avoided any effort to ensure bioelectromagnetic compatibility between electronics systems and living systems.

NEPA requires that the Commission consider the environmental impact of covered actions. The purpose is to, among other things, "create and maintain conditions under which man and nature can exist in productive harmony. …" 42 U.S.C. § 4331(a) (emphasis added). Agencies are to, *inter alia*, "utilize a systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making which may have an impact on man's environment." 42 U.S.C. § 4332(A) (emphasis added). NEPA is therefore intended to address the impact on the "human environment"[30] and that includes both humans and all other living things.

NEPA, however, is a "purely procedural statute" that "imposes no substantive environmental obligations or restrictions." *Seven Cty. Infrastructure Coal. v. Eagle Cty*., 145 S.

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dictionary definition of "interference" as explained in other sections of this submission. FCC authorized emissions degrade biological performance, lead to cellular "misinterpretation" and cause a "loss of information" because it deconstructs natural modulation of internal biological electromagnetic fields and causes changes in cellular responses.

[30] 47 C.F.R. 1.1303, 1.1305, 1.1306(a), 1.1307(b)(1)(ii) and (b)(2), 47 CFR 1.1308(c), 1.1309, 47 CFR 1.1311(e), along with 17.4(c)(1)(vi) and (5)(ii) all employ the phrase "human environment."

Ct. 1497, 1507 (2025). The FCC's "Exposure" rules were promulgated to comply with NEPA.[31] The equipment and emission rules in Part 2 and scattered elsewhere in other parts do have substance, by way of "technical standards and other requirements for radio frequency equipment and parts or components thereof" (47 C.F.R. §2.901(a))[32] but they apply only to those seeking equipment authorization, providing communications service or using equipment. Nothing in the Communications Act or any Commission rule purports to, does, or lawfully can extend to or bind a person that is exposed to emissions from authorized equipment without informed consent.

D. Artificial EMR "Interferes" With Fundamental Life Processes

Electromagnetic radiation is the "self-sustaining oscillation of perpendicular electric and magnetic fields, which propagate through empty space at the speed of light." Jerry Kang et al., Communications Law and Policy, Cases and Materials 4 (2024). Electromagnetic radiation propagates in waves that can be mathematically defined as a sine function. Two important attributes of an electromagnetic wave are its amplitude and its frequency. Amplitude is basically the strength of the wave. Frequency is the number of cycles the electric field makes per second, measured in "hertz" (Hz). A wave can equally be described by its wavelength, the physical distance the wave traverses in a single cycle. The wave's "speed" is its wavelength times its frequency (*i.e.*, the distance it covers per cycle times the number of cycles per second tells you how far it travels per second). All electromagnetic waves travel at the speed of light, a constant, so wavelength is inversely related to frequency. A wave's energy is also related to frequency. Higher-frequency (or shorter-wavelength) waves carry more energy.

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[31] Even though, again, the Congressional command was to "prescribe and make effective rules regarding the environmental effects of radio frequency *emissions*" not "exposures."

[32] Note that at least as to "mobile" and "portable devices" 47 C.F.R. 2.1091 and 2.1093 expressly state they "are a consequence of Commission responsibilities under the National Environmental Policy Act to evaluate the environmental significance of its actions."

Electromagnetic radiation is physical. It carries energy and momentum. Just like a moving physical object, electromagnetic radiation can transfer energy and momentum to objects it interacts with. These are synchronized, vibrating electric and magnetic fields. These fields can exert physical forces on charged particles, which is the basis for how radio antennas work.

Radio signals are generated by applying voltage at a desired frequency to an antenna, which emits radio waves at that frequency; when those waves reach the recipient, they induce a corresponding voltage in the receiving antenna. So even though radio waves cannot be seen or felt (by most, there are exceptions), wireless communications are the result of measurable, physical phenomena: for a cell phone to receive a call, radio waves have to first traverse the physical space between the cell tower and the handset, and then travel close enough to the phone that they are able to excite the electrons within the atoms that make up the phone's antenna.

But electromagnetic radiation also interacts with living or biological matter. Artificially generated electromagnetic fields – including those from FCC authorized emitters – will clearly and always perturb, or "interfere" with living things' own electromagnetic fields if one looks at the dictionary definition of "interference."[33] This flows directly from Maxwell's equations. The perturbation will arise from the receipt of additional energy regardless of frequency overlap and, separately, from simple interference and/or noise.

The extent of the perturbation will vary, depending on coherence, phase, and polarization so total energy density (internal and external; natural or anthropogenic) at the point of exposure

[33] "Interference" is the act of interfering. The online version of Merriam-Webster defines "interfering" at https://www.merriam-webster.com/dictionary/interfering:

> 2: to interpose in a way that hinders or impedes: come into collision or be in opposition
> …
> 4: to act reciprocally so as to augment, diminish, or otherwise affect one another —used of waves

may be more or less than the sum of the energy received from all individual sources. If the sources are "coherent" (same frequency, fixed phase relationship) the average energy density at the convergence point is affected by interference and is therefore not necessarily the simple sum of the individual average energy densities. Instead, it can be higher (constructive interference) or lower (destructive interference)[34] than the sum, depending on the phase difference between the waves. Instantaneous energy will fluctuate, but time-averaged density will reflect the ongoing constructive or destructive overlap.

If they are incoherent (different frequencies, different phases), the energy density will lead to energy adding approximately linearly over time, meaning the average energy density will be close to the sum. Instantaneous energy will be temporarily higher or lower at any given moment because of fluctuating interference. The phases or frequencies differ, so the interference will oscillate at the beat frequency if frequencies are close but not identical, or randomly if phases are uncorrelated. The instantaneous will modulate around the sum, but if the wavelengths are far apart (*e.g.*, an MHz or more) the fluctuations are too rapid to observe in most practical measurements, effectively appearing as the sum on average. If the phases are random (such as will occur between two different transmitters), the interference may be unpredictable but energy density will jitter around the average. In summary, for incoherent sources, Maxwell's equations yield linear field superposition,[35] but the quadratic energy density means instantaneous total energy density fluctuates around the sum due to transient interference effects, while the average

[34] In the rare case where all individual energy densities are equal, the destructive effect may lead to zero density.

[35] The principle of superposition tells us that the flows of the electron transport chain and of the protons generating ATP are both currents that are perturbable by any level of electromagnetic fields from the external environment, pointing to a no-threshold risk dependency. Maxwell's equations thus extend the range of biologically active EMR intensities all the way down to zero.

remains additive. The exact behavior depends on how incoherent the sources are (*e.g.*, frequency difference or phase randomness).

The foregoing scenarios were premised on a continuous wave. Modulation and pulsation in an RF transmitter introduce time-varying changes to the transmitted signal, which can significantly alter the behavior of field superposition and energy density at a convergence point. Maxwell's equations still govern the linear superposition of fields, but since energy density depends quadratically on the fields, these variations affect the interference terms, potentially changing coherence, frequency content, and temporal overlap.

Given that electromagnetic fields from various sources add together locally, attention is necessary to the specific frequencies and intensities involved in health impacts, considering the case of signals of different frequencies together, and of their modulation and pulsation. As the Commission manages the electromagnetic spectrum, it issues licenses to exploit some of its segments and assigns numerous applications along a wide range of frequencies, spreading them along what looks like a complex and long keyboard. Each key, each key combination and the force of each keystroke, has biological impacts.

i. Health effects across frequencies

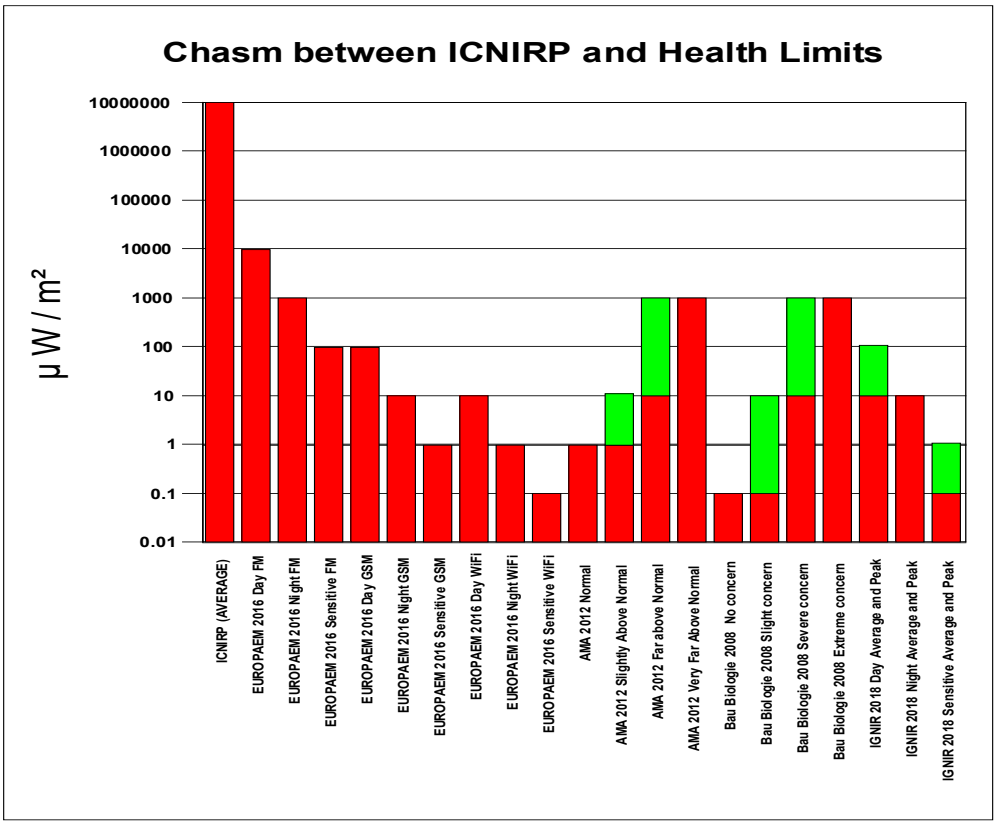
Most research on health effects of EMR has concentrated for practical reasons around important technological applications. There is literature on power systems at ELF frequencies. There is literature surrounding wireless communications systems at higher frequencies. The notion that biological responses occur at multiple points across a wide spectrum is supported by not only by experimental data (Pethig 1979) but also by the fact that very basic biologically relevant phenomena occur at all frequencies. For example, the charging of biological membranes by EM fields occurs at low frequencies as a Debye relaxation (Schwan 1968). On the other hand,

electrons and protons moving about through biological or water molecules in tissues can respond to very high frequencies and even to specific frequencies according to the characteristics of quantum mechanics (Vinothkumar 2014).

This spread of biological effects of EMR is compatible with the powerful physical concept of resonance, meaning that phenomena in biology occur at different speeds. Some opine that evidence for health effects of EMR is more easily and reliably obtained at low vs high frequencies. This may be true, but it may also reflect the fact that ELF "targets" (50 and 60 Hz) are more clearly defined than telecommunications targets in view of the number of frequencies and modulations involved. The prudent attitude is to consider all parts of the spectrum as individually and collectively bioactive.

ii. Field intensity

There has long been a strong disagreement between the ideas promulgated by ICNIRP and advanced by the Commission, and those supported by health evidence about the intensity of electromagnetic fields that are biologically active. The Commission has adhered to what is widely known as the "thermal hypothesis," claiming that all health effects of EMR are heat based and that meaningful effects occur only with a rise in temperature of 1 K or more. By contrast, massive amounts of scientific publications on cells and animals have amassed over time and confirm biological effects orders of magnitude below the thermal limits. Sub-thermal health effects have also been repeatedly detected through epidemiology. The D.C. Circuit held the Commission adopted the industry view without adequately addressing the health view.



Of most practical and toxicological interest are protection limits promoted by organizations completely independent from industry, specifically Bau-Biologie (2008), the Austrian Medical Association (2012), the European Academy for Environmental Medicine (EUROPAEM, 2016) and the International Guidelines on Non-Ionizing Radiation (2018, updated 2021). The graph shows on a vertical logarithmic scale the difference between ICNIRP limits and the health limits discriminated between sources (FM, GSM and Wi-Fi), time of day, and alert level.

The maximum approved radiation level by ICNIRP is 10,000,000 μW/m² while the safe limit for all health classifications is below 0.1 μW/m². Further considering that ICNIRP's limit is rated as an average value while the health limits are rated as peak values, and a widely quoted Peak/RMS ratio is ten, the gulf of opinions on what intensity of EMR can be associated with danger is 10^9 or 90 dB.

Toxicological science looks for the Lowest Observed Adverse Effect Level (LOAEL) or the No Observed Effect Level (NOEL) as a starting point to compute Safe Human Doses (SHD).[36] Ideally, the NOEL is divided by a Safety Factor (SF) to obtain the SHD. The graph above does not inform on the NOEL but suggests that 0.1 μW/m² (peak) might be used as a LOAEL that applies to sensitive (EHS) people.

Even if we make the concession that 0.1 μW/m² is actually a NOEL and that intraspecies and interspecies SFs are unnecessary because the data is from a sensitive human population, the 90 dB range between industry and health SHDs is still daunting. This chasm explains why the Commission is threatened by the prospect of recognizing the effects of small EM field intensities and taking stock of the overwhelming evidence for health effects. The *FCC's admitted fear* is that biologically based limits might be so low that communication by radio would not be possible. *See, e.g., In re Human Exposure to Radiofrequency Electromagnetic Fields et al*., 34 FCC Rcd 11687, 11694, ¶12 (2019) ("No device could reliably transmit any usable level of energy by today's technological standards while meeting those limits"). The Commission may also be worried that lowering the current limits might lessen the attractiveness of the public asset and thereby reduce the auction value of spectrum in the future.

CHD asserts that this is not the case. Efficient communications and robust use are possible with lower power and peak emissions, as is clear from the experience in Italy and Switzerland, where the limits are lower by a factor of 10 times or more.[37] If – as the Commission insists – the FCC in in charge of advancing both health and communications capability, it must

[36] https://www.epa.gov/risk/human-health-risk-assessment.

[37] EHT Petition p. 24.

pay meaningful attention to all sides of the problem and cannot entirely sacrifice one competing imperative in service of another.

iii. Multiple simultaneous signals

Toxicology is helpful here. Cancer science provides a "Multi-Hit model" where the number of "hits" triggering cancer range between 2 and 8 (Anandakrishnan 2019). While many may assume that this applies to hits that happen sequentially over time, covering initiation promotion and progression, there is no reason why the hits could not happen simultaneously, or over a spectrum of frequencies in the case of EMR. Many diseases are multifactorial (Lazarova 2021; Kostoff 2019) and the electromagnetic spectrum provides the frequency diversity that is needed for multiple etiologic factors to contribute together to a disease. The experimental literature using two electromagnetic signals simultaneously is small unless one considers, for example, failure to control for power frequency fields in RF studies. In absence of such literature, which could determine whether combined fields are generally subtractive, additive or synergistic, the safe assumption is to consider that two EM signals of different frequencies have additive health impacts, similar to what Maxwell's equations say is the case. The concept that different frequencies and energy variations can contribute to pathology is important, as we will see below. As a toxic agent, continuous wave radiation is substantially different from modulated or pulsed radiation: wireless radiation never stays "in its lane." Modulation and pulsation generally reduce coherence, making average energy more additive (like incoherent sources) while introducing temporal fluctuations that amplify instantaneous variations.

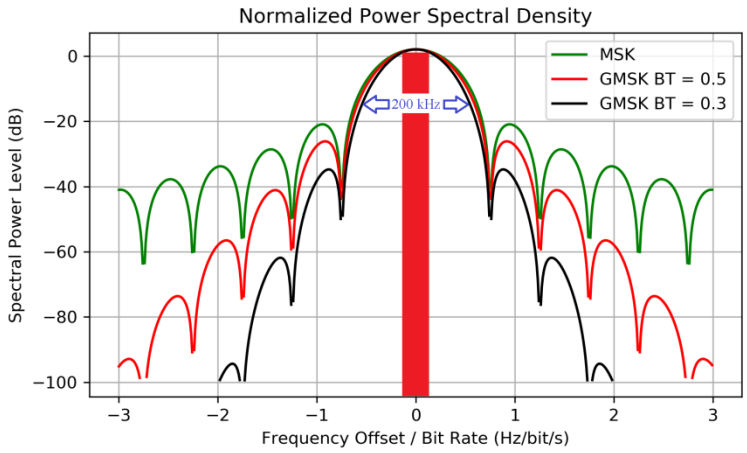
iv. Modulation

Unmodulated continuous wave signals at the same frequency tend to maintain fixed phase relationships, leading to stable constructive or destructive interference (affecting both

instantaneous and average energy density). As modulation encodes information by varying the carrier wave's amplitude, frequency, phase, or a combination, dynamic phase/frequency shifts or amplitude variations are introduced, which can disrupt this coherence if the two transmitters use different modulation schemes, data rates, or content. Phased array systems, for example, cause constructive boosting. This leads to larger momentary total energy density fluctuations during aligned modulation cycles, or dips during misalignments.

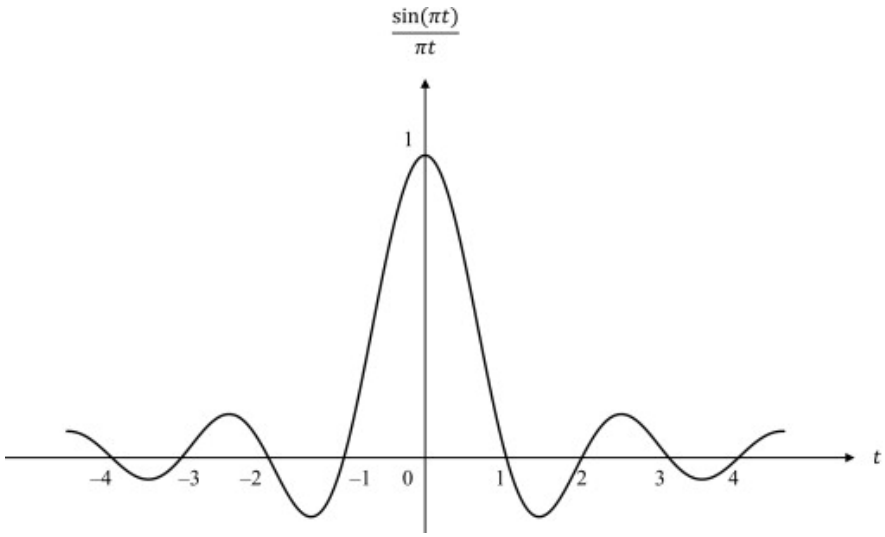
Modulation broadens the signal's "frequency spectrum." It is widely accepted that an electromagnetic signal spread over time can be understood in terms of the repartition of its components over frequency. This is referred to as the Fourier analysis of signals, and the analysis is presented as a graph of power density as a function of frequency.

As can be seen in the picture below, an unmodulated carrier sits as a single frequency (the red vertical bar). When modulated by different techniques (minimum shift keying, or Gaussian minimum shift keying) the number of frequencies emitted increases. The broadening is also influenced by the bandwidth multiplied by the symbol time duration, BT. Cellular phone systems channels are 200 kHz wide, so great efforts are made to tame the transmitted signal to prevent it from bleeding over to other channels. This is a telecommunications constraint. In the graph, the main modulated peak would need to stay within the 200 kHz limit. If the carrier is at 890 MHz, this broadening is only 0.02%. Still, the bandwidth of the modulated signal is significant



compared to that of quantum resonances involving the motions of electrons and protons, for example.

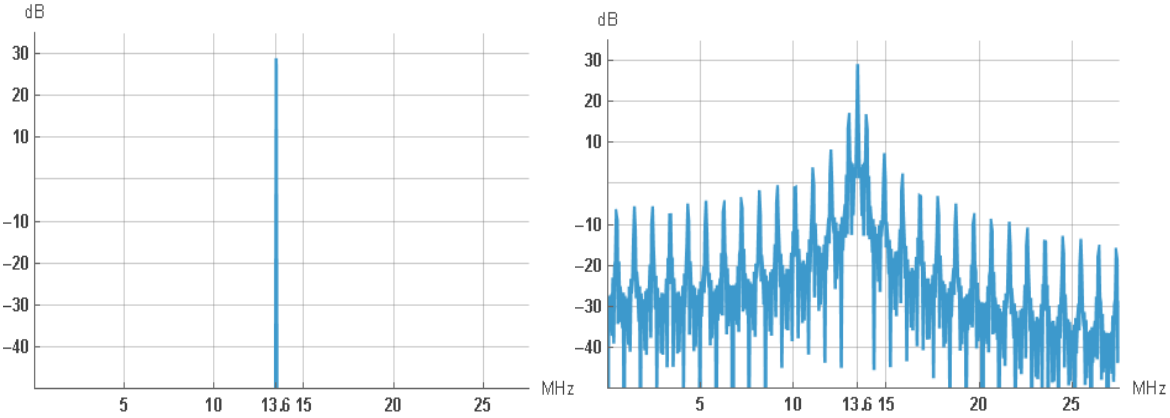
v. Pulsation



A pulse determines a limited time during which radiation is emitted. The limited time is called a "box" function, and the Fourier transform of a box function is a "sinc" function, *e.g.*, an oscillating wave in the time domain that extends its sidelobes unlimitedly towards zero and infinity in the frequency domain. What this means is that as long as we are using EM pulses, there is a spontaneous generation of sidelobes (sources of radiation at other than the carrier frequency) that flank the emission of the carrier. These sidelobes are a mathematical inevitability associated with the use of all pulses.

This means that a wide variety of parasite signals, spread across frequency, are created unless they are carefully controlled by filters. We have already noted that precautions are taken to limit this phenomenon in a cellular phone system to avoid crosstalk between channels and the restricted use of telecommunications bandwidth. In other applications, such precautions are not considered necessary and EMR exposure is increased in scope across frequencies.

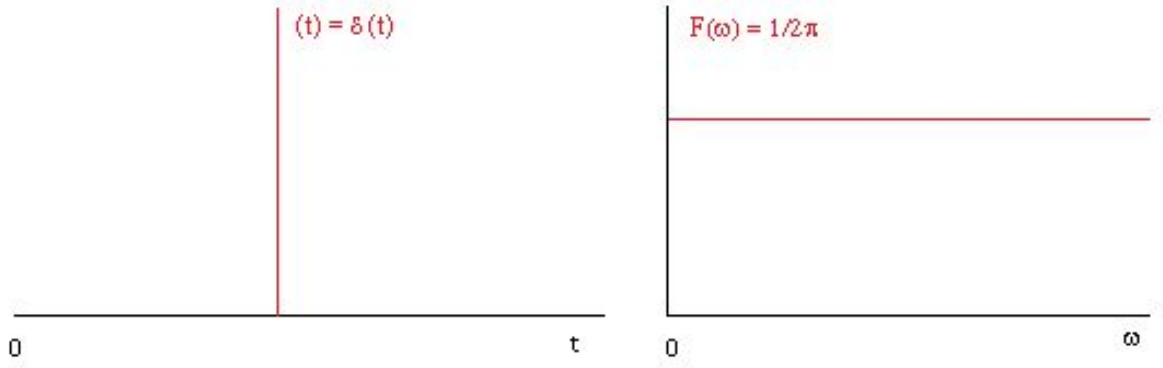
For example, the Radio-Frequency Identification (RFID) system (device at left) is a means to track tags located within a relatively small distance. Common applications are deactivation of anti-theft tags at a cash counter and tallying inventory in a warehouse. The passive tags residing in individual items are activated by an RFID reader (at left) which continuously transmits a 13.56 MHz carrier, thereby providing the energy needed to power the tag's passive circuit (Novotny 2008). The figure shows as an insert the actual signal we used in the simulation



Using Mathematica 14.3.0.0, simulations of the spectrum composition of the signal show that the unmodulated 13.56 MHz carrier contains a single frequency (at left) while the modulated signal is enriched with 17 sidelobes between zero and the carrier frequency. In this application, the sidelobes are considered not to interfere with the application: the lowest sidelobe at 430 kHz is 35.4 dB less than the carrier. Industry has been taught that these components are irrelevant to system operation and human health. We know from previous sections, however, that EMR at levels 90 dB less than the carrier can be of biological consequence. One of the reasons why the

sidelobes have no effect on the operation of the system is that electronic circuitry can filter out the sidelobes. But biological tissues have no such filters.

Unless precautions are taken, the wide diversity of electronic systems that operate in a pulsative fashion can generate this sidelobe pollution, otherwise known as dirty electricity, which pervades the environment. We are talking about very wide band noise that can access a large fraction of all possible electromagnetic disturbances of biological significance. Since extremely brief pulses (delta function at left below) generate extremely wide frequency interference (Fourier transform at right), this problem is endemic in our environment.



Biological tissues absorb EM energy. That is how a microwave oven cooks food. But the fields also interfere with living processes when the tissue is still alive. Our present difficult situation in terms of EMR protection was brought about by the self-serving assumption propagated by industry that small fields have no impacts on life. The D.C. Circuit ruled that this assumption "may not be valid" and remanded for further treatment.

Attempts by industry to ignore life processes by simulating humans using mixtures of water salt and sugar, and their quantification of the heat process at scales of cubic centimeters rather than at cellular levels only serve to illustrate the critical distance between engineering dreams and the reality of biology. If industry's view of the human body as a collection of simple

dipoles that can be heated was implanted in living systems, all life would instantly cease to exist. Flowing electrical currents are the very essence of life.

Pulsed signals only contribute fields during their “on” periods. If pulses from two transmitters do not overlap in time at the convergence point (due to different pulse repetition frequencies or delays), there is no simultaneous superposition. Energy density alternates between each source, with no cross-term. Each pulse will have a wide frequency spectrum, making even same-carrier-frequency pulses partially incoherent unless perfectly synchronized. This reduces sustained interference, pushing behavior toward incoherent cases, with a similar effect on average energy density. During pulse overlap there will be instantaneous constructive or destructive interference, similar to coherent sources. Non-overlapping pulses mean total density will be that from the individually pulsing source (*e.g.*, no interference) but the convergence point will see pulsing from each source in sequence. Pulse timing jitter (random variations) can make overlaps unpredictable, leading to erratic fluctuations in total density. When multiple high-power pulsed systems are involved, overlaps could create extreme instantaneous peaks, risking damage to receivers and, more important here, biological tissues via nonlinear absorption. Duty cycle plays a key role: Low-duty-cycle pulses (short on-times) reduce overall average energy, but overlaps concentrate it, leading to additive behavior.

What this all means is that when there are multiple energy sources at any convergence point, the instantaneous energy density can experience sharp spikes, and the average sum is often greater than the average parts, especially when the averaging period is longer. To understand total effect, one must consider the convergence point energy density for both instantaneous and average and use the proper averaging period.

Biological tissue absorbs RF energy (like a passive receiver), exhibits linear superposition of fields at low intensities (per Maxwell's equations), and shows nonlinearities at cellular scales through effects like oxidative stress. This is especially so for modulated/pulsed RF. Biological tissue does not directly "demodulate" (extract the content or information) from exogenous RF like a receiving "station," but modulated/pulsed energy does have significant and direct impacts on tissue beyond just heating. Exogenous RF influences nerve cells. Modulation and pulsation introduce time-varying fields and there is no longer any doubt all tissues respond (albeit without demodulation).

Exposure to artificially generated RF within the current "limits" clearly has multiple effects because it "interferes" with biological processes.[38] The FCC, however, has never made a genuine effort to understand non-thermal EMR health effects. It steadfastly refuses to admit that its exposure rules and testing protocols improperly ignore pulsation and modulation, employ

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[38] Non-thermal Pulsed EMF is used for a variety of medical treatments. Tumor Treating Fields apply alternating electric fields at 100–300 kHz to disrupt cancer cell division. The mechanism involves interference with intracellular electric fields and dipole alignments during mitosis, affecting tubulin polymerization and septin localization – processes tied to endogenous bioelectric fields (voltage changes in dividing cells). This is proof that non-thermal EMF fields can modulate biological fields, albeit for beneficial effect.

The FDA has approved many other medical devices that employ EMR. Recently the FDA issued an alert over Class II "RF Microneedling" devices that "use an array of small electrodes, also known as microneedles, to deliver RF energy into and under the skin to produce local heating." The FDA has received "reports of serious complications (adverse events) including burns, scarring, fat loss, disfigurement, and nerve damage, and the need for surgical repair or medical intervention to treat injuries." Potential Risks with Certain Uses of Radiofrequency (RF) Microneedling – FDA Safety Communication, Oct. 15, 2025, available at https://www.fda.gov/medical-devices/safety-communications/potential-risks-certain-uses-radiofrequency-rf-microneedling-fda-safety-communication. Medical devices employing RF technology must register with the Commission and FDA and operate with the FCC's limits. Radio Frequency Wireless Technology in Medical Devices Guidance for Industry and Food and Drug Administration Staff, August 14, 2013, available at https://www.fda.gov/media/71975/download. This means it is possible for detrimental thermal effects to occur even within the current limits, and it also means there can no longer be any dispute the EMR causes biological responses, some beneficial and some severely adverse.

extensive averaging using short-duration measurement windows (6 or 30 minutes), disregard cumulative, and long-term exposures, and still do not take account of many simultaneous exposures from all sources whether fixed or mobile/portable. The current protocols do not reliably capture, measure and mitigate all health effects. This is so even though, as demonstrated above, Maxwell's equations prove that biological systems are, for the most part, cumulatively sensitive to all emission sources to which they are exposed and peak intensities are a significant issue that must be recognized and addressed. From the point of view of field intensity, human beings must be seen as at least if not more sensitive to fields as man-made antennas.

Aspect	Applicability to Tissue	Caveats
Linear Superposition	Yes; fields add linearly in low-intensity regimes.	Tissues are lossy, so fields decay; multipath interference (e.g., fading) occurs in body.
Interference on Energy Density	Yes; quadratic terms lead to constructive/destructive effects, influencing absorption.	Non-thermal nonlinearities (e.g., at cell membranes) may introduce additional effects.
Modulation/Pulsation	Yes; reduces coherence, making averages additive, but pulses can cause spikes in absorption.	Modulation/pulsation introduces peaks and sidelobes. Tissue responds to both.
Tissue as Receiver	Yes; tissue absorbs energy but can also experience interference with its own processes.	Tissue does not "demodulate" (interpret) encoded information, but external sources can interfere with internal modulation.

The Court of Appeals required a reasoned explanation regarding "the ubiquity of wireless devices." 9 F.4th at 908, 914. The existing "limits" arbitrarily isolate fixed sources (and consider only some of them) for MPE, and then individual portable/mobile sources for SAR exposure analysis. As the court noted, the limits and testing protocols do not take total simultaneous exposures from all artificial sources into account even though, as Maxwell's equations show, it is total and peak exposures that matter.

The short-term averaging for general public and occupational exposures is irrational and arbitrary, based entirely on the exclusive consideration of body heat, and does not address cumulative exposures.[39] Electromagnetic science points to both instantaneous and chronic exposures as matters of concern. Furthermore, Maxwell's incontestable equations prove that external fields will unavoidably interfere with active currents generated by the body.

In the past, industry has felt that it could insulate itself from the EMR bioeffects problem by claiming that physics viewed effects as impossible. We now know that the non-ionizing barrier to health effects is an illusion, and external EM fields generated by artificial sources at any intensity will interact with the internal fields of the body. This means that health impacts previously claimed to be "impossible" are instead undeniable.

E. FCC Does Not Have The Authority To "License" Preemptive Involuntary Exposure

The Commission believes it has the statutory power to deputize private parties and bestow the right to maim members of the public who have not given knowing and voluntary consent and even over loud objection once the harms are known. Not so. The Commission does not have the power to authorize licensees to "subject" anyone to RF/EMF exposure without informed and voluntary consent. No federal agency can issue domestic licenses to kill that also grant complete immunity from liability for personal or property invasions by ensuring there is no remedy.

The Commission is also under the misapprehension that it has the authority to grant an interest in the real property of every homeowner and business in the nation. This is apparent

[39] The different treatment as between "occupational" and "general population" exposures also lacks a rational basis. "Occupational" exposures can no longer be treated as knowing or voluntary. The higher limits and averaging merely expose workers to more radiation so it adds to the cumulative load.

since the FCC believes it can issue a "license" that conveys the "right" to radiate artificially-generated energy and EMR fields through all kinds of private property, against the will of the property owner in defiance of the owner's property-based "right to exclude."[40] Licensees are effectively claiming a servitude by way of a prescriptive easement or easement in gross[41, 42] or

[40] Property ownership constitutes a "bundle of rights" (sometimes called "sticks") – a collection of individual rights. The most commonly recognized "sticks" in the bundle are the rights to "possess, use, transfer and exclude others." The power to exclude has traditionally been considered one of the most treasured strands in an owner's bundle of property rights. *Cedar Point Nursery v. Hassid*, 594 U.S. 139, 149 (2021), *quoting Loretto v. Teleprompter Manhattan CATV Corp*., 458 U.S. 419, 435 (1982). Exclusion is necessary to fully enjoy the related rights to possess and use. For this reason, the right to exclude is sometimes called the "*sine qua non*" of property. *Cedar Point*, 594 U.S. at 150, referencing Merrill, Property and the Right to Exclude, 77 Neb. L. Rev. 730 (1998). "…[G]overnment-authorized invasions of property—whether by plane, boat, cable, or beachcomber—are physical takings requiring just compensation." 594 U.S. at 152.

[41] The U.S. Supreme Court has indicated that the common law doctrine *cujus est solum ejus est usque ad coelum et ad inferos*, which translated means, "to whomever the soil belongs owns also to the sky and to the depths" or "for whoever owns the soil, it is theirs up to Heaven and down to Hell," must sometimes give way to the needs of the "modern world." *United States v. Causby*, 328 U.S. 256, 261 (1946). *Causby* involved application of the Air Commerce Act of 1926, as amended by the Civil Aeronautics Act of 1938, then codified at 49 U. S. C. § 171 and 49 U. S. C. § 401, respectively. Those statutes effectively declared the air a "public highway" akin to the way Congress asserted control over spectrum use. "[P]rivate claims to the airspace would "clog these highways, seriously interfere with their control and development in the public interest, and transfer into private ownership that to which only the public has a just claim." *Causby*, 328 U.S. at 261. Even so, the Court held that if federally authorized overflights "immediately above the land would limit the utility of the land and cause a diminution in its value" the property owner has suffered a taking. 328 U.S. at 262. Further, "[t]he landowner owns at least as much of the space above the ground as he can occupy or use in connection with the land" 328 U.S. at 264. "The superadjacent airspace at this low altitude is so close to the land that continuous invasions of it affect the use of the surface of the land itself. We think that the landowner, as an incident to his ownership, has a claim to it and that invasions of it are in the same category as invasions of the surface." 328 U.S. at 265. Flights over private land that "are so low and so frequent as to be a direct and immediate interference with the enjoyment and use of the land" impose a servitude upon the land. 328 U.S. at 266. This kind of servitude is commonly called an "air" or "avigation easement" but the Court did note that depending on the facts it could rise to the level of "the equivalent of a fee interest."

[42] Imposing a servitude to facilitate efficient communications may (or may not) be a good idea or even good policy, but that is not enough. What matters is that individual property owners cannot be compelled to contribute to its realization. If the FCC wants to establish easements across private property the federal government must afford due process and just compensation. *Nollan*

depending on the duration even an interest in fee – although interestingly this real estate interest is never memorialized in any land records. The licensee is the one undertaking the activity, but its "right" to do these things apparently comes from the Commission as part of the license. Notably, however, no FCC-issued RSA so provides even though § 301 prohibits conveyance of rights not expressly granted in a license. See also 47 CFR 1.903(b).[43]

A pending permit matter in Oceanside, California starkly illustrates the property issue. Verizon Wireless is seeking a conditional use permit for a "Wireless Telecommunications Facility" on a 70-foot "stadium light pole" to be located within a public park.[44] The tower will be close to nearest residential property line. The adjoining property is well within the fall and debris zone, so there is a physical hazard to the adjoining property if the tower collapses. But the real

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v. Cal. Coastal Com, 483 U.S. 825, 841 (1987). The right to exclude is a "'fundamental element of the property right' … 'that cannot be balanced away.'" "…the complexities of modern society …only reinforce the importance of safeguarding the basic property rights that help preserve individual liberty." *Cedar Point*, 594 U.S. at 158.

[43] One would think that if Congress had intended to delegate the power to effectively take property or reassign ownership rights without notice, hearing or compensation it would have spoken clearly about it. This is surely an assertion of extravagant statutory power that affects millions of private landowners. As the Court noted in *West Virginia v. EPA*, 597 U.S. 697 (2022):

> Precedent teaches that there are "extraordinary cases" in which the "history and the breadth of the authority that [the agency] has asserted," and the "economic and political significance" of that assertion, provide a "reason to hesitate before concluding that Congress" meant to confer such authority. *FDA v. Brown & Williamson Tobacco Corp.,* 529 U. S. 120, 159-160, 120 S. Ct. 1291, 146 L. Ed. 2d 121. *See, e.g., Alabama Assn. of Realtors v. Department of Health and Human Servs*., 594 U. S. ___, ___, 141 S. Ct. 2485, 210 L. Ed. 2d 856; *Utility Air Regulatory Group v. EPA*, 573 U. S. 302, 324, 134 S. Ct. 2427, 189 L. Ed. 2d 372; *Gonzales v. Oregon*, 546 U. S. 243, 267, 126 S. Ct. 904, 163 L. Ed. 2d 748; *National Federation of Independent Business v. OSHA*, 595 U. S. ___, ___, 142 S. Ct. 661, 211 L. Ed. 2d 448. Under this body of law, known as the major questions doctrine, given both separation of powers principles and a practical understanding of legislative intent, the agency must point to "clear congressional authorization" for the authority it claims. *Utility Air*, 573 U. S., at 324, 134 S. Ct. 2427, 189 L. Ed. 2d 372. Pp. 16-20.

[44] Application for Administrative Conditional Use Permit (ACUP24-00002) Wireless Telecommunications Facility at 4970 Lake Boulevard (Lake Park), Oceanside California.

problem is starkly presented by the Applicant's own "Radiofrequency Emissions Compliance Report" (See Attachment 2): emissions and exposures far above the general population and even occupational limits will extend out and over the residential property at elevations of 25-75 feet. See Attachment 2, pp. 4, 5, 7, 9 (revealing excessive levels several thousand percent higher than current limits extending far into the residential property boundary at 25-75 feet AGL). Verizon is proposing to place signage near the tower but entirely fails to recognize the intrusion at excessive levels over the adjoining land and apparently assumes it is a matter of no concern.[45]

FCC rules *require* "positive access control" "with restrictive barriers" in any area where the general population limits are exceeded. 47 CFR 1.1307(b)(4)(ii), (iii). The operator must *exclude the public from that area.* That means the applicant in Oceanside will be bound by FCC rules to actively prevent the *private property owners* from accessing the space above <u>their own land</u> where excessive exposures occur. They and their children cannot climb a tree and if they do then they must first take training or "be supervised by trained occupational personnel." They cannot build a structure more than two-stories high. Verizon will be required by FCC rule to assert the property-based "power to exclude" – the essence of real property ownership – even as against the current owner in fee, all without any due process, compensation or even a polite request.

The Commission and industry have wandered far beyond authorization to use spectrum within certain bands or only on certain conditions. The government is claiming it can grant, indeed compel, access and exclusion rights to a third party over the owner's objection, 24 hours a

[45] The Report on p. 4 states that "[t]he proposed operation will not expose members of the General Public to hazardous levels of RF energy at ground level or in adjacent Structures" but says nothing about the hazardous levels at 25-75 feet AGL, even for the part protruding over the neighboring residential property.

day and 365 days a year, effectively vetoing the owner's own "right to exclude." That is a physical taking. *Cedar Point Nursery v. Hassid*, 594 U.S. 139, 149 (2021); *Loretto v. Teleprompter Manhattan CATV Corp*., 458 U.S. 419, 424, 434-435 (1982).[46] Nothing in the Communications Act comes close to granting the FCC the power to override private parties' property rights in this fashion.[47] The Commission is not a court, so it cannot determine or reallocate real property rights.

The FCC does have authority over licenses, and it can grant them licenses to employ RF for communications and power transfer. Those licenses, however, do not expressly or implicitly grant the power to compel that any person suffer exposure without informed consent,[48] nor can any Commission rule or other missive operate to strip individuals that experience injury or property deprivation of their right to obtain appropriate judicial relief for the insults they suffer. Stated simply, the FCC may have Congressionally delegated statutory authority to let regulated parties emit energy into and through the air, but it has no power or jurisdiction[49] over the rights

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[46] The intrusion is "physical" since, as explained above, the energy and fields each clearly have physical force and can be precisely detected and measured. Some particularly sensitive individuals can directly perceive the force.

[47] If the Commission asserts this right and the courts uphold it, the local jurisdiction may and the U.S. government will face an immense potential liability for the taking. A local permit allowing the project and thereby authorizing the property invasion will be subject to a takings claim since its action will effectively bar landowners from the affected part of their private property or at least significantly diminish their property bundle. *See Alford v. Walton Cty*., No. 21-13999, 2025 U.S. App. LEXIS 29952, at *15 (11th Cir. Nov. 17, 2025). But they will have done so under federal compulsion, and it will "bear a federal imprimatur." *See Montgomery County v. FCC*, 811 F.3d 121, 128 (4th Cir. 2015) (concluding that the FCC's "deemed granted" permit flowing from the Commission's eligible facilities rules bear a federal imprimatur).

[48] *See* 47 U.S.C. §301 ("… no such license shall be construed to create any right, beyond the terms, conditions, and periods of the license"; 47 CFR 1.903(b) ("The holding of an authorization does not create any rights beyond the terms, conditions and period specified in the authorization.")

[49] The Commission is an Article I executive agency. Congress has not delegated, and cannot lawfully delegate, adjudication of private rights to the Commission. *SEC v. Jarkesy*, 144 S. Ct. 2117, 2127, 2139 (2024); *Axon Enter. v. FTC,* 598 U.S. 175, 198 (2022) (Thomas, J. concurring).

of and remedies available to those struck by (exposed to) that energy in the absence of informed consent or those that do not voluntarily grant property access rights. No statute or regulation can overrule individuals' inherent right to refuse being involuntarily exposed or to deny access to their property.

We are not herein asserting an unenumerated fundamental right to a "radiation free" or even "healthful" *environment*.[50] Congress does have the power to authorize (directly or through delegation) the emission of artificial non-ionizing electromagnetic radiation for specific purposes, and it has done so with the caveat that licensees use "the minimum amount of power necessary to carry out the communication desired." 47 U.S.C. § 324. But this does not mean Congress (and, by delegation, this Commission, and then by further delegation or leave given to a private company through a license) can *compel* that any individual accept *nonconsensual exposure* of a toxic and dangerous agent[51] – especially in their own homes. Nor is there any hint in the statute that Congress intended that licensees would be completely immunized from liability for the damage they do to those who suffer health or property damage from licensed emissions.

The FCC has a longstanding policy of not interfering in private disputes where the claim does not assert a violation of the Communications Act, FCC rules or the terms of a license, *Listeners' Guild, Inc. v. FCC*, 813 F.2d 465, 469 (D.C. Cir. 1987); *Environmentel, LLC v. FCC*, 661 F.3d 80, 85 (D.C. Cir. 2011); *Regents v. Carroll*, 338 U.S. 586, 602 (1950), but here it claims the right to grant a public right that *sub silentio* overrides all competing private rights.

[50] *See, e.g., Sterling v. City of Jackson*, No. 24-60370, 2025 U.S. App. LEXIS 30006, at *36 (5th Cir. Nov. 17, 2025) ("We assume that the dissenting opinion would not equate a holding that a police officer violated an individual's right to bodily integrity with the recognition of a right to 'competent' policing.")

[51] In 1968 Congress separately recognized "the dangers of electronic product radiation" (which includes non-ionizing electromagnetic radiation) and delegated power to the HHS Secretary to establish an "electronic product radiation control program" "to provide for the protection of the public health from radiation emissions from electronic products." Radiation Control for Health and Safety Act of 1968, PL 90-62, 82 Stat. 1173, codified, as amended, at 21 U.S.C. Ch 9 Subch. V Part C.

i. FCC must respect the right to informed consent

> No right is held more sacred, or is more carefully guarded, by the common law, than the right of every individual to the possession and control of his own person, free from all restraint or interference of others, unless by clear and unquestionable authority of law. As well said by Judge Cooley, The right to one's person may be said to be a right of complete immunity: to be let alone.

Union P. R. Co. v. Botsford, 141 U.S. 250, 251 (1891) (internal quotes and citations omitted).

Indeed, the rights of bodily integrity and personal autonomy are foundational and form the bedrock of our society. *See Cruzan v. Dir., Mo. Dep't of Health*, 497 U.S. 261, 265 (1990). "Every human being of adult years and sound mind has a right to determine what shall be done with his own body" *Id.* at 269, citing *Schloendorff* v. *Society of New York Hospital*, 211 N.Y. 125, 129-130, 105 N.E. 92, 93 (1914); *see also Missouri v. McNeely*, 569 U.S. 141, 159 (2013) ("We have never retreated. . .from our recognition that any compelled intrusion into the human body implicates significant, constitutionally protected privacy interests"); *Washington v. Glucksberg*, 521 U.S. 702, 720 (1997) (right of bodily integrity is fundamental); *Davis v. Hubbard*, 506 F. Supp. 915, 930 (N.D. Ohio 1980) ("In the history of the common law, there is perhaps no right which is older than a person's right to be free from unwarranted personal contact") (and collecting authorities).

The rights of bodily integrity and personal autonomy find their most essential safeguard in the requirement of informed consent, without which these and many other important rights and liberties are meaningless. Accordingly, the Supreme Court has recognized that the fundamental right to bodily integrity is protected by the right to informed consent, along with its corollary, the right to refuse unwanted impingements on the body. *Cruzan*, 497 U.S. at 269, 2846; *Washington v. Harper,* 494 U.S. 210, 221-22 (1990) (recognizing constitutionally protected liberty interest in avoiding unwanted medical treatment); *Riggins v. Nevada*, 504 U.S. 127, 134 (1992) (same); *Sell v. United States*, 539 U.S. 166, 179 (2003) (same).

The principles underlying informed consent are simple: information and choice. The right to informed consent requires actors to provide truthful information about the potential consequences of a proposed course of action to individuals who will be affected by that course of action, including the risks and benefits. *See Canterbury v. Spence*, 464 F.2d 772, 780 (D.C. Cir. 1972) ("True consent to what happens to one's self is the informed exercise of a choice, and that entails an opportunity to evaluate knowledgeably the options available and the risks attendant upon each"). Informed consent *also* requires a meaningful opportunity to say "No." *See Sterling v. City of Jackson*, No. 24-60370, 2025 U.S. App. LEXIS 30006, at *20 (5th Cir. Nov. 17, 2025 ("If the Constitution protects a person's right to refuse potable water necessary for life, then it certainly protects the right to refuse toxic water. The government violates that right when it, as the provider, lies to and gaslights the public, depriving individuals of the ability to give informed consent and exposing them to harm without their knowledge")[52]; *Guertin v. Michigan*, 912 F.3d

[52] The *Sterling* panel majority held that the government had acted with deliberate indifference. Although the officials have qualified immunity, the governmental entity itself does not. "We conclude that a city may not introduce toxins into the water, pump the water to people's homes, and lie about the water's safety. Our analysis further relies on the specific facts at issue—the City's actions occurred over a significant amount of time and by the time the Defendants shared information about the water's safety, they knew it to be false. In brief, people generally trust that their tap water is safe until told otherwise. The City introduced toxins into the tap water and pumped it to people's homes. People drank, cooked, and bathed in that water. The City and its officials then lied about the safety of the water, deceiving residents into consuming the contaminated water. Based on this alleged conduct, we conclude that Plaintiffs state a plausible claim that Defendants violated Plaintiffs' right to bodily integrity. Thus, as to the City, the lawsuit may proceed." 2025 U.S. App. LEXIS 30006, at *42-*43. The panel also formally adopted the "state-created danger" theory of liability, following the lead of other circuits, again as to the city but not the officials. 2025 U.S. App. LEXIS 30006, at *45-*50.

There is good reason to assert that the Commission's active actions and purposeful gaslighting and deception over all these years about a problem it created – with plenty of time to reflect and correct course – meets this standard. The harm did, of course, come from private actors but it is now clear that the Commission itself took affirmative action and purposefully refused to act after full knowledge of the problem. It therefore created and exacerbated the risk of harm.

The Commission is of course a federal agency so remedies under the Fourteenth Amendment due process and 42 U.S.C. § 1983 may not be available. But there is still potential federal

907, 920-21 (6th Cir. 2019) ("Involuntarily subjecting nonconsenting individuals to foreign substances. . .is a classic example of invading the core of the bodily integrity protection"). As the Nuremberg Code explains,

> [T]he person involved should have legal capacity to give consent; should be situated as to be able to exercise free power of choice, without the intervention of any element of force, fraud, deceit, duress, over-reaching, or other ulterior form of constraint or coercion, and should have sufficient knowledge and comprehension of the elements of the subject matter involved as to enable him to make an understanding and enlightened decision. This latter element requires that before the acceptance of an affirmative decision by the experimental subject there should be made known to him the nature, duration, and purpose of the experiment; the method and means by which it is to be conducted; all inconveniences and hazards reasonably to be expected; and the effects upon his health or person which may possibly come from his participation in the experiment.

Informed consent is so essential that it is recognized and enforced far beyond the field of medicine, across myriad societal domains where bodily integrity, personal autonomy, or other important rights or interests are potentially at stake. In these contexts, governments, industries, and individuals are required by law to provide the truthful information people need to make informed decisions about whether to consent to actions that could affect their rights and interests. Informed consent is relevant here, in the context of wireless regulation.

Most notably, the right to informed consent is enforced in the context of research involving human subjects, through a host of stringent requirements, regardless of whether the research is medical or other. *See* 45 C.F.R. 46.116(b) (listing requirements for informed consent in research involving human subjects) and 21 C.F.R. 50.25 (same); *In re Cincinnati Radiation Litig.*, 874 F. Supp. 796, 812 (S.D. Ohio 1995) ("If the Constitution protects personal autonomy in making certain types of important decisions, the *decision whether to participate* in the Human

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government liability under various federal law theories and even if damages are not recoverable declaratory and injunctive relief certainly is.

Radiation Experiments was one that each individual Plaintiff was entitled to make freely and with full knowledge of the purpose and attendant circumstances involved") (emphasis added).[53]

Similarly, the right to informed consent is enforced in the context of consumer products through the duty to warn of risks associated with dangerous products, as well as through truth-in-advertising and fair-labeling laws, so consumers can make informed decisions about whether to use a product. *See e.g., Air & Liquid Sys. Corp. v. DeVries*, 586 U.S. 446, 452-53 (2019) ("For the manufacturer of a product, the general duty of care includes a duty to warn when the manufacturer "knows or has reason to know" that its product "is or is likely to be dangerous for the use for which it is supplied" and the manufacturer "has no reason to believe" that the product's users will realize that danger. 2 Restatement (Second) of Torts §388, p. 301 (1963-1964)"); *United States v. Philip Morris USA, Inc.*, 449 F. Supp. 2d 1, 856 (D.D.C. 2006) (finding RICO violation, where "[u]sing the sophisticated and well-organized machinery created to serve their agenda, Defendants fraudulently denied the adverse health effects of smoking for at least 40 years in order to sustain the appearance of an open controversy about the link between smoking and disease"); *see also* 15 U.S.C § 1125 (prohibiting false or deceptive advertising); 16 C.F.R. 408-465 (trade regulation rules) and 500-503 (regulations under the Fair Labeling and Packaging Act).

The right is similarly enforced in the context of environmental torts, through liability imposed due to a failure to provide adequate warnings. *See, e.g.*, *Fowler v. Akzo Nobel Chems., Inc.*, 251 N.J. 300, 325 (2022) ("an asbestos manufacturer or supplier has a duty to provide adequate warnings to both the employee directly *and* the employer").

[53] The FCC has basically engaged in an even larger and more pernicious radiation experiment on the entire population, without providing full knowledge or obtaining consent.

Informed consent is enforced in the context of financial and real-estate transactions through various types of disclosure requirements and associated penalties for failures to disclose and fraud. *See, e.g.*, 12 C.F.R. Part 1026 (Truth in Lending Regulations); *Horiike v. Coldwell Banker Residential Brokerage Co.,* 1 Cal. 5th 1024, 1035, 210 Cal. Rptr. 3d 1, 8, 383 P.3d 1094, 1100 (2016) (real estate brokerage liable for violation of duty to "investigate and disclose all facts materially affecting the residence's value or desirability").

The principle of informed consent lies at the heart of common-law fraud, which is in essence an injured plaintiff's claim that her consent to some course of action was not truly informed because it was made in reliance on a defendant's deliberate misrepresentation. *See, e.g., Formosa Plastics Corp. United States v. Presidio Eng'rs & Contractors*, 960 S.W.2d 41, 47 (Tex. 1998) (fraud cause of action requires material misrepresentation which was false, and which was either known to be false when made or was asserted without knowledge of its truth, which was intended to be acted upon, which was relied upon, and which caused injury).

Finally, the right to informed consent also plays an essential role in the criminal context, where waivers of constitutional rights must be knowing, voluntary, and intelligent. *See, e.g.*, *Miranda v. Arizona*, 384 U.S. 436, 444 1612 (1966) (waiver of right against self-incrimination must be knowing, voluntary, and intelligent); *Von Moltke v. Gillies*, 332 U.S. 708, 724 (1948) (waiver of right to counsel "must be made with an apprehension of the nature of the charges, the statutory offenses included within them, the range of allowable punishments thereunder, possible defenses to the charges and circumstances in mitigation thereof, and all other facts essential to a broad understanding of the whole matter"); *Boykin v. Alabama*, 395 U.S. 238, 244 1713 (1969) (record must show that defendant's guilty plea was entered voluntarily and understandingly).

The Fourth Amendment maintains privacy for search purposes, but it also prohibits property invasions without a warrant. *Florida v. Jardines*, 569 U.S. 1, (2013) (Intrusion into porch, part of the curtilage, is a search requiring a warrant); *United States v. Jones*, 565 U.S. 400 (2012) (mounting GPS device on property is a search); *Soldal v. Cook Cty*., 506 U.S. 56, 63 (1992) ("A 'seizure' of property occurs where there is some meaningful interference with an individual's possessory interests in that property."). In *Kyllo v. United States*, 533 U.S. 27, 35-36 (2001), the Court held that thermal imaging used to reveal goings-on inside a home is a search. The Court noted even more advanced surveillance methods were on the horizon so it created a bright-line rule because otherwise it would "leave the homeowner at the mercy of advancing technology – including imaging technology that could discern all human activity in the home. While the technology used in the present case was relatively crude, the rule we adopt must take account of more sophisticated systems that are already in use or in development." Note 3 described then-nascent technology using radar and other "radiation." That capability is now here. Wi-Fi and modern wireless systems can now isolate and follow people around and artificial intelligence can then be used to establish identity inside the home even if they are not carrying a device.[54] Doing this without consent is a search that requires a warrant. Yet the Commission and industry would contend that licensees can engage in the same activity on an ongoing full-time

[54] Khandaker Foysal Haque, Milin Zhang, Francesca Meneghello, Francesco Restuccia, BeamSense: Rethinking Wireless Sensing with MU-MIMO Wi-Fi Beamforming Feedback, Computer Networks, Volume 258, 2025, 111020, ISSN 1389-1286, https://doi.org/10.1016/j.comnet.2024.111020, https://www.sciencedirect.com/science/article/pii/S1389128624008521; Mosharaf M, Kwak JB, Choi W, WiFi-Based Human Identification with Machine Learning: A Comprehensive Survey. Sensors, 2024; 24(19):6413, https://doi.org/10.3390/s24196413, https://www.mdpi.com/1424-8220/24/19/6413.

basis as a matter of right – whether the homeowner consents or not – thereby asserting the unilateral right and power to invade privacy and take property.[55]

There can be no rational dispute that the right to informed consent applies here, where wireless devices and facilities undeniably cause "interference" in the bodies of persons exposed to the radiation from those devices and facilities. These people are entitled to full, complete and truthful information about risks and benefits. Then, after being properly warned, they have the unequivocal and unilateral right to say "No."

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[55] The Supreme Court often borrows Fifth Amendment property concepts when applying the Fourth Amendment's protection of "houses," "papers" and "effects." The test is whether the property owner's "right to exclude" has been overridden without consent during the seizure or search. The analysis does not turn on whether a "trespass" has occurred; rather it is about a "physical intrusion" of some kind. *Jardines*, 569 U.S. at 5, 7 ("unlicensed physical intrusion"); *Silverman v. United States*, 365 U.S. 505, 511 (1961) ("[W]e need not pause to consider whether or not there was a technical trespass under the local property law relating to party walls…"). The invasion as to "persons" also harkens to the notion of bodily autonomy rights. A GPS tracking device the government requires one to wear obtains information "by physically intruding on a subject's body" thereby effecting a Fourth Amendment search. *Grady v. North Carolina*, 575 U.S. 306, 310 (2015) (*per curiam*).

"Property" protected by the Fifth Amendment does not automatically receive full protection under the Fourth Amendment, however, given the wording of and purposes for each. If officers exceed the authority granted in a warrant by destroying some property that may implicate the Fifth Amendment or give rise to an action in tort under theories of trespass *ab inito* or distraint, but the undestroyed property seized pursuant to the warrant may still be admissible. *McGuire v. United* States, 273 U.S. 95, 97-100 (1927). Fourth Amendment protection of "houses" includes the curtilage but not "open fields" on private property. *See*, *e.g.*, *Hester v. United States*, 265 U.S. 57 (1924). An intrusion onto privately owned open fields by law enforcement does not compel a warrant. The Fifth Amendment, on the other hand, recognizes that open fields are property, but the test for a taking is the scope and length of the intrusion and the extent to which the intrusion interferes with the owner's property rights bundle. *Cedar Point Nursery*, *supra*; *Loretto*, *supra*.

The Fourth and Fifth Amendments, of course, reach only to government action and do not always extend to private action. But here the "private action" is said to be authorized by statute or regulation and could not be undertaken without government approval. That is a taking, just as was the state law purporting to authorize non-consensual union intrusions on private land in *Cedar Point Nursery*.

ii. FCC does not have "exclusive" authority over EMR exposure

The Commission's characterizations and administration of the Human Exposure Guidelines show an overweening pretense to unconstrained and exclusive authority over EMR exposures. This pretense has carried the day through vigorous repetition, but it does not represent practical or legal reality. The assertion of "exclusive authority over emissions limits"[56] is flatly incorrect. The Secretary of Health and Human Services also has express statutory authority over devices that emit EMR, including the power to set standards, require registration and disclosures and impose product recalls.[57] The Secretary's power extends to both "emissions" and "exposures."[58] Other agencies have independent roles and duties that are statutorily unencumbered by whatever FCC may say, although they have mostly chosen in their discretion to defer to or collaborate with the FCC when their jurisdiction overlaps.[59]

The FCC <u>*does not*</u> have "exclusive" or any other kind of regulatory jurisdiction over every human body and soul in the country, nor can it require that birds, bees and trees register and comply with *any* Commission rule, in Parts 1, 2, 15 or otherwise. It cannot limit, control or

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[56] *See, e.g*. Notice of Proposed Rulemaking, *In the Matter of Build America: Eliminating Barriers to Wireless Deployments*, FCC 26-67, WT Docket No. 25-276, ¶62 (Sept. 30, 2025) ("62. The Commission has exclusive authority to set RF emissions limits….")

[57] *See, e.g.,* 21 U.S.C. Ch 9 Subch. V Part C (Electronic Product Radiation Control) – delegation to Secretary of Health and Human Services. The Secretary is supposed to, among other things, "consult and maintain liaison with…other appropriate Federal departments and agencies on techniques, equipment, and programs for testing and evaluating electronic product radiation" (21 U.S.C. § 360ii(a)(3)) and, when conducting studies shall "invite the participation of other Federal departments and agencies having related responsibilities and interest" but still has independent authority to set standards for electronic products "if he determines that such standards are necessary for the protection of the public health and safety." 21 U.S.C. § 360kk(a)(1).

[58] *See* 21 U.S.C. §§ 360hh, 360jj(a)(3) (emission); 360ii(a)(2), (4), (5) (exposure).

[59] The EPA, OSHA, Interior and perhaps other federal agencies have their own independent legal authority touching on emissions and exposures. They have for the most part chosen to defer to the Commission, but they do have jurisdiction.

regulate, and does not have any authority over, humans' naturally occurring electromagnetic fields and conduction; the Commission does not "assign" those frequencies in any way. Humans' "right" to "use" natural electromagnetic energy derives from a power much higher than the Commission or Congress. More fundamentally, the FCC cannot *force* people to accept "interference" from Commission-authorized emissions.

Yet both industry and the Commission pretend all individual and property rights have been forfeited in the dictionary sense.[60] This is so even though the "forfeiture" provisions in the Act do not cover, or even allow, such rights-stripping. Section 503(b) does extend to "any person" but that person must have "willfully or repeatedly failed to comply with any of the provisions of this chapter or of any rule, regulation, or order issued by the Commission under this chapter or under any treaty, convention, or other agreement to which the United States is a party and which is binding upon the United States." 47 U.S.C. § 503(b)(1)(A). Further the person must receive notice, have an opportunity to contest liability, and any forfeiture takes the form of a monetary fine, not loss of personal or property rights other than money.[61] The Act's forfeiture provisions on their face do not permit this outcome.

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[60] Merriam-Webster Online Dictionary, https://www.merriam-webster.com/dictionary/forfeit

Forfeit, verb
forfeited; forfeiting; forfeits
transitive verb
1: to lose or lose the right to especially by some error, offense, or crime
2: to subject to confiscation as a forfeit
also: abandon, give up

[61] The Commission also recently took the position before the Supreme Court that if the Commission imposes a forfeiture the party can wait for the government to seek collection in court and secure a full *de novo* review. Petition for Writ of Certiorari, *FCC v. AT&T, Inc.*, No. 25-406 (October 8, 2025).

iii. There can be no preemption of state law remedies if there is not an adequate federal remedy

The Commission expressly refused to assert that its rules had any preemptive effect several times. For example, in 1985, the FCC dismissed commentators' concerns about varied state and local RF exposure standards and refused to preempt such standards. *See In re Responsibility of the Federal Communications Commission to Consider Biological Effects of radiofrequency radiation when authorizing the use of radiofrequency devices*, Report and Order, 100 FCC 2d 558 at ¶¶42-43 (1985) ("1985 RF Order"). The Commission wrote:

> The issue of federal preemption of such local and state RF standards was a recurring theme in many of the comments. Several of the respondents stressed the need for a federal radiation standard to preempt possibly inconsistent and nonuniform state and local regulation of RF radiation. Others called for the issuance of a Commission policy statement on federal preemption of state and local RF exposure standards that may adversely affect operations and public availability of interstate telecommunications services.
> **We have reviewed these comments closely and given the matter serious consideration. However, we do not believe it is necessary at this time to resolve the issue of federal preemption of state and local RF radiation standards**…

Id. (emphasis added).

In a related 1990 order, the FCC again denied a request to preempt state and local regulation of RF radiation standards affecting communications services to the public. *In re National Association of Broadcasters Petition for Issuance of a Declaratory Ruling to Preempt State and Local Regulation of RF Radiation Standards that Affect Communications Services to the Public*, 5 FCC Rcd 486 (1990). The Commission noted, "Any specific problems warranting action by the Commission can be brought to our attention on a case-by-case basis." *Id*. at ¶3.

When it was developing the 1996 exposure rules, the FCC considered comments from more than 100 parties, many of whom requested that the Commission establish "[f]ederal preemption of state and local regulations concerning RF radiation exposure." *Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation*, 11 FCC Rcd 15123, 15181-

15183, ¶ ¶164-168 (1996) ("*1996 Order*"). This portion of the *1996 Order* titled *Federal Preemption* notes, "[i]n the past, parties have requested that the Commission preempt state and local authority over RF exposure matters. **To date the Commission has declined to preempt on health and safety matters**." *Id.* at 15181, ¶164 (emphasis added). "[T]he Commission has hesitated to intrude on the ability of states and localities to make regulations affecting health and safety." 11 FCC Rcd at 15182, ¶166; *see also* ¶167. The Order concludes by denying petitions that requested a broad-based preemption policy to cover all transmitting sources. 11 FCC Rcd at 15183, ¶168.[62]

In 1997, responding to petitions to reconsider aspects of the *1996 Order* – including requests to "broaden [the FCC's] authority to preempt state and local regulations concerning RF exposure" – the FCC again declined to preempt. *Procedures for Reviewing Requests for Relief From State and Local Regulations Pursuant to Section 332(c)(7)(B)(v) of the Communications Act of 1934; Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation; Petition for Rulemaking of the Cellular Telecommunications Industry Association Concerning Amendment of the Commission's Rules to Preempt State and Local Regulation of Commercial Mobile Radio Service Transmitting Facilities*, 12 FCC Rcd 13494, 13529, ¶¶4, 88, 90 (1997) ("*1997 Reconsideration Order*"). Rejecting an argument that the Commission should "specify a federal rule of liability for torts related to RF emissions," the *1997 Reconsideration Order* states, "we believe that such action is beyond the scope of this proceeding and **we question whether such an action, which**

[62] The *1996 Order* did implement a regulation mirroring §332(c)(7)(B)(iv) by promulgating 47 C.F.R. 1.1307(e), but this rule, just like the statute, applies only to personal wireless facilities and both on their face address emissions, not exposures.

would preempt too broad a scope of legal actions, would otherwise be appropriate."

Id. at ¶90 (emphasis added).

FCC orders issued after 1997 in connection with RF emissions rules continue this theme. In 2013, the FCC issued the *Notice of Inquiry* soliciting public comments about whether the RF emissions rules in the *1996 Order* should be reassessed. *In re Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies*, 28 FCC Rcd 3498 (2013). Notably, the notice did not raise the question of preemption, and the Order that was issued to resolve the notice left the Commission's prior orders on preemption intact. *See In re Proposed Changes in the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields*; *Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies; Targeted Changes to the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields,* 34 FCC Rcd 11687 (2019).

The FCC has never ruled in any order that state law is preempted in connection with RF emissions and/or exposures for devices that are not personal wireless service facilities. At most, various orders have cited certain judicial holdings for that proposition with seeming agreement starting around 2013.[63]

There is good reason for the Commission's past hesitation and restraint. Federal preemption over any state remedy for damages from nonconsensual exposure and associated property invasions without inclusion of an adequate federal remedy for those harms would present significant Constitutional substantive and procedural due process problems. *See,*

[63] As to personal wireless service facilities, §332 and 1.1307 on their face apply only to "state and local instrumentalities" so neither the statute nor the rule can or do have any "preemptive" or overruling effect as to any federal law.

Pruneyard Shopping Ctr. v. Robins, 447 U.S. 74, 93-94 (1980) (Marshall, concurring)[64]; *United Construction Workers v. Laburnum Construction Corp*., 347 U.S. 656, 663-64 (1954)[65]; *Duke Power Co. v. Carolina Envt'l. Study Group*, 438 U.S. 59, 87-92 (1978) (sustaining federal statute preempting state law remedies and providing *alternative* federal remedy with reasonable liability caps); *Rice v. Santa Fe Elevator Corp.*, 331 U.S. 218, 230 (1947); *Silkwood v. Kerr-McGee Corp*., 464 U.S. 238, 251 (1984)[66]; *see also id.* at 263-264 (Blackmun, J. dissenting)[67]; *Pedraza v. Shell Oil Co*., 942 F.2d 48, 54, n7 (1st Cir. 1991).[68]

Duke Power held that a federal statute preempting traditional state remedies could stand because it also provided an adequate federal remedy. It is also noteworthy that the statute required that licensees have and maintain adequate private insurance, subject to a cap. In the event of an accident so extensive the private liability cap is exceeded, then Congress committed

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[64] "Quite serious constitutional questions might be raised if a legislature attempted to abolish certain categories of common-law rights in some general way. Indeed, our cases demonstrate that there are limits on governmental authority to abolish 'core' common-law rights, including rights against trespass, at least without a compelling showing of necessity or a provision for a reasonable alternative remedy."

[65] "Here Congress has neither provided nor suggested any substitute for the traditional state court procedure for collecting damages for injuries caused by tortious conduct. For us to cut off the injured respondent from this right of recovery will deprive it of its property without recourse or compensation."

[66] "It is difficult to believe that Congress would, without comment, remove all means of judicial recourse for those injured by illegal conduct."

[67] "…because it is inconceivable that Congress intended to leave victims with no remedy at all, the pre-emption analysis established by *Pacific Gas* comfortably accommodates – indeed it compels – the conclusion that compensatory damages are not pre-empted whereas punitive damages are."

[68] "It is noteworthy as well that OSHA provides no replacement remedy for workplace injuries, disease or death caused to employees by suppliers of products used in the workplace."

to "take whatever action is deemed necessary and appropriate to protect the public from the consequences of" a nuclear accident. 438 U.S. at 89-91.[69]

The Commission seeks to arrogate all power to itself without accepting any responsibility to address resulting harms or making any effort to ensure that licensees, rather than the *victims*, bear the costs. The FCC maintains that it can directly regulate not just licensees but also all others by setting an "exposure limit" below which the people have no right of informed consent to refuse, have no right to recover damages for the injuries they sustain and must individually bear all losses.[70] The Constitution does not permit this outcome, and, indeed, neither can any reasonable reading of the Communications Act.

iv. FCC and industry notion of preemption power and scope way overstated and ignores the need for specific facts before preemption can be found

The industry and Commission like to cite various conflict preemption holdings for the proposition that federal law prevails.[71] The citations fail to deal with the difference between express, field and conflict preemption, although the cases themselves usually do to some extent. Sections 332(c)(3) and (7)(B) operate in a way similar to express preemption, but there are significant disputes over the scope and reach of each of these provisions and the outcome is fact dependent. None of the cited cases properly frame the issue in any event.

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[69] The *Duke Power* court did note that legislation can eliminate common law rules and even limit liability. 438 U.S. at 88, n.32. But the Supreme Court has never held that the government can authorize property deprivation or involuntary exposure to a toxin while also granting full immunity to the delegee. In any event, later Supreme Court cases like *Cedar Point* strongly preserve core personal and property rights as against legislative encroachment.

[70] The Commission takes the position and at least one court has agreed there is no private cause of action in court or even at the agency to enforce the limits when a licensee exceeds them. *See Hueter v. AST Telecomm LLC*, 557 F. Supp. 3d 1101 (D. Haw. 2021) (relying on FCC July 15, 2021 Statement of Interest).

[71] The go-to citations are *Fontana v. Apple, Inc. et al.,* 321 F.Supp.3d 850, 852 (W.D. Tenn. N.E. Div. 2018), *Robbins v. New Cingular Wireless LLC*, 854 F.3d 315, 319-20 (6th Cir. 2017) and *Farina v. Nokia, Inc.*, 625 F.3d 97 (3d Cir. 2010).

"[R]egardless of the language sometimes used by Congress and this Court, every form of preemption is based on a federal law that regulates the conduct of private actors, not the States." *Murphy v. Nat'l Collegiate Athletic Ass'n*, 584 U.S. 453, 479 (2018). When the claimed preemptive laws or regulations purport to restrict state or local mandates, the direct focus is not how the federal law "regulates" state conduct; rather, it is about claimed federal rights granted to private actors.[72] In other words, one must first determine if there is a federally granted private right of exemption from local regulation. Only then can a judicial determination whether a particular state or local action is foreclosed be made. The issue is whether the private party has a federally granted "right to be free" from a specific state or local requirement. *Id*., *citing Arizona v. United States*, 567 U. S. 387, 401 (2012). This is an important point missed by cited decisions, industry and the Commission. All want to look only at whether the state law implicates an area where the FCC has authority, not whether the Communications Act or any FCC rule gives wireless providers a "right to be free" from supposedly conflicting state requirements. Viewed from this lens, 47 U.S.C. § 332(c)(3) and (7)(B) at least arguably provide a right to be free, although the individual facts will matter to that inquiry as well. The conflict preemption caselaw, however, is an entirely different matter: the cited decisions did not analyze the issue in terms of whether the specific state laws in issue would re-shackle a licensee from a duty the federal law or regulation is said to free them from.

[72] The Commission's brief before the Second Circuit in *Cell Phone Task Force* expressly noted this dynamic. Brief for Respondents, p. 42 & n. 22, *citing Hodel v. Va. Surface Mining & Reclamation Ass'n*, 452 U.S. 264, 291 (1981).

The field preemption question is easy. Neither 332(c)(3) nor (7)(B) completely occupy the field given the multiple savings clauses that apply[73] and the fact that both expressly retain some room for state law to operate.

Conflict preemption has two prongs, "impossibility" and "purposes and objectives." Both prongs require inquiry into detailed facts because the outcome depends on the particulars of the individual case. There must be "clear evidence" of an "actual conflict." *Savage v. Jones*, 225 U.S.501, 533 (1912). Mere "possibility of inconvenience" is not a sufficient obstacle – the repugnance must be "so direct and positive that the two acts cannot be reconciled or consistently stand together." *See Goldstein v. California*, 412 U.S. 546, 554-55 (1973) (quoting The Federalist No. 32, p. 243 (B. Wright ed. 1961)); *Kelly v. Washington ex rel. Foss Co.*, 302 U.S. 1, 10 (1937). For "impossibility" the fact question is whether the licensee "can independently do under federal law what state law requires of it." *Wyeth v. Levine*, 555 U.S. 555, 573 (2009). If the licensee "cannot satisfy its...duties" under a state law "without the Federal Government's special permission and assistance, which is dependent on the exercise of judgment by the federal agency, that party cannot independently satisfy those state duties for pre-emption purposes," and the state law is preempted. *Pliva v. Mensing*, 564 U.S. 604, 623-624 (2011). But if the party can obey both mandates then there is no "impossibility" problem. As to emissions (or even exposure) while the Commission's rules prescribe a supposed maximum, they do not mandate that any licensee operate at the maximum all the time or indeed at any time. To the contrary, 47 U.S.C. § 324 requires licensees to "use the minimum amount of power necessary to carry out the

[73] Savings provisions are "fundamentally incompatible with complete field preemption; if Congress intended to preempt the entire field . . . there would be nothing . . . to 'save,' and the provision would be mere surplusage." *In re NOS Commc'ns*, 495 F.3d 1052, 1058 (9th Cir. 2007); *See also Holk v. Snapple Beverage Corp*., 575 F.3d 329, 338 (3d Cir. 2009); *Time Warner Cable v. Doyle*, 66 F.3d 867, 878 (7th Cir. 1995).

communication desired." A state mandate that, for example, mimics the dictates of § 324, would not create the situation where it is impossible to follow both state and federal law requirements because each mandate is the same.

Facts are also essential to the "purposes and objectives" part of conflict preemption. The facts must show that the state mandate would materially interfere with the purposes and objectives behind the federal statute or regulation. This is a high threshold, *Chamber of Com. of U.S. v. Whiting*, 563 U.S. 582, 607 (2011); *Geier v. Am. Honda Motor Co.,* 529 U.S. 861 (2000); *Hines v. Davidowitz*, 312 U.S. 52, 67 (1941), and the facts matter. General pronouncements about "federal policy" do not suffice. The evidence must clearly show that, and even more particularly *how*, the state law in issue will unreasonably disrupt the purposes and objectives of the federal regime by applying the specific facts. And, again, it must be shown that the "purpose and objective" of the federal regime is to in fact grant a *private party* a "right to be free" from any supposedly conflicting state regulation. State requirements that merely "inhibit" a *policy* or *regulatory goal* are not conflict preempted.

As we have explained, however, the preemption coin here has two sides. The answer to one side does not necessarily determine the answer to the other side. Congress can preempt state law that regulates one private party under certain conditions, but that does not mean it preempts as to *all private parties* that may somehow be involved or impacted. The Commission regulates licensees; it does not and cannot regulate people that are not themselves licensees.

State and local jurisdictions might be able to decline to exercise zoning authority with respect to wireless services. But that does not entirely resolve all preemption questions. There is still the question of whether *individuals* must submit to the Commission's claimed coercive regulatory power over each of their persons and property.

v. Commerce Clause cannot justify regulation of those that purposefully avoid use of any interstate product or service; Commission cannot coerce individuals into consuming an interstate product and waiving all rights to relief

The Communications Act relies exclusively on the Commerce Clause[74] for its Constitutional vitality, except perhaps for 47 U.S.C. § 606, which can also source to Congress' and the President's War Powers.[75] *See*, *e.g.*, *Radio Commc'ns Corp. v. FCC*, 141 F.4th 243, 252 (D.C. Cir. 2025), *citing FCC v. League of Women Voters of Cal.*, 468 U.S. 364, 376 (1984); *Indus. Communs. & Elecs v. Town of Alton*, 646 F.3d 76, 78 (1st Cir. 2011), *citing Cellular Phone Taskforce v. FCC*, 205 F.3d 82, 96 (2d Cir. 2000), *cert. denied* 531 U.S. 1070 (2001) (47 U.S.C. § 332(c)(7) "rests" on the Commerce Clause). The Commerce Clause has a mighty sweep and lots of force to be sure, but as with all things there are limits to it ingrained in other provisions of the Constitution (such as separation of powers) and in particular the later adopted amendatory Bill of Rights. The Commission's notion of its delegated power ventures far outside Constitutional underpinnings.

What all seem to be missing is that the Commission and industry want to interpret a statute that regulates licensees and their activity to mean that the FCC can *also regulate each individual in the United States*, even those that do not engage in any wireless communications activity. To take a single example, the Commission apparently believes it has jurisdiction and coercive power over individuals that have purposefully chosen not to participate in interstate wireless communications, by refusing to purchase any wireless service or product and trying to eliminate all wireless gadgets from their lives. Surely the FCC does not believe it has the power to require that these private parties accept an unwanted product by way of exposure to the very

[74] Constitution Article I, Section 8, Clause 3.

[75] Constitution Article I, Section 8, Clause 11 and Article II, Section 2.

thing they are trying to avoid. *See Nat'l Fed'n of Indep. Bus. v. Sebelius,* 567 U.S. 519, 548-558, 558-561, 646-660 (2012) (Chief Justice Roberts, Justice Scalia, Justice Kennedy, Justice Thomas, and Justice Alito (that makes five, mind you) explaining that the Commerce Clause does not allow participation compulsion). To be bound by Commerce Clause authorized regulation one must voluntarily engage in interstate economic activity. *See also*, *United States v. Morrison*, 529 U.S. 598 (2000); *United States v. Lopez*, 514 U.S. 549, 566 (1995). The wireless provider engages in interstate commerce, to be sure. But the real object of the industry's desire is to strip individual rights – even those of people that purposefully avoid their product – so they can spread their poison with impunity. This is not reasonable, fair or lawful and it needs to stop.

The conflict preemption cases proffered by industry and the Commission all involved people who subscribed to service (albeit without fully informed consent), thereby engaging in interstate commerce. No case to date has held that someone who refuses to engage in wireless communications in interstate commerce is still bound by Commission rules, stripped of all rights, and has no available remedy under state law or for a violation of individual rights. We doubt any court would ever go that far. Congress can forcibly extract money through taxes and use that revenue to subsidize wireless, but it cannot compel anyone to "eat the EMR."

vi. Commission and industry cannot compel that an individual that does participate in interstate commerce by "consuming" wireless service forfeit all personal and property rights

Even those that do choose to use wireless to some extent do not waive all their rights. For example, some may use wireless because they have not been truly or fully informed of the potential consequences. If they knew the real potential consequences they might decide to quit. Those who heard about potential health risks, however, likely do not know that the Commission and industry *also* claim a right to access and use their real property without consent or compensation. A cell service user does not forfeit her real property rights by buying mobile

service. Nothing in any mobile service contract so provides. The statute does not so provide. No Commission rule says that. The FCC has never issued any order so declaring. The Commerce Clause does not allow it since – as mighty as it is – the Bill of Rights and in particular the Fifth Amendment are even more potent when it comes to liberty and individual rights.

The Commission should carefully consider the implications of its claim to exclusivity and omnipotence, including the authority to bestow impunity and immunity on licensees, thereby binding non-licensees and stripping their own personal and property rights. Step back from this precipice and accept reasonable limiting principles. The Communications Act does not support this outcome and even if that was Congress' intent the Constitution does not allow it.

5. Commission Must Finally and Fully Carry Out Congress' Direction To Protect Persons, Property And The Environment

The Commission seems to think its job is to cover the earth with radiation and clear anything that "inhibits" that outcome so its industry friends can profit, but that is not so. Balancing is necessary, and there are statutory and Constitutional limits to what the FCC can do by way of favors to communications firms. Several parts of this submission contend the Commission lacks substantive jurisdiction or authority over non-licensees and has no statutory authority over exposures, in contrast to emissions. However those issues are ultimately resolved, and even if the FCC does "exposures" only for NEPA procedural purposes, there is still much work to be done, especially given the D.C. Circuit's *Environmental Health Trust* decision and mandate.

The United States does "control[76] all the channels of radio transmission." 47 U.S.C. §301.[77] The FCC oversees spectral assignments, approves devices and facilities, and prevents interference. 47 U.S.C. §§302a, 303, 305, 306, 307, 321. Congress says it wants "efficient and intensive use of the electromagnetic spectrum," 47 U.S.C. §309(j)(3)(B), but at the same time the Commission must also be "promoting safety of life and property" and the environment, and these responsibilities stand on equal ground with utility. *See* §§151, 154(n), 254(c)(1)(A), 324, 332(a)(1), 336(h)(4)(B), 925(b)(2)(C), 1455(a)(3). Health and safety considerations are a necessary part of any "efficiency" mandate since there are significant costs when health and safety are compromised. Section 324 requires licensees to "use the minimum amount of power necessary to carry out the communication desired" and that too demands "efficiency." The Commission's regulations must contain "adequate safeguards of the public health and safety." *See* H.R. Report No. 104-204, p. 94. The FCC must serve the "public interest," including careful balancing of utility and public health and safety. *KFKB Broad. Ass'n v. Fed. Radio Com*., 47 F.2d 670, 671-672 (D.C. Cir. 1931); *see also Banzhaf v. FCC*, 405 F.2d 1082, 1096 (D.C. Cir. 1968) (public interest indisputably includes public health). As the Commission noted in in the *1997*

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[76] Notice the usage. Section 301 asserts "control" (but not ownership) of "the channels of radio transmission." It speaks to "channels" and "transmission." It says a license does not convey "ownership" of channels. Another sentence in the section prohibits any person from "us[ing] or operat[ing] any apparatus for the transmission of energy or communications or signals by radio… except under and in accordance with this chapter and with a license in that behalf granted under the provisions of this chapter." This sentence governs the use and operation of equipment for transmission of "energy," "communications" and "signals."

This and other parts of the Act, properly construed, do not convey (or even assert initial government) ownership of the energy, the radiation or the resulting artificial fields. Nor do they speak to "control" over exposure or in any way purport to regulate individuals who are not engaging in radio communications or energy transfer.

[77] The D.C. Circuit has interpreted the phrase "all the channels of radio transmission" to mean "the electromagnetic spectrum used to send and receive wireless data." *Northstar Wireless, LLC v. FCC*, 38 F.4th 190, 197 (2022).

Reconsideration Order, its duty is to establish "a proper balance between the need to protect the public and workers from exposure to potentially harmful RF electromagnetic fields and the requirement that industry be allowed to provide telecommunications services to the public in the most efficient and practical manner possible." 12 FCC Rcd 13494, 13496, ¶2.

Therefore, even within its much lesser than perceived authority over non-licensees and its power only over emissions (rather than exposure as well), the FCC must pay due regard to the effects its regulations and authorizations have on all living things, especially humans. The Court of Appeals held it had not done so and required further action:

> … we find the Commission's order arbitrary and capricious in its failure to respond to record evidence that exposure to RF radiation at levels below the Commission's current limits may cause negative health effects unrelated to cancer. …That failure undermines the Commission's conclusions regarding the adequacy of its testing procedures, particularly as they relate to children, and its conclusions regarding the implications of long-term exposure to RF radiation, exposure to RF pulsation or modulation, and the implications of technological developments that have occurred since 1996, all of which depend on the premise that exposure to RF radiation at levels below its current limits causes no negative health effects. Accordingly, we find those conclusions arbitrary and capricious as well. Finally, we find the Commission's order arbitrary and capricious in its complete failure to respond to comments concerning environmental harm caused by RF radiation.

Environmental Health Trust, 9 F.4th at 903.

Quit Stalling and honor the law and the court mandate.

A. The Commission Should Seek Input From Its "Sister Agencies" And Allow Comment On Their Findings And Suggestions

i. FCC lacks health and environmental expertise and has traditionally sought input from "sister agencies" that do

"Since the Commission is not a health and safety agency, we defer to other organizations and agencies with respect to interpreting the biological research necessary to determine what levels are safe." *Reassessment of Radiofrequency Exposure Limits & Policies*, Notice of Inquiry, 28 FCC Rcd. 3498, 3501, ¶6 (2013). "Because the Commission does not claim expertise as a de facto health agency, it necessarily considers the views of federal health and safety agencies and

institutes that continue to address RF exposure issues." 28 FCC Rcd. at 3574, ¶217; "In reaching our decision on the adoption of new RF exposure guidelines we have carefully considered the large number of comments submitted in this proceeding, and particularly those submitted by the U.S. Environmental Protection Agency (EPA), the Food and Drug Administration (FDA) and other federal health and safety agencies. The new guidelines we are adopting are based substantially on the recommendations of those agencies, and we believe that these guidelines represent a consensus view of the federal agencies responsible for matters relating to the public safety and health." *1996 Order*, 11 FCC Rcd at 15124, ¶2. As the *1997 Reconsideration Order* notes (12 FCC Rcd at 13506, ¶34), the FCC has historically "consulted extensively with all of the relevant health and safety agencies."

The Commission was far humbler about its proper role and the effect of its exposure rules for many years. It noted in a 1979 Notice of Inquiry, **"[w]e emphasize that the information we request. . .is not for the purpose of our promulgating radio frequency radiation health and safety standards. That is a function of the health and safety agencies**." *In re the Responsibility of the Federal Communications Commission to Consider Biological Effects of Radio Frequency Radiation When Authorizing the Use of Radio Frequency Devices*, 72 F.C.C.2d 482, 495, ¶33 (1971)(emphasis added). In a related 1982 Notice of Proposed Rulemaking, the FCC emphasized its own lack of expertise in this area, stating, "**we would like to stress that the Commission has neither the expertise nor the primary jurisdiction to promulgate health and safety standards for RF and microwave radiation**." *In re Responsibility of the Federal Communications Commission to Consider Biological Effects of Radiofrequency Radiation when Authorizing the Use of Radiofrequency Devices*, 89 FCC 2d 214, 251, ¶183 (1982)(emphasis added).

"We would prefer to defer in this area to the expert federal health and safety agencies." 100 FCC 2d 543, 551 ¶26 (1985). Back then the FCC realized that it "has neither the expertise nor the authority to develop its own health and safety standards, …" *Id.* at 560, ¶49. It proceeded to create exposure standards only because NEPA functionally required it. The exposure rules did not assume prominence outside that context until several years after 1996. The creep beyond use only for NEPA procedural purposes and into other substantive areas that require health expertise and authority over both emissions and exposure must be rolled back. Get back in your lane.

ii. FCC should specifically seek and obtain new input from Health and Human Services given the Appeals Court's treatment of the 2019 FDA CDRH letter and the release of the MAHA Commission report

The 2019 decision to close the 2013 *NOI* heavily relied on representations on a web page, a statement by Jeffrey Shuren, M.D., J.D., the then-director of the Center for Devices and Radiological Health at the Food & Drug Administration and an April, 2019 letter from Dr. Shuren to the Commission's OET Chief suggesting that "no changes to the current standards are warranted at this time." *Environmental Health* Trust, 9 F.4th at 904-905. The D.C. Circuit found that these FDA statements were "conclusory" and did not "address the implication of Petitioners' studies [challenging] [t]he factual premise—the non-existence of non-thermal biological effects—underlying the current RF guidelines may no longer be accurate." The Court then noted that the FCC could work with and rely on input from other agencies but ultimately one or more of them must provide and sufficient reasoning for any conclusions that are made. *Id.* at 905.

The Make America Healthy Again Commission, with support from the White House, released its strategy and summary conclusions on September 9, 2025.[78] That document indicated

[78] *See*, Strategy Report, Make Our Children Healthy Again, Sept. 9, 2025, available at https://www.whitehouse.gov/wp-content/uploads/2025/09/The-MAHA-Strategy-WH.pdf; MAHA Commission Unveils Sweeping Strategy to Make Our Children Healthy Again, Sept. 9,

on page 7 that "HHS, in partnership with other departments and Federal agencies, will undertake a study on electromagnetic radiation and health research to identify gaps in knowledge, including on new technologies, to ensure safety and efficacy." HHS will therefore be working this topic, and it plainly anticipates doing so "in partnership with" other agencies.[79]

Studies will be ensuing on the topic, but HHS likely has some ideas and suggestions on immediate and short-term next steps and actions that can be taken. The Commission clearly looks to HHS for guidance on health issues and it should reach out to HHS and seek input with a specific request that HHS provide reasoning for its suggestions this time. Any response should immediately be made available on ECFS so the public can respond.[80]

B. The Commission Must Specifically Address RF Radiation on Children[81]

The Court of Appeals specifically required a "reasoned explanation" for its refusal to specifically look at the effects on children:

> Second, the Commission equally failed to provide a reasoned explanation for brushing off record evidence addressing non-cancer-related health effects arising from the impact of RF radiation on children. Many commenters, including the American Academy of Pediatrics, urged the Commission to adopt limits that account for the use of RF-emitting devices by vulnerable children and pregnant women. See, e.g., J.A. 4,533-34. In dismissing those concerns, the Commission again relied on a conclusory statement from the FDA that "[t]he scientific evidence does not show a danger to any users of cell phones

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2025, available at https://www.hhs.gov/press-room/maha-commission-report-childhood-disease-strategy.html.

[79] As already noted above, the HHS Secretary has independent statutory authority under 21 U.S.C. Ch 9 Subch. V Part C (Electronic Product Radiation Control). This authority includes testing, product registration and standards-setting. Even more important, and in significant contrast to the Communications Act, the HHS Secretary has *express* jurisdiction over both emissions and *exposures. See* 21 U.S.C. §§ 360hh, 360jj(a)(3) (emission); 360ii(a)(2), (4), (5) (exposure).

[80] The April 24, 2019 letter from Dr. Shuren was not posted to ECFS until 4 months after receipt, on August 19, 2019. *See* https://www.fcc.gov/ecfs/search/search-filings/filing/108192566617397. The significant delay between FCC receipt and ECFS posting was never explained but this time around any HHS comment must be immediately made publicly available.

[81] Section 5.B also relies on the Statement in Support by Dr. Paul Héroux, Ph.D, Attachment 1.

> from RF exposure, including children and teenagers." 2019 Order, 34 FCC Rcd. at 11,696. But, as we have already explained, such a conclusory and unexplained statement is not the "reasoned" explanation required by the APA. In addition, the Commission noted that the testing to determine compliance with its limits "represents a conservative case" for both adults and children. Id. at 11,696 n.50. Whether the testing of compliance with existing limits was conservative is not the point. The unanswered question remains whether low levels of RF radiation allowed by those existing limits cause negative health effects. So once again, the Commission's failure to provide a reasoned or even relevant explanation of its position that RF radiation below the current limits does not cause health problems unrelated to cancer renders its explanation as to the effect of RF radiation on children arbitrary and capricious.

Id. at 908-909.

EHT's recent motion goes through the scientific and medical evidence of the particular risks to children and the special impacts on them, so that will not be repeated here. But what they do not fully convey is the enormity of the Commission's utter disregard and lack of concern for the children whose lives have been forever damaged by the FCC's deliberate indifference and complete abdication of its responsibility to society's most precious resource. Children have no choice over whether they are exposed to this toxin, and that is precisely what EMR radiation is for many of them. More will begin to exhibit symptoms in the future that would not suffer that fate if the FCC had merely acted in timely fashion. This is on you. You were told and warned. The evidence by way of science, medical opinions and individual testimonies was before the Commission in 2019 but the Commission threw it all away and chose to instead serve the industry – those doing the poisoning – rather than acting to protect children. The Court then required a reasoned explanation and the agency still refused.

Some can still be saved. Act now.

C. The Commission Must Address the Implications of Long-Term Exposure, Pulsation and Modulation, and Technological Developments That Have Occurred Since 1996, Including the Ubiquity of Wireless Devices and Wi-Fi, and the Emergence of 5G Technology[82]

The Commission, supported by industry, has effectively shifted the burden of proving harm to individuals, and then it – with enthusiastic industry joinder – has claimed there are no remedies for adverse effects. There is no present pathway to guidelines improvement even if harm is proven. But the public does not have the burden of proving harm – even though harm has been proven anyway. The burden is on the Commission and the industry to demonstrate the technology is safe, especially in the long term to life in general, humans and children in particular.

The D.C. Circuit directly spoke to this issue by remanding for a reasoned explanation of the Commission's "failure to discuss the implications of long-term exposure to RF radiation, exposure to RF pulsation or modulation, or the implications of technological developments that have occurred since 1996, including the ubiquity of wireless devices and Wi-Fi, and the emergence of '5G' technology." 9 F.4th at 908.

We address elsewhere how the FCC can respond to this mandate over the longer term. In the meanwhile, we concur with EHT's immediate and short-term recommendations.

D. The Commission Must Deal With Those With Special Sensitivity[83]

The *1997 Reconsideration Order*, 12 FCC Rcd at 13505, ¶31, refused to consider whether there should be stricter standards or some special provision for, or even recognizing, "certain individuals [who] might be "hypersensitive" or "electrosensitive." The Second Circuit affirmed this refusal in *Cellular Phone Taskforce v. FCC*, 205 F.3d 82, 90 (2d Cir. 2000), but that

[82] Section 5.C also relies on the Statement in Support by Dr. Paul Héroux, Ph.D, Attachment 1.
[83] Section 5.D also relies on the Statement in Support by Dr. Paul Héroux, Ph.D, Attachment 1.

court relied on the promise that changes in scientific knowledge and understanding would be considered and accommodated, *id.* at 91, consistent with the Commission's promise in the *1996 Order* ¶4 that "research and analysis relating to RF safety and health is ongoing, and we expect changes in recommended exposure limits will occur in the future as knowledge increases in this field. In that regard, we intend to continue our cooperative work with industry and with the various agencies and organizations with responsibilities in this area in order to ensure that our guidelines continue to be appropriate and scientifically valid." 11 FCC Rcd at 15125.

Thirteen years later the FCC issued the *NOI* because science had progressed, and new knowledge abounded. It received mountains of evidence indicating there are individuals with special sensitivity but still chose to ignore it all and close the *NOI* in 2019. The D.C. Circuit found that the Commission failed to adequately assess and respond to that new evidence. "[A]n an agency cannot simply ignore evidence suggesting that a major factual predicate of its position may no longer be accurate." *Environmental Health Trust*, 9 F.4th at 906.

General population limits – if appropriately set – may suffice for the *general population*. Statistics sometime eliminate outliers but here we are talking about <u>people</u>, individual souls that are, in fact, being *excluded* and ultimately ***eliminated***. The number of people suffering from EMR-S continues to grow, so it is questionable whether EMR-S sufferers can still be considered anomalies; indeed, they may well be predictive indicators of what is to come for the rest of the population. Yet the Commission continues to gaslight the public into thinking EMR exposures below the limits are "safe" and there is no evidence people with special sensitivities even exist. But they clearly do and the Commission's effort to pretend otherwise is yet another indicator of its deliberate indifference to the problem.

6. Commission Must Require **Real-World** Emissions and Exposure Testing That Considers and Accounts for **All** Emissions and Exposures and Modulation/Pulsation

No federal agency, including the Commission, has ever performed testing of exposures in real-life exposure scenarios. Pre-market approvals for portable devices and fixed sources are all performed in a lab or through computer modeling.[84] The SAR tests for portable devices use a "Specific Anthropomorphic Mannequin" that is supposed to simulate the human body but the entire purpose is only to determine the amount of heating after a relatively short period of exposure.[85] The mannequin does not truly represent any human body and it cannot assess biological responses to exposure. We are not aware of any post-market testing requirements, although the Commission does reserve the right to investigate if there is a concern over exposures that exceed the guidelines.

The *Environmental Health Trust* decision functionally mandates real-life testing of emitting sources for determining whether cell phones and other portable electronic devices comply with its guidelines, as irrational, arbitrary and clearly inadequate as they presently are. The National Academies of Science identified several "research gaps" in 2008.[86] It noted, in part:

> Wireless technology is leading to devices such as wireless PCs, handheld devices used for video calls, and other handheld devices for text messaging. In their typical usage, the antennas are closer to the hand or other parts of the body. SAR distributions for these

[84] *See*, *e.g.*, 47 C.F.R. 2.1093(2) ("Evaluation of compliance with the SAR limits can be demonstrated by either laboratory measurement techniques or by computational modeling.")

[85] The EHT Motion does not acknowledge the recent modification to the Commission's testing protocol for portable devices that went into effect in April of this year encouraging reduction of the body testing distance to "not to exceed 5mm" under certain circumstances and for some devices. *See*, Interim Simplified Guidance for Testing §2.1093-PortableDevice, available at https://www.fcc.gov/sites/default/files/32-Interim-Simplified-RFX-Guidance-for-Portable-Devices_Apr2025_Final-TCB.pdf. The change is in the right direction, but it is limited in effect and is still based on "the premise that exposure to RF radiation at levels below its current limits causes no negative health effects" that the D.C. Circuit found had not been adequately explained.

[86] Identification of Research Needs Relating to Potential Biological or Adverse Health Effects of Wireless Communications Devices, National Academies of Sciences, Engineering, and Medicine, 2008, at p. 16, The National Academies Press, https://doi.org/10.17226/12036.

> newer devices have been obtained using homogeneous liquid-filled flat phantom models. Though these models are reasonably accurate to get the 1 or 10 Watts/kg average SAR needed for safety compliance testing, they are incapable of providing detailed SAR distributions because of lack of detailed anatomical features, e.g., for the hand or the human lap or parts of the body close to the devices. Additionally, such models cannot resolve the detailed RF field distribution at the cellular and subcellular levels. Given a set of anatomical data, the RF field distributions can be modeled and estimates can be made of the effects of various wave forms and carrier frequencies. An important research gap is the lack of models of several heights for men, women, and children of various ages for use in the characterization of SAR distributions for exposures characteristic of cell phones, wireless PCs, and base stations.

Computer modeling can serve a valuable role for pre-market purposes, but it is not enough. Even the best predictive models cannot truly capture the full real-world experience. That is why the 2008 National Academy of Sciences report said real-world exposure analysis is necessary on page 13:

> …there is a need to characterize exposure of juveniles, children, pregnant women, and fetuses both for personal wireless devices (e.g., cell phones, wireless personal computers [PCs]) and for RF fields from base station antennas. This characterization includes taking into account gradients and variability of exposures due to the actual use of the device, the environment in which it is used, and exposures from other sources, multilateral exposures, and multiple frequencies.[87]

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[87] The NAS Report summarized its priority research needs in bullet format on p. 2:

- Characterization of exposure to juveniles, children, pregnant women, and fetuses from personal wireless devices and RF fields from base station antennas.
- Characterization of radiated electromagnetic fields for typical multiple element base station antennas and exposures to affected individuals.
- Characterization of the dosimetry of evolving antenna configurations for cell phones and text messaging devices.
- Prospective epidemiologic cohort studies of children and pregnant women.
- Epidemiologic case-control studies and childhood cancers, including brain cancer.
- Prospective epidemiologic cohort studies of adults in a general population and retrospective cohorts with medium to high occupational exposures.
- Human laboratory studies that focus on possible adverse effects on electroencephalography activity and that include a sufficient number of subjects.
- Investigation of the effect of RF electromagnetic fields on neural networks.
- Evaluation of doses occurring on the microscopic level.
- Additional experimental research focused on the identification of potential biophysical and biochemical/molecular mechanisms of RF action.

The Commission should require far more rigorous pre- and post-market testing. The FDA has established protocols for Class III devices that are used to demonstrate a reasonable assurance the device is safe and effective for its intended use. Class III medical devices that are also "electronic products" must still demonstrate safety and effectiveness even if they meet the Commission's exposure guidelines. Additional safety testing and data is required, including clinical trials, biocompatibility testing and other evaluations. While the FDA has so far chosen to not extend its pre- and post-market registration and testing requirements to fixed transmitters or portable/mobile devices, the same basic approach should be used for them, except for the initial inference that exposures within the Commission's guidelines are "safe."

This is an ideal situation where the two agencies – FCC and HHS – can collaborate. Each has jurisdiction over the matter, including some measure of standard-setting power and registration/authorization authority. The FCC is not a health agency so it should largely defer to HHS and then amend its rules to provide that HHS "safety" approval will also serve for Commission "safety" certification requirements.[88]

7. Commission Must Obtain A Risk Assessment

The scientific community has been calling for a proper EMR risk assessment, including epidemiologic studies,[89] for many years, including from some in the engineering community.[90]

Despite the passage of over 17 years very few of these "knowledge gaps" have been studied, much less filled. The MAHA Strategy Report's reference to "knowledge gaps" was a bow to the NAS findings and a commitment to address them.

[88] The Commission has always been far more interested in "interference" so it could maintain its own rules for that purpose.

[89] *See* 2008 NAS Report at p. 19 ("Thus, while the observational nature of the epidemiologic studies makes them difficult to conduct and interpret, they remain indispensable by providing direct information on the health of people exposed to an agent.")

[90] Miller AB, Sears ME, Morgan LL, Davis DL, Hardell L, Oremus M, Soskolne CL, Risks to Health and Well-Being From Radio-Frequency Radiation Emitted by Cell Phones and Other Wireless Devices, Front Public Health, 2019 Aug 13;7:223. doi: 10.3389/fpubh.2019.00223.

The insurance industry has long refused to cover EMR related liability except through more expensive "pollution"[91] policies, so the professionals that manage matters touching on liability know there are definite and significant public risks.[92] Conducting a thorough risk assessment of human exposures to EMR emissions is essential to any program that purports to establish and maintain exposure limits.

Risk assessment is a critical process used by federal agencies to evaluate the potential health risks associated with exposure to environmental toxins. There are longstanding federal agency guidelines for risk assessments.[93] The EPA has established protocols for human health risk assessments, including one that involves or relates to children.[94] Various HHS agencies routinely perform risk assessments. The National Toxicology Program performs assessments for

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PMID: 31457001; PMCID: PMC6701402, available at https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2019.00223/full; N. Aalam, Radio frequency radiation exposure, health hazards and risk assessment strategies, 2017 International Conference on Innovations in Electrical Engineering and Computational Technologies (ICIEECT), Karachi, Pakistan, 2017, pp. 1-1, doi: 10.1109/ICIEECT.2017.7916592, available at https://ieeexplore.ieee.org/document/7916592.

[91] Artificially produced non-ionizing radiation is classified as "pollution" for purposes of the general exclusion in most commercial insurance policies. Indeed, even the wireless companies' device protection policies contain this exclusion and definition. *See*, *e.g.*, Verizon Mobile Protect and Verizon Mobile Protect Multi-Device brochure pp. 8, 22, available at https://scache.vzw.com/content/dam/support/pdf/device-protection-brochure-consumer.pdf;

[92] Swiss Re classified electromagnetic fields as an "emerging risk" in 2013 and still maintains that position. https://www.jrseco.com/wp-content/uploads/electromagnetic_radiation_risk_assessment_swiss_re.pdf#page+12; https://www.swissre.com/institute/research/sonar/sonar2019/SONAR2019-off-the-leash.html. Lloyd's also refuses to underwrite coverage for potential liability resulting from electromagnetic radiation. https://www.jrseco.com/lloyds-insurance-company-does-not-cover-health-damage-caused-by-electromagnetic-radiation/.

[93] *See, e.g.*, 2 C.F.R. 200.206; National Research Council (US) Committee on the Institutional Means for Assessment of Risks to Public Health, Risk Assessment in the Federal Government: Managing the Process, Washington (DC): National Academies Press (US), doi: 10.17226/366 (1983), available at https://www.ncbi.nlm.nih.gov/books/NBK216620/.

[94] *See, e.g.*, Human Health Risk Assessment, EPA, https://www.epa.gov/risk/human-health-risk-assessment.

cancer and non-cancer health effects,[95] and has a Risk of Bias Tool to evaluate the internal validity of a study to reduce the chance the design and conduct may compromise the credibility of any link between exposure and outcome.[96]

This is yet another area where the Commission can work with its "sister agencies" – and in particular HHS – to take meaningful steps toward solving the obvious problems in the current exposure guidelines and testing regime.

Conclusion: <u>FCC Must Act NOW</u>

There is no longer any discretion about timing or legitimate reason for continued logrolling. The Commission must act now by establishing a process for determining – this time fully and using actual biological principles – the point at which exposure to RF emissions begins to interfere with biological processes and when that interference is likely to lead to negative effects. It must end the current contrived and non-representative testing protocols and establish a way to accurately measure ***real-world*** emissions/exposures. It must develop a proper risk analysis, so it can properly quantify not only the "benefits" of communications by radio but *also* the human and environmental <u>costs</u>. The guidelines and testing protocols are arbitrary, irrational and not founded on fundamental physics or biology. They must be replaced with a regime that reflects reality. This can and should be accomplished using the expertise and authority of "sister" federal agencies, and especially HHS.

The now four-year-old mandate compels these actions. Failing to undertake the effort will further defy the mandate, constitute "agency action unlawfully withheld or unreasonably delayed" (5 U.S.C. § 706(1)), "arbitrary, capricious, an abuse of discretion, or otherwise not in

[95] *See* https://ntp.niehs.nih.gov/research/assessments.

[96] https://ntp.niehs.nih.gov/research/assessments/noncancer/riskbias.

accordance with law" (§ 706(2)(A)) and continue regulations that are at present "contrary to constitutional right, power, privilege, or immunity" (§706(2)(B)) and, as the current regulations have been interpreted and applied, "in excess of statutory jurisdiction, authority, or limitations, or short of statutory right" (§ 706(2)(C)).

It is also time for the FCC to expressly recognize that it has no authority over natural electromagnetic radiation, human or other living things' electromagnetic processes or signals, and, most important, it cannot itself or by license to private persons compel that anyone suffer exposure *at any level* without informed consent. The Commission must quit claiming (notably, without ever actually holding) that those harmed by Commission-authorized emissions have no remedy for injuries they suffer and can only meekly ask that the Commission change its limits on a prospective basis, only to be rudely ignored, again.

The Commission seems intent on doubling down and even further clearing the way for heedless unconstrained deployment, while flagrantly disobeying the court mandate. The FCC must stop all that and instead do the homework assigned by the D.C. Circuit before any other steps are taken to advance industry's interests and inflict further harm on people and the environment. That is our motion and request.

Submitted,

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November 25, 2025

ATTACHMENT 1
STATEMENT OF PAUL HÉROUX, Ph.D IN SUPPORT

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies	)	ET Docket No. 13-84 (Termination order remanded)
	)	
Targeted Changes to the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields	)	ET Docket No. 19-226
	)	
Human Exposure to Radiofrequency Electromagnetic Fields	)	ET Docket No. 03-137

STATEMENT OF PAUL HÉROUX, Ph.D IN SUPPORT OF

JOINDER IN ENVIRONMENTAL HEALTH TRUST PETITION TO IMPLEMENT D.C. CIRCUIT JUDGMENT AND MANDATE, REOPEN *NOTICE OF INQUIRY* AND PERFORM TASKS ORDERED BY THE COURT, AND REQUEST FOR PROMPT ADMINISTRATIVE ACTION

AND

RENEWED SEPARATE MOTION FOR SIMILAR RELIEF

Contents

1. History of the Radiations

Non-Ionizing Radiation (NIR) came from physics and engineering, while Ionizing Radiation (IR) sprang from radioactive elements found in the Earth.
Both introduced major technological ingredients from 1860 to 1895.
Both types of radiation are invisible and undetectable without special equipment.

The Second World War was a turning point for both NIR and IR because of their iconic military applications, the atomic bomb for IR and radar for NIR.

The military had significant influences on the development of both NIR and IR science and safety, highlighting the different risk tolerances of the military and civilian populations. With civilian applications involving NIR (wireless) and IR (nuclear reactors), public narratives on the health risks of NIR and IR conflicting with science were inevitable.

NIR and IR safety have had difficult histories over a span of 140 years because on many occasions there have been motives to hide or underplay the health impacts of both types of radiation. Despite some overlap in physics and in their health impacts, NIR and IR safety practices have nevertheless remained different until 2020 and 2021.

- In 2020, the International Radiation Protection Association (IRPA) reminded the International Commission on Non-Ionizing Radiation Protection (ICNIRP) of its obligations under its 1992 "Statute of Creation."

- In 2021 the D.C. Circuit opinion and judgment in *Environmental Health Trust, et al v. Federal Communications Commission (FCC), et al*, required it to "…provide a reasoned explanation for its determination that its guidelines adequately protect against harmful effects of exposure to radiofrequency radiation unrelated to cancer, in accordance with the opinion of the court…"[1]

[1] Judgment*, Environmental Health Trust, et. al. v. Federal Communications Commission, et. al*., No 20-1025. D.C. Circuit (August 13, 2021).

2. Ionizing Radiation Safety

Wilhelm Röntgen discovered X-rays in 1895 and Henri Becquerel radioactivity in uranium salts in 1896. “Radioactive” was coined by Pierre and Marie Curie, and ionizing radiation’s applications as well as its dangers were seen almost immediately.

1895: Wilhelm Röntgen burns his fingers with X-rays.
1896: William Lofland Dudley X-rayed his head, resulting in hair loss.
1897: David Walsh establishes the symptoms of “radiation sickness.”
1901: Henri Becquerel gets severe skin inflammation from carrying radium.
Early 1900s, the first radiation-induced cancers were reported.
1911: Reports of leukemia in radiation workers had emerged.

These early, acute effects were the consequence of high doses and lack of safety precautions. Because of disease latency, it took years to establish a clear link between exposure and long-term effects like cancer. This led to the development of the basic principles of ionizing radiation protection which have been under the coordination of the International Commission on Radiological Protection (ICRP) starting in 1928.

As atomic bombs detonated in 1945, radio protection benefited from the availability of a large cohort of survivors with varying degrees of exposure, and whose health would be meticulously monitored for decades. This long-term research has yielded epidemiological data on ionizing radiation-induced health effects that were previously unknown or poorly understood from laboratory experiments. The *linear no-threshold assumption* (see 12.I and 12.III) for cancer risk was confirmed, as well as the relative absence of heritable genetic effects from ionizing radiation exposure.

After the atomic bombs in August 1945, it became deceitful to deny the health impacts of IR, although some disinformation persisted afterwards.[2] Precautionary and pro-active measures were taken for those risks that could no longer be plausibly denied. Painting radium on watch faces was phased out approximately as the first US Nuclear Power station was inaugurated at Shippingport in 1958. Whereas NIR risks derive almost entirely from man-made technology, most IR risks are associated with natural sources (radon, cosmic radiation, soil radiation), although a relative few, such as medical procedures, selected consumer products, nuclear power generation and associated wastes, are man-made. Despite early measures, nuclear sites faced challenges from environmentalists. But the relative ease with which individuals could evade or control most of these risks made the situation more manageable than for NIR, where man-made risks are inevitable.

[2] The head of the Manhattan Project, Major General Leslie Groves downplayed the dangers of radiation. In November 1945, he testified to a Senate committee that radiation sickness was a “very pleasant way to die” and misleadingly claimed there was “no radioactive residue” in Hiroshima and Nagasaki.

3. Non-Ionizing Radiation Safety

This Statement accompanies and supports the Joinder In Environmental Health Trust Petition To Implement D.C. Circuit Judgment And Mandate, Reopen *Notice Of Inquiry* And Perform Tasks Ordered By The Court, And Request For Prompt Administrative Action And Renewed Separate Motion For Similar Relief and concurs in the physics and engineering principles and conclusions in Part 4 Subparts A-D. The characterization of artificial EMR as having physical properties and the application of Maxwell's Equations to biological matter are consistent with current science. This demonstration belies industry propaganda and shows that the current emission/exposure guidelines have no scientific or biological basis.

In 1864, James Clerk Maxwell demonstrated that electricity, magnetism and electromagnetic radiation are each manifestations of the electromagnetic force, a fundamental force of nature. Maxwell's theory predicted that coupled electric and magnetic waves travel through space as "electromagnetic waves." Heinrich Hertz later proved the existence of the waves predicted by Maxwell's equations. He created the first radio transmitter in 1886 and through experimentation, validated Maxwell's equations. Hertz did not see any practical application for his discoveries, but others soon did. Marconi developed wireless telegraphy, with the first working model in 1894. By 1897 Marconi was able to transmit Morse code for 3 miles. He is often called the "Father of long-distance radio" because he proved the commercial utility of artificially generated radiation using Maxwell's and Hertz's theoretical work on natural radiation.

At the low frequencies used by electrical power networks (60 Hz), severe accidents and electrocutions became common with increased electrification in the early 20th century. Acute risks were limited by safety regulations in the 1920s and 1930s. Concerns about the magnetic fields radiated by power lines and systems took hold only in 1979. Wertheimer and Leeper uncovered a statistical link between exposure to extremely low frequency (ELF) magnetic fields from power lines and an increased risk of childhood leukemia, which catalyzed research and public interest.[3] Non-thermal NIR effects were observed in 1926 and 1928 with 150 MHz radiation by J.W. Schereschewsky, a surgeon with the US Public Health Service.[4]

Wireless saw minimum use in World War I,[5] but radar developments were already in place leading to the second World War. NIR wireless has been widely recognized as a critical

[3] Wertheimer N, Leeper E., "Electrical wiring configurations and childhood cancer," Am J Epidemiol, 1979 Mar; 109(3):273-84, doi: 10.1093/oxfordjournals.aje.a112681, PMID: 453167, https://pubmed.ncbi.nlm.nih.gov/453167/.

[4] Schereschewsky, J.W., "Biological Effects of Very High Frequency Electro-magnetic Radiation," RSNA, Radiology, Vol. 20, No. 4, https://pubs.rsna.org/doi/10.1148/20.4.246.

[5] In the early 1930s, the only way for a ship to spot approaching attack planes was binoculars, which was ineffective for locating targets in all weather conditions and at night.

military tool ever since. The US military probed for health effects of radar following World War II. During the cold war, speaking of the health effects of NIR was widely seen as "unpatriotic."[6] This attitude is somewhat maintained today: "The US Department of Defense recognizes the importance of US wireless leadership to the nation's economic prosperity, and 5G technologies mark a critical pivot for spectrum policy, technology innovation, and national security." The goal is "decisive military overmatch to meet wartime and peacetime national security objectives. Of note, this successful international engagement begins with effective Department participation in domestic processes."[7]

Civilian concerns about the safety of NIR rose with the introduction of microwave ovens in 1947 and became a public preoccupation with the introduction of cordless phones in the early 1980s, Digital Enhanced Cordless Telecommunications in the late 1980s (DECT) and cellular phones in the 1990s. These devices placed microwave transmitters against the head of practically every adult and child. Industry fought hard to maintain NIR radiation's innocuous image, with quiet support from the military to evade scrutiny of increasing reliance on wireless for war purposes. This capitalized on the considerable consumer interest in the convenience of wireless, thus expanding the large markets available for NIR applications.

In 1960, at a meeting between the American National Standards Institute (ANSI, a conglomerate of engineering firms), the US Navy and the Institute of Electrical and Electronics Engineers (IEEE), there was consternation over the fact that various NIR limits were used by various groups (at left). "Heated" discussions took place on the safety limits for NIR. Industry had a deep interest in influencing outcomes and on placing safety limits at high levels. The military wanted to avoid lower general population limits as well because it might limit its ability to use EMR for war-fighting and other strategic aims.[8]

THE STANDARDS (1960) FOR EXPOSURE TO RADIO-FREQUENCY AND MICROWAVE RADIATION

US Air Force	10 mW/cm²
General Electric	1 mW/cm²
Bell Laboratories	0.1 mW/cm²
Soviets	0.01 mW/cm²

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[6] Steneck, "The Microwave Debate," The MIT Press, 1984, MMS ID 996029183406676, ISBN 9780262192309, ISBN 0262192306, NLM Unique ID 8506268.

[7] Department of Defense, (2020), "Electromagnetic Superiority Strategy, Objective 4.1, https://media.defense.gov/2020/oct/29/2002525927/-1/-1/0/electromagnetic_spectrum_superiority_strategy.pdf#page=20.

[8] A declassified 1976 Defense Intelligence Agency report documented that military personnel exposed to non-thermal microwave radiation experienced symptoms such as headaches, fatigue, dizziness, irritability, sleeplessness, and a lack of concentration. The report contended that "

> If the more advanced nations of the West are strict in the enforcement of stringent exposure standards, there could be unfavorable effects on industrial output and military functions. The Eurasian Communist countries could, on the other hand, give lip service to strict standard, but allow their military to operate without restriction and thereby gain the advantage in electronic warfare techniques and the development of antipersonnel applications.

Defense Intelligence Agency, "Biological Effects of Electromagnetic Radiation (Radiowaves and Microwaves), Eurasian Communist Countries" (1976),

NIR radiation of various sorts came to cover a large part of the developed world very rapidly, and the risks associated with these multiple artificial sources covered the human environment within a few decades. The figure below illustrates the historical increase in wireless exposures. Frequencies are differentiated horizontally, with cellular networks in the center of the diagram. Each step of the vertical axis (in W/m²) represents a thousand-fold increase in exposures.[9]

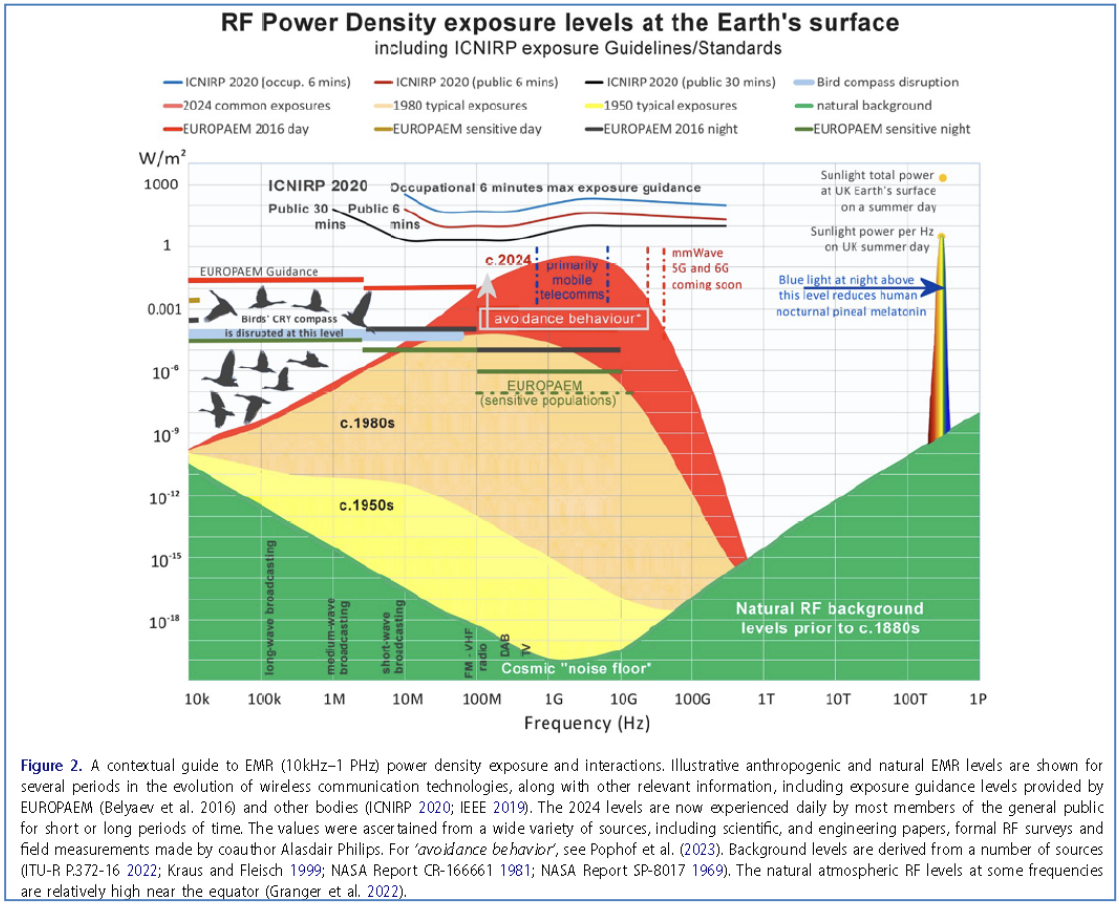

Figure 2. A contextual guide to EMR (10kHz–1 PHz) power density exposure and interactions. Illustrative anthropogenic and natural EMR levels are shown for several periods in the evolution of wireless communication technologies, along with other relevant information, including exposure guidance levels provided by EUROPAEM (Belyaev et al. 2016) and other bodies (ICNIRP 2020; IEEE 2019). The 2024 levels are now experienced daily by most members of the general public for short or long periods of time. The values were ascertained from a wide variety of sources, including scientific, and engineering papers, formal RF surveys and field measurements made by coauthor Alasdair Philips. For *'avoidance behavior'*, see Pophof et al. (2023). Background levels are derived from a number of sources (ITU-R P.372-16 2022; Kraus and Fleisch 1999; NASA Report CR-166661 1981; NASA Report SP-8017 1969). The natural atmospheric RF levels at some frequencies are relatively high near the equator (Granger et al. 2022).

https://ia800203.us.archive.org/14/items/cia-and-ussr-research-on-electromagnetic-frequencies-collection/%5BDIA%5D%20Adams%201976%20-%20BIOLOGICAL%20EFFECTS%20OF%20ELECTROMAGNETIC%20RADIATION%20%28RADIOWAVES%20AND%20MICROWAVES%29%20EURASIAN%20COMMUNIST%20COUNTRIES.pdf#page-5.

[9] Henshaw DL, Philips A., "A mechanistic understanding of human magnetoreception validates the phenomenon of electromagnetic hypersensitivity (EHS)," Int J Radiat Biol. 2025;101(2):186-204, doi: 10.1080/09553002.2024.2435329, Epub 2024 Dec 9. PMID: 39652433, https://pubmed.ncbi.nlm.nih.gov/39652433/#page=2.

The literature exposes that the power and telecommunications industries deliberately created a deep chasm in the public's mind between the obvious dangers of ionizing radiation and those of wishfully nontoxic NIR.[10] The U.S. Government, especially the military, worked in tandem with industry to hide the growing and now overwhelming evidence of risk and ongoing harm.

4. World Radiation Safety Framework

In June 1965, as industry was awakening to the importance of the NIR safety issue, the IRPA was established as the international professional organization to implement the International Commission of Radiological Protection (ICRP) principles for **all** radiation protection (IR and NIR). At the 1972 IRPA Congress, a session specifically on NIR was organized, leading to the creation of the International Non-Ionizing Radiation Committee (INIRC) in 1977. IEEE also dealt early on with safety concerns at both ends of the electromagnetic spectrum. IEEE established separate working groups for 60 Hz power frequencies at Extra-Low Frequencies (ELF) (Technical Committee 95, Subcommittee 3) and for wireless at radio-frequencies (RF, C95.1). Scientific work surrounding NIR safety in the 1960s and 1970s had established that biological systems could respond to weak electromagnetic fields at levels well below those causing significant shocks or heating both at ELF and RF. Industry became more and more involved in NIR safety, realizing the potentially substantial consequences of future regulatory developments.

At the 7th IRPA International Congress in 1992, INIRC was chartered as the *independent* International Commission on Non-Ionizing Radiation Protection (ICNIRP). The ICNIRP was to perform a function similar to that of the ICRP for ionizing radiation since 1928, but for NIR. To this end, the IRPA issued ICNIRP with its "Statute of Creation" according to which the *ICNIRP must maintain close contact and collaborate with the ICRP and ICRU* (International Commission on Radiation Units and Measurements) and must submit its recommendations, for comments, to the IRPA-Executive Committee and all Radiological Protection Societies at least 90 days before publication.[11] The first president of ICNIRP was Michael H. Repacholi, the champion of the thermal approach to NIR safety until today. The thermal approach claims that the only true effects of NIR is its ability to heat material as happens in a microwave oven and that all other impacts are "unsubstantiated."

ICNIRP benefited from its connection with ICRP, which allowed it to gain influence with international authorities such as the World Health Organization (WHO). Unfortunately, the ICNIRP proceeded to use its independence to cater to the needs of industry, failing to follow the ICRP philosophy that it was expected to enforce. It is only in 2020 that international radiation specialists got around to reminding the ICNIRP of its duties.

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[10] Héroux, P., "Building the gulf of opinions on the health and biological effects of electromagnetic radiation," Frontiers in Public Health, Vol. 13 (2025), DOI=10.3389/fpubh.2025.1589021, ISSN=2296-2565, https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2025.1589021.

[11] Charter of ICNIRP (2024), https://cipracem.org/charter-of-icnirp/#page=3.

5. USA: Federal Communications Commission

The Federal Communications Commission claims exclusive authority over private industry activities involved in artificially generated NIR. The FCC's role is to manage the orderly operation of the electromagnetic spectrum within the United States made available for public use. Since various technological applications prefer specific frequency ranges to nest their operations, allocating bands of the spectrum has become a rivalrous process. This management of emissions is a mandate given to the FCC by the US Congress, but these emissions unavoidably involve the exposure of all US citizens to a new type of electromagnetic radiation: wireless frequencies were never part of Earth's natural environment (graph in section 3). Since the FCC has no indigenous health expertise, it needed to gather advice from other US agencies about the health impacts of exposures. FCC ostensibly turned to the Environmental Protection Agency (EPA) and the Food and Drug Administration (FDA).

6. USA: Environmental Protection Agency

The EPA has an ongoing mandate to issue protection limits for IR and later developed expertise pertinent to NIR. As cellular phones were becoming immensely popular in the early 1990s, Congress defunded the agency's NIR research efforts in 1996, just as the EPA was poised to release the first phase of its safety limits for radiofrequency radiation. The defunding was linked to pressure from the industries that would have been affected by stricter regulations. Even though it has jurisdiction, EPA does not regulate NIR emitted by electrical devices such as cell phones.[12] It has deferred to the FCC.

Simultaneously, the 1996 Telecommunications Act directed the FCC to complete its ongoing environmental review on NIR emissions.[13] The Commission proceeded to largely maintain the basic structure first applied in 1985 based on ANSI/IEEE thermal-only based limits, slightly modified and supplemented by these groups and the relatively new ICNIRP. These limits did not incorporate the more stringent limits the EPA had been considering, which would have taken more account of long-term, non-thermal biological effects of NIR.

7. USA: Food and Drug Administration

The Radiation Control for Health and Safety Act of 1968 mandates the FDA to regulate electromagnetic emissions and exposures from electronic products, both medical and non-medical, through performance standards and by working with manufacturers to minimize unnecessary exposure. Due to the rapidly growing use of cell phones in the 1990s and the limited information about the possible health effects of long-term exposure to the non-thermal levels of radiofrequency radiation (RFR) they emit, the FDA formally asked the National Toxicology Program (NTP) to investigate with "high priority" the health effects of cell phones in 1999. FDA

[12] https://www.epa.gov/radiation/radiation-resources-outside-epa.

[13] Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56, § 704(b) (1996) ("RADIO FREQUENCY EMISSIONS.—Within 180 days after the enactment of this Act, the Commission shall complete action in ET Docket 93–62 to prescribe and make effective rules regarding the environmental effects of radio frequency emissions.")

determined that "animal experiments are crucial because meaningful data will not be available from epidemiological studies for many years due to the long latency period between exposure to a carcinogen and the diagnosis of a tumor" and that such studies would "provide the basis to assess the risk to human health."[14] The resulting large-scale animal studies by the NTP, which cost several tens of millions, were published as final reports in November 2018. But in an unusual step, the NTP director elected to release some results early in June 2018 because

- given widespread cell phone use, even a small increase in disease incidence could have major public health implications;
- high level of public and media interest in the study;
- the tumor types observed in these studies are similar to those found in human studies of cell phone use; and
- the results support the International Agency for Research on Cancer (IARC) classification of radiofrequency radiation as potentially cancer-causing in humans.[15]

Despite the above, as the results travelled from the NTP laboratory to FDA high administration, Jeffery Shuren, director of the FDA's Center for Devices and Radiological Health was reassuring about the results, stating that the high cellular phone exposure limits of IEEE-ICNIRP based on heat were safe. The spin was based on claims that (1) animal experiments are not relevant to human health, and (2) the animal testing was not performed at typical human exposures. Both arguments fly in the face of toxicological science in that animals have always been accepted as surrogates for humans in toxicity testing, and that testing is always done at higher than typical exposure doses so that savings can be achieved in the tests both on the number of animals used and on their duration.

The NTP results, which were designed specifically to gauge the carcinogenicity of cell phone signals were dismissed, and Shuren recommended that safety limits not be disturbed. Shuren went on to claim that his decision was based on a learned assessment of the whole of "the science" and that FDA would keep an eye on the evolution of things.[16] But in fact, "the science" was not what Shuren claimed and, as the *EHT* court found,[17] his denial was "conclusory" and lacked a "reasoned explanation."

Groups of scientists have repeatedly challenged ICNIRP's thermal limits over the years: the Freiburger Appeal (2002), the Benevento Resolution (2006), the Bioinitiative report (2012), the International EMF Scientist Appeal (2015), the 5G Appeal (2017) and the EMF Call (2018).

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[14] FDA letter to NTP, May 19, 1999, pp. 2, 3, 7, available at https://ehtrust.org/wp-content/uploads/FDA-Nomination-for-Cell-Phone-NTP-Study-.pdf.

[15] Wyde (2016). NTP Toxicology & Carcinogenicity Cell Phone Radiofrequency Radiation Studies. Presentation at BioEM 2016 Meeting (Ghent, Belgium). June 8, 2016. http://ntp.niehs.nih.gov/ntp/research/areas/cellphone/slides_bioem_wyde.pdf.

[16] https://www.fda.gov/news-events/press-announcements/statement-jeffrey-shuren-md-jd-director-fdas-center-devices-and-radiological-health-recent-national#:~:text=We+respect+the+recently+released,energy+exposure+from+cellular+phones.

[17] *Environmental Health Trust*, 9 F.4th at 904-905.

Two reports by the IARC had already linked EMR to cancer at both ELF (2002) and RF (2013) frequencies. IARC documented its thinking in 925 pages of detailed analysis. We have yet to see a rebuttal of these reports from the FDA. If the FDA took the health of the public "extremely seriously," it would be impossible to "continue to believe" that present EMR limits protect US citizens.

8. Federal Communications Commission Adheres to ICNIRP

FCC is a US government agency, while IEEE is a corporation of professional electrical and electronics engineers based in New York, and the ICNIRP is a non-government organization based in Munich, Germany specialising in non-ionizing radiation protection and funded by grants from "public bodies." Failure of the FCC to get real input from US government agencies such as the EPA or FDA left it in a position to rely for its own health recommendations on professional organizations such as the IEEE's C95.1 committee or to acquire international scope using a foreign organization, the ICNIRP.

IEEE had taken the baton of NIR safety from the ANSI and issued the IEEE C95.1 standard in many successive versions: 1966, 1974, 1982, 1991, 2005 and finally 2019. These recommendations concern maximum permissible exposure (MPE) levels to protect against "established" adverse health effects from electromagnetic fields. The IEEE has refused to accept non-thermal NIR effects as established, so it still bases its limits on the thermal paradigm, despite increasing internal debate challenging the assumption.[18]

ICNIRP is a Commission of up to 14 members with scattered scientific backgrounds that are elected to the commission in a closed internal procedure every four years. Decisions on who to invite in are taken by ICNIRP itself. According to two members of the European Parliament, many "scientists" on the Commission are not trained specifically on RF EMF, and cannot make a professional judgment on this subject, while the minority that are trained are very closely related to industry.[19] ICNIRP is used by industry to give IEEE's opinions a more international and less professional (self-serving) scope. Many observers claim that the recommendations of ANSI, IEEE, ICNIRP and finally FCC are more influenced by engineering and a policy of ensuring widespread and "efficient" wireless service availability even in the face of significant health risks.

The views of IEEE, ICNIRP and FCC on NIR safety are highly convergent if not redundant: all have safety-based thermal limits (10 W/m²), ignore long-term effects of radiation, and have exposure averaging times (which allow one to ignore crest or pulsed exposures and all aspects of signal modulation) that vary between 6 and 30 minutes.

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[18] N. Aalam, "Radio frequency radiation exposure, health hazards and risk assessment strategies," 2017 International Conference on Innovations in Electrical Engineering and Computational Technologies (ICIEECT), Karachi, Pakistan, 2017, pp. 1-1, doi: 10.1109/ICIEECT.2017.7916592, available at https://ieeexplore.ieee.org/document/7916592.

[19] Buchner K, Rivasi M., "The International Commission on Non-Ionizing Radiation Protection: Conflicts of interest, corporate capture and the push for 5G," Brussels June 2020**,** https://klaus-buchner.eu/wp-content/uploads/2020/06/ICNIRP-report-FINAL-19-JUNE-2020.pdf.

	IEEE C95.1-2019	ICNIRP 2020	FCC 47 CFR 1.1310
Public Limits (2 GHz)	10 W/m²	10 W/m²	10 W/m²
SAR to Power Density transition	6 GHz	6 GHz	100 GHz
Time Averaging	25 minutes	6 minutes	30 minutes
	Professional	International	US Regulation

9. ICNIRP's Science Background

Current EMR emission/exposure limits were established in the late 1990s, based on common scientific assumptions and research, protection from acute, short-term thermal (heating) effects. Both stem from behavioral studies conducted on animals in the 1980s, which identified a threshold for adverse effects (behavioral disruption) at a whole-body Specific Absorption Rate (SAR)[20] of approximately 4.0 W/kg. Both apply a 10-fold safety factor for occupational exposure (0.4 W/kg whole body SAR) and an additional 5-fold safety factor (total 50-fold) for the general public (0.08 W/kg whole body SAR).[21] The primary objective of both the FCC and ICNIRP guidelines is prevention of excessive tissue heating from short-term exposure, an approach that has been criticized for ignoring long-term, non-thermal effects. Both organizations reaffirmed these limits around 2020, despite calls for a reassessment based on newer research into potential long-term health impacts.

The single difference between FCC and ICNIRP is that FCC averages SAR over 1 gram of tissue, while ICNIRP averages over 10 grams of tissue. This means that ICNIRP is slightly more permissive. Many observers believe that ICNIRP acts as an industry "scout" testing the tolerance of national agencies and the public as it steers towards higher exposures made necessary by the introduction of new generations of devices such as 5G. The FCC is obviously influenced by the IEEE's C95.1 2019 standard, while ICNIRP's influence is powerful within the European Union and many other countries.

10. Is There a Hazard or Not?

Industry handles the issue of non-ionizing electromagnetic radiation (NIR) health effects by warning us against hazards (heat) that its designs are unlikely to create. No one fears being cooked by his cell phone. The industry's "thermalist" discourse acknowledges the acute effects of temperature rise, which are actually remote except in very unusual situations, but ignores the real non-thermal chronic risks, which it labels as "unsubstantiated." This position rests on the

[20] The Specific Absorption Rate, intended to measure of radiation exposure, is the number of Watts (Joule or energy per second) absorbed per unit weight of the body, delimited in the shape of a cube. Unit is Watt per kilogram.

[21] Héroux, P.; Belyaev, I., Chamberlin, K.; Dasdag, S., De Salles, A.A.A., Rodriguez, C.E.F., Hardell, L., Kelley, E., Kesari, K.K., Mallery-Blythe, E., et al. "Cell Phone Radiation Exposure Limits and Engineering Solutions," Int. J. Environ. Res. Public Health 2023, 20, 5398. https://doi.org/10.3390/ijerph20075398.

physical properties of the radiation, specifically that (1) NIR is non-ionizing, so inoffensive and (2) the energy communicated by the radiation to living tissues is much smaller than the thermal molecular energy of the tissue itself, and so will be negligible. Although these statements may be convincing for the lay public, they have no scientific value. And the reason why these arguments have convinced the engineering community and politicians is that both are profoundly uninformed about the most important element in this debate, the mechanics of life systems.

The refutation of arguments (1) and (2) stems from 5 tenets.

1. Life is the transformation of elements into organized structures that construct, repair and reproduce themselves. According to the 2nd Law of Thermodynamics, a foundational principle in physics, any such "organization" inevitably leads to a decrease in entropy and so must be compensated by an increase in entropy (or disorder) elsewhere to restore balance ($\Delta S \geq 0$). This is why Erwin Schroedinger referred to life as "neg-entropy."[22]

2. In the mitochondria of animals or the chloroplasts of plants, this entropic shuffle is powered by the energy of Adenosine Triphosphate (ATP).

3. ATP is created by the flow of electrons and protons. If either of these currents stop, the living cell dies.

4. Air breathing organisms place the electron transport chain at the cellular level between their food and the oxygen they breathe. Free radicals inevitably escape from the electron transport chain, restoring the balance of entropy.

5. According to the principle of superposition (from Maxwell's equations), the flows of the electron transport chain and of the protons generating ATP are both currents that are perturbable by any level of electromagnetic fields from the external environment, pointing to a no-threshold risk dependency. Maxwell's equations thus extend the range of biologically active EMR intensities from ICNIRP's thermal threshold (4.0 W/kg) all the way down to zero.

Bringing these five points together, one can conclude that:

- ionization is irrelevant to the health effects of NIR debate because living tissues are pre-ionized due to the mechanism of metabolism itself, and

- the action of NIR on living tissues does not compete with the energy of molecules, as the fields act predominantly on already existing electronic and protonic currents, not on molecules. Consequently, there is no theoretical minimum amplitude restraining the action of weak NIR on living systems.

This is similar to what the International Commission on Radiological Protection (ICRP) found for ionizing radiation: there is no identified dose threshold for those radiation effects

[22] E. Schrodinger. What is life? the physical aspect of the living cell. Cambridge Paperbacks Science, Reprinted edition, Cambridge University Press, Cambridge, 2010.

classified as "stochastic" (ACGIH 2024, acgih.org). The ionizing radiation dose limits are selected so that the risk of inducing a fatal cancer during the lifetime of the exposed individual is less than 1/1000 per year.

The sensitivity to NIR of the metallic antennas used in electrical engineering is due to some electrons within the metal behaving as a degenerate Fermi gas, so that they can be driven by any intensity of NIR field.

The electrical characteristics of the human body differ from those of a metallic antenna. While metallic conductors are entirely passive, electrons and protons need to be actively liberated by the metabolism of living tissues to make them conductive. Further, its electrons and protons propagate over distances of 100-200 nanometers, and their paths are partly intra-molecular (jumping from one site to another within a molecule) and partly in the liquid conductive media surrounding the intermembrane space of mitochondria.[23] These electric properties of the human body, liberated charges and conductive paths, turn living things into an incidental antenna and receiver for NIR.[24]

Industry interests devised a strategy to deviate attention from the real health impact problems towards a restricted metric (heat) that produces very high field thresholds of action in such a way as to eliminate any consideration of the interactions between NIR and human health. The interaction that we describe between the currents in mitochondria and environmental electromagnetic fields is based on solid scientific principles and show that non-thermal effects of NIR cannot be discounted as they have been by FCC-ICNIRP-IEEE in the past. The demise of ICNIRP's *red hot herring* is inevitable.

11. Is ICNIRP-IEEE's Science Sound?

Unfortunately, the ICNIRP did not fully comply with the requirements established by the IRPA in its 1992 "Statute of Creation." This explains why, 30 years later, the "Protection System for NIR" was found to be incompatible with the protection techniques established by the ICRP, and to be neither satisfactory nor effective. This comment mirrors an internal report of re-insurer Swiss Re which has explicitly classified EMR and 5G mobile networks developments as "off-the-leash" risks.[25]

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[23] Héroux, P., "The collision between wireless and biology," (2025) Heliyon, Vol. 11, Issue 10, doi: 10.1016/j.heliyon.2025.e42267, 10.1016/j.heliyon.2025.e42267, doi: 10.1016/j.heliyon.2025.e42267, https://doi.org/10.1016/j.heliyon.2025.e42267.

[24] In physics anything that is conductive is a "receiver." Many structures are conductive. One example is a power line, which can gather and propagate RF and electrical energy from external sources including lightning strikes. Living things are also conductive so they too are "receivers."

[25] Swiss Re classified electromagnetic fields as an "emerging risk" in 2013 and still maintains that position. https://www.jrseco.com/wp-content/uploads/electromagnetic_radiation_risk_assessment_swiss_re.pdf#page+12; https://www.swissre.com/institute/research/sonar/sonar2019/SONAR2019-off-the-leash.html. Lloyd's also refuses to underwrite coverage for potential liability resulting from electromagnetic

In order to improve the control of NIRs that will allow protection of the population and environment from NIR and to direct the activities of the ICNIRP, the ICNIRP met in 2020 with representatives from the ICRP (Jacques Lochard), the IRPA (Sig Magnusson), the ILO (Shengli Niu), the UNSCEAR (Ferid Shannoun) and the WHO (Emilie Van Deventer). It was determined that, in the future, the Reference Document managing protection against NIRs will be ICRP-103. ICRP-103 is known officially as "The 2007 Recommendations of the International Commission on Radiological Protection."[26] It provides a system of radiation protection based on the fundamental principles of justification, optimization, and dose limitation. A new document of ICNIRP Principles was adopted which is considered an International Consensus and must be followed to protect the population and *environment* from NIRs.[27] This international agreement requires ICNIRP to take into consideration protection of the environment. The agreement specifically mentions 10 important criteria that had not been previously met by the ICNIRP regulations.

1. Dose, not Exposure rate
The important parameter for radiation protection should be the *Dose, not the Exposure rate* (SAR) used by the ICNIRP in its protection guidelines. Health effects are proportional to the exposure rate multiplied by the exposure time.

2. A Single Non-Ionizing/Ionizing Spectrum
A Single joint Spectrum of Electromagnetic Radiation is established, which includes NIR and IR, given that the mechanisms of action and their consequences are *comparable.*

3. Basic Principles of Protection
The 3 Basic Principles of Radiation Protection must be applied to the entire spectrum: 1. The Principle of Justification, 2. Optimization of Radiation Protection, and 3. Dose Limits, to avoid deterministic effects and to keep stochastic effects as low as possible.

4. Precautionary Principle
The Precautionary Principle must always be applied, even in cases where scientific knowledge is not yet complete and further research is required.

5. Reference is ICRP-103
The same criteria must be met for NIR and IR, and the Reference Standard for both radiations must be the ICRP-103 (The 2007 Recommendations of the International Commission on Radiological Protection, see URL above).

6. All Studies Considered for Causation
To establish *Causality*, all available information must be used: case studies + in vitro studies, + animal studies, etc, and Sir Bradford Hill's 9 Principles *must always be applied to move from statistical association to Causation*.

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radiation. https://www.jrseco.com/lloyds-insurance-company-does-not-cover-health-damage-caused-by-electromagnetic-radiation/.

[26] https://www.icrp.org/publication.asp?id=ICRP-Publication-103.

[27] https://cipracem.org/wp-content/uploads/2024/03/1-icnirp-principles-2020.pdf.

7. Special Groups
Pregnant women, children, and patients, particularly those with cancer, are categories of increased risk requiring specific Dose Limits.

8. Conservative Criterion
The Conservative Criterion should be applied (the worst-case scenario of irradiation should always be analyzed before establishing the necessary protective measures). For example, consider the combination of different frequencies, exposure to other carcinogens, synergy with ionizing radiation, modulation, pulsed radiation, polarization, etc.

9. ICNIRP Integration with ICRP
The ICNIRP is independent but must always maintain a very close relationship with the IRPA, the ICRP, and the ICRU to establish radiation protection measures.

10. Practicality of Safety Limits
The ICRP and the ICNIRP have the common objective of providing protection against the adverse effects of radiation, but "without unduly limiting the benefits associated with its use."[28]

The consequences of this international intervention on ICNIRP should be considerable.

12. Eight Things to Change in FCC's Safety Vision

I. Add a Cumulative Dose Metric

ICNIRP-FCC safety recommendation uses the SAR or its derived E (V/m), H (A/m) or Power Density (mW/cm²) as basic variables.[29] The tolerated amplitudes of these variables are based on temperature rises. There is no cumulative exposure index for NIR exposures. It resets the hazard estimate to zero at each interval of 6 or 30 minutes. This 6- or 30-minute exposure can be repeated an unlimited number of times, which makes this exposure index equally blind to past and future exposures. The ICRP has correctly noted this is a glaring omission, as impacts on humans must be rated as exposure multiplied by exposure time. ICNIRP's error is based in its conviction that evanescent heat escapes subjects without cumulative harm, while ICRP believes that health effects of radiation are cumulative. Physicists are strict and knowledgeable about the measurement methods of radiation and its effects, and they believe that this cumulative index must be implemented for NIR.

A brief review of ionizing radiation hygiene which uses two units, the Gray (Gy) and the Sievert (Sv), is useful to clarify the international view of radiation impacts.[30]

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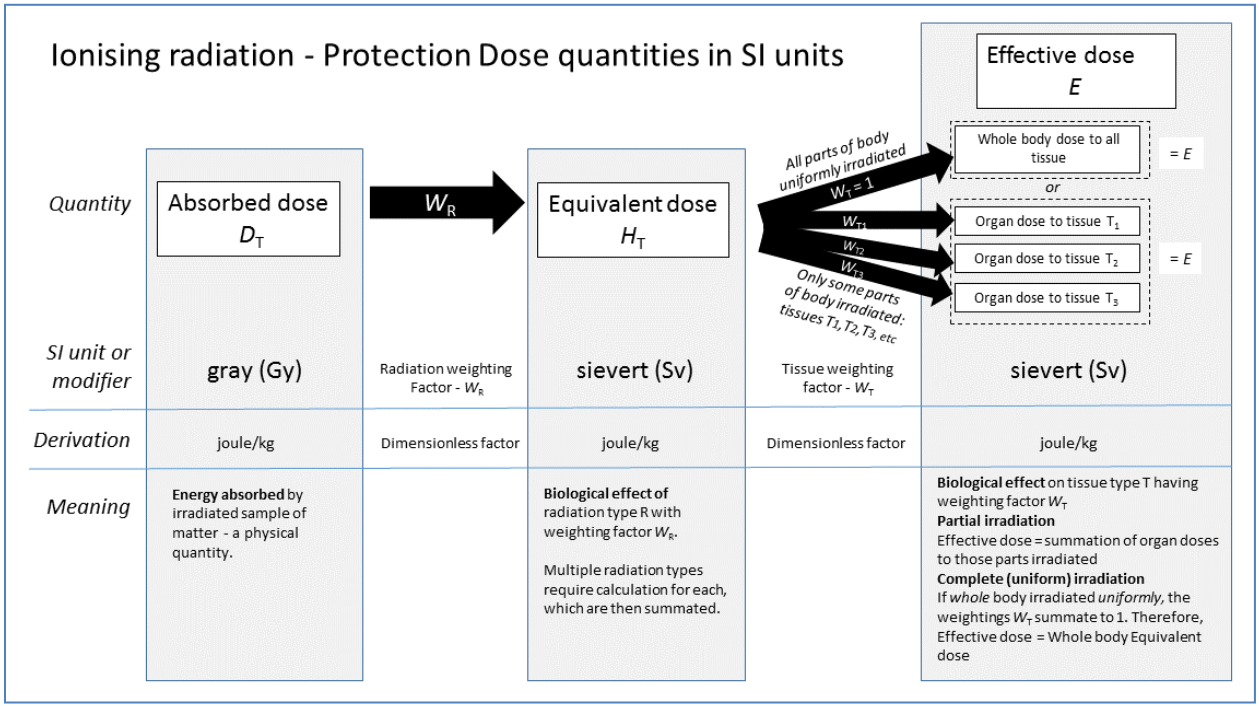
[28] https://cipracem.org/wp-content/uploads/2024/03/1-icnirp-principles-2020.pdf.
[29] https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-1/subpart-I/section-1.1310.
[30] Ferrari C, Manenti G, Malizia A., "Sievert or Gray: Dose Quantities and Protection Levels in Emergency Exposure Sensors (Basel)," 2023 Feb 8;23(4):1918, doi: 10.3390/s23041918, PMID: 36850517, PMCID: PMC9959072, https://pmc.ncbi.nlm.nih.gov/articles/PMC9959072/.

The Gray is the international unit of absorbed radiation dose, defined as one Joule of energy absorbed per Kilogram of matter (1 Gy = 1 J/kg). It measures the energy deposited by ionizing radiation in a material and is used in fields like radiotherapy and food irradiation. It is very similar to ICNIRP's Specific Absorption Rate (SAR), which is defined as Watts per Kilogram. Since one Watt is one Joule per second, both units are energy based if one considers ICNIRP's time element of 6 or 30 minutes.



https://commons.wikimedia.org/w/index.php?curid=29827386

When it comes to effects on human health, ionizing radiation uses the Sievert (Sv) which is derived from the Gray, but takes into account the effectiveness (W_R) of multiple types of radiation in creating cancer damage. If ICNIRP's safety thinking was complete, it would include a NIR weighting factor according to various frequencies. A tissue weighting factor (W_T) is also used to obtain the Effective Dose (E) from the Sievert value. In the case where the body is uniformly exposed, the Sievert value converts "as is" into the Effective Dose in Sv.
If ICNIRP's safety thinking was complete, it would include another NIR weighting factor according to the biological impact of NIR on various tissues or diseases.

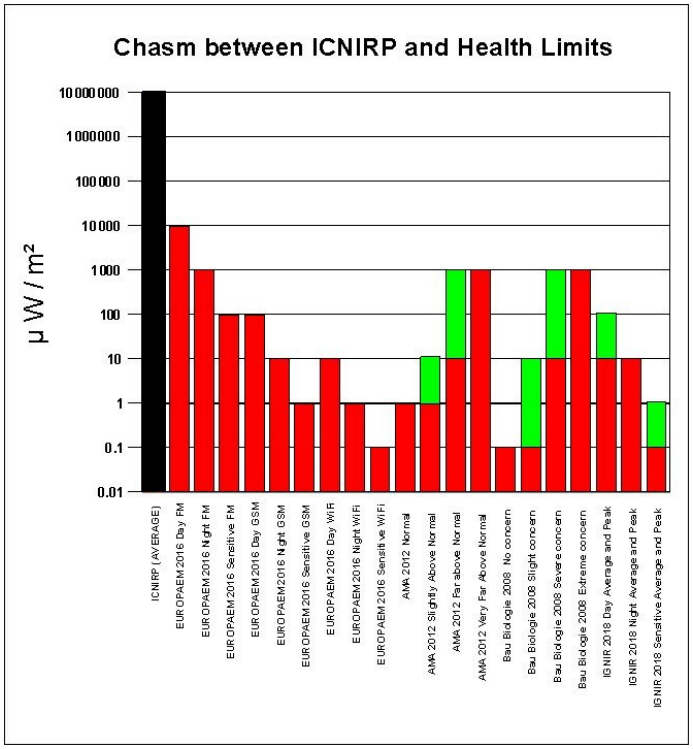
But the most important element is that the Effective Dose in Sv is cumulated over time when assessing the risk of chronic health effects, specifically cancer, which is considered the dominant risk for IR. The risk of developing cancer is viewed as a stochastic effect, meaning that the likelihood of cancer occurrence is proportional to the total accumulated dose, with no safe threshold below which the risk disappears (the linear no-threshold model).
An exposure of 0.1 Sv / year increases lifetime cancer risk by approximately 0.5%**.**
To satisfy ICRP's scientific criteria, ICNIRP should study chronic dose responses for the various diseases associated with NIR, and determine the acceptable cumulative exposures in Power Density-years (µW-Years/m²) that will keep health impacts within acceptable limits.

II. Forget the "Non-Ionizing" Argument

Even though IR's capacity for ionization is absent in NIR, ICRP believes that similar non-thermal risks exist across the electromagnetic spectrum, and that in addition to acute deterministic risks like burns and shocks, chronic (stochastic or non-thermal) risks must be considered as well. Further support for this position is provided by basic principles such as the Second Law of Thermodynamics (10.1) and Maxwell's Equations (10.5) whose corollary is the principle of superposition. The need of living systems for instability (Second Law) makes them vulnerable as they are ionized, and the superposition (Maxwell's Equations) of life's fields with those of artificial sources guarantees an action of NIR on biological systems. Thus, industry's presentation of NIR as inoffensive because it is "non-ionizing" has no scientific basis.

III. Hazard Has No-Threshold

ICNIRP chose to rely on a single evanescent physical variable, heat, that it surrounded with a framework that ignores cumulative risks from NIR. In the toxicology of chemical substances, there is a debate over using Threshold vs No-Threshold dose-response rates. But for radiation, the ICRP has determined, based on the Hiroshima-Nagasaki database, that the No-Threshold assumption should be used for regulation.



This IR principle is generously supported in NIR both by epidemiological observations in humans as reported by many recommendations issued by groups independent from industry, specifically Bau-Biologie (2008), the Austrian Medical Association (2012), the European Academy for Environmental Medicine (EUROPAEM, 2016) and the International Guidelines on Non-Ionizing Radiation (2018, updated 2021). When these recommendations are compared to the thermal limits promoted by ICNIRP (in black), we see evidence of human impacts at field intensities one billion times lower (10^{-9}) than the ICNIRP limits. Note also that ICNIRP limits are for averages of the NIR signals, while all other limits use the maximum value attained within a pulse train, usually 10 times higher. The green segments of the graph represent ranges for thresholds rather than single values.

From laboratory work, there is ample evidence of biological effects at extremely small NIR levels, for example at levels 10^{-29} lower than ICNIRP limits.[31] Therefore, the No-Threshold

[31] I.Y. Belyaev, V.S. Shcheglov, Y.D. Alipov, and V.A. Polunin, "Resonance Effect of Millimeter Waves in the Power Range From 10^{-19} to 3 x 10^{-3} W/cm^2 on Escherichia coli Cells at

toxicity dose-response suggested by ICRP is supported by epidemiological evidence and laboratory experiments.

IV. Stochastic/Non-Thermal Effects must be Considered

As explained above, ICNIRP must from now on explicitly take into account not only deterministic (heat) effects, but also stochastic (non-thermal effects). These would be expected to include cancer, reproductive risks, as well as chronic diseases like diabetes, Alzheimer's disease, Parkinson's disease, Amyotropic Lateral Sclerosis, effects on memory and learning, interference with sleep, etc.

A legitimate question arises as to what variables should be used to develop the possible connections between NIR and these various diseases. We do not believe that a heating variable is appropriate for such investigations because it severely limits toxicological thinking. The proper variables to use are the electric (E) and magnetic fields (H) below 300 MHz, and either E or H above 300 MHz, which can be derived from plane-wave power density results of NIR levels in the environment, since the relationship between E and H is consistent in the far-field.

$$Pd = H^2 \times 377\ \Omega = E^2/377\ \Omega$$

Within tissues, E and H (or D for electric displacement and B for magnetic field density) should be used. Algorithms will take into account peak field values as well as pulsing characteristics using the Fourier transform (see VII).

V. Vulnerable Populations must be Considered

ICRP (11.7) also requires paying attention to special groups. This is manifested in ionizing radiation hygiene by lowering limits for subjects at or less than 18 years old, since they have more time to develop cancers, pregnant women because the process of reproduction is particularly vulnerable, and the lens of the eye because it is very superficial. ICNIRP's 2020 limits recognizes in a minor way the vulnerability of pregnant women when it treats pregnant workers as members of the general public, but it does so on the basis of heat only, not recognizing the biologically obvious fact that pregnancy and fetal growth unpack a large number of biological processes that do not occur in the "Standard Anthropomorphic Mannequin." Although ICNIRP distinguishes between occupational and general exposure limits, we will show below (12.VIII) that such categories are more connected to industry interests than to real protection.

The special case of children specifically mentioned by ICRP in 11.7, is easy to illustrate for NIR exposure. The figure at left shows a brain shadowed to display in color the position of the hippocampus (a brain structure crucial for memory and learning). ICNIRP simulations use a large, homogenous, adult male head phantom, the "Standard Anthropomorphic Mannequin" in their simulations. Because of the smaller size and anatomy of a child's brain, the radiation level

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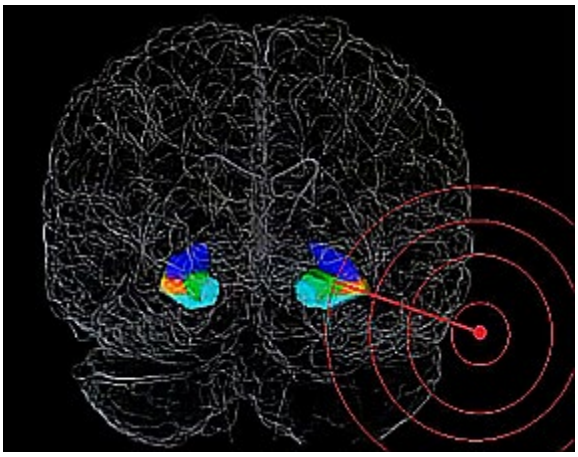
Different Concentrations," Bioelectromagnetics 17:312-321 (1996), https://pubmed.ncbi.nlm.nih.gov/8891190/).



at the hippocampus is 30 times higher for children than for adults.[32] In Europe, Denmark, Finland, Norway and Sweden were the earliest adopters of cellular phones. This year (2025), Nilsson and Hardell report an increase in memory problems in children 5-19 years old by factors of 8.5 in Norway and 60 times in Sweden.[33] The rising NIR exposures are likely to impact academic achievements in these countries.[34]

Groups in special need of protection are also mentioned in 11.7, which means that the Electromagnetically Hyper-Sensitive population is also expected to be given special consideration.[35] In view of the large gap between ICNIRP safety limits and the field levels documented to disturb this sensitive population (12.III), serious measures will be needed to curb deleterious exposures for this population. Some options include the establishment of white zones where EHS victims can establish residence, regulations that limit or eliminate the use of radiating devices in multi-dwelling buildings, as well as the development of NIR-free zones in hospitals and important public places. Failure to do so would dramatize the electromagnetic apartheid that is currently in development within our population.

VI. Adjustments must be Justified

ICNIRP's largest departure from scientific evidence is in dealing with the exposure of different body parts. This flexibility is used in IR hygiene as Tissue Weighting Factor, W_T. But it is there based on vulnerability of the tissue rather than engineering convenience: it reflects the

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[32] Fernandez et al., "Absorption of wireless radiation in the child versus adult brain and eye from cell phone conversation or virtual reality," Environ Res 2018 Nov:167:694-699, doi:10.1016/j.envres.2018.05.013, Epub 2018 Jun 5, https://pubmed.ncbi.nlm.nih.gov/29884550/.

[33] Nilsson, M, Hardell, L, "Increasing Numbers of Children Aged 5-19 Years with Memory Problems in Sweden and Norway," Archives of Clinical and Biomedical Research. 9 (2025): 416-424, https://www.researchgate.net/publication/397309717_Increasing_Numbers_of_Children_Aged_5-19_Years_with_Memory_Problems_in_Sweden_and_Norway.

[34] Byun Y-H, Ha M, Kwon H-J, Hong Y-C, Leem J-H, et al, (2013) "Mobile Phone Use, Blood Lead Levels, and Attention Deficit Hyperactivity Symptoms in Children: A Longitudinal Study," PLoS ONE 8(3): e59742. doi:10.1371/journal.pone.0059742, https://pubmed.ncbi.nlm.nih.gov/23555766/.

[35] Héroux, P., Belyaev, I., Chamberlin, K., Dasdag, S., De Salles, A.A.A., Rodriguez, C.E.F., Hardell, L,; Kelley, E., Kesari, K.K., Mallery-Blythe, E., et al, "Cell Phone Radiation Exposure Limits and Engineering Solutions," Int. J. Environ. Res. Public Health 2023, 20, 5398. https://doi.org/10.3390/ijerph20075398.

relative sensitivity of various tissues to the harmful effects of ionizing radiation.[36] ICNIRP accommodates the use of cell phones held against the head by placing the tolerable limit (SAR) for the head at 25 times higher than that for the whole body average.[37] This permissiveness cannot be physiologically based, as the brain is arguably the tissue most sensitive to and impacted by NIR.

As well, anatomical parts ("extremities," such as hands, wrists, feet, ankles and pinnae) are categorized as more "resistant" not because of any physiological particularity, but because basic human anatomy concentrates fields there, in that they are more exposed in some work procedures, or because an oversight occurred when arranging for homologation of cell phones. The pinna (outer ear) was recategorized as an "extremity" in electromagnetic safety standards in 2004, to allow a favorable assessment of hand-held wireless devices, such as mobile phones, used close to the ear.[38] Such alterations have been frequently made to "safety" limits aimed at accommodating engineering preferences and without consideration of their health consequences.

Another example is that ICNIRP plans a transition from SAR to Power Density as a basic exposure variable above 6 GHz. Since then, dosimetry documents from the engineering community have routinely spread the idea that 5G and further generations of wireless working at higher frequencies will be inoffensive because 26 GHz radiation barely penetrates the first millimeter of the skin.[39] All of this propaganda conveniently forgets that penetration depth for UV light, which is a known carcinogen, is less than 1 mm for UVA, 0.02-0.04 mm for UV-B and 0.01-0.05 for UV-C.

Industry tends to see and propagate only the "facts" and models that facilitate acceptance of its deployments in the public. Here, they conveniently ignore that free nerve endings come extremely close to the surface of the skin, extending into all layers of the epidermis (the outermost layer). Some nerve endings can even be found external to the stratum granulosum, one of the final layers before the dead cells (*stratum corneum*) that form the absolute outer surface (0.01 mm).

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[36] https://icrpaedia.org/Absorbed,_Equivalent,_and_Effective_Dose#:~:text=where-wT-is-the,being-used-is-clearly-stated.

[37] ICNIRP Guidelines for Limiting Exposure to Electromagnetic Fields (100 kHz TO 300 GHz) published in: Health Phys 118(5): 483–524; 2020, https://www.icnirp.org/cms/upload/publications/ICNIRPrfgdl2020.pdf.

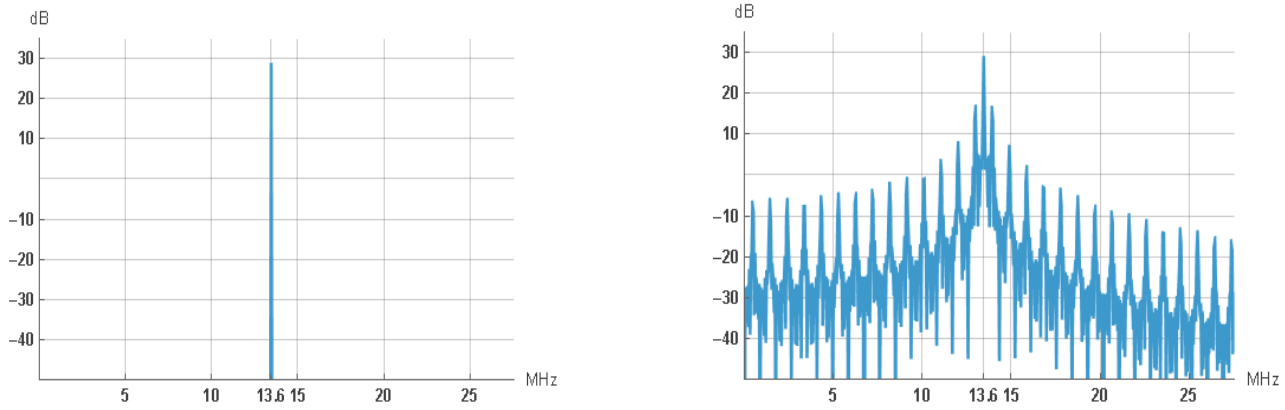
[38] C95.1b-2004, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz - Amendment 2: Specific Absorption Rate (SAR) Limits for the Pinna," https://ieeexplore.ieee.org/document/1378612.

[39] Adekola, S.A., Amusa, K.A. & Biowei, G., "Impact of 5G mmWave radiation on human tissue using skin, cornea (eye) and enamel (tooth) as study candidates," J. Eng. Appl. Sci. 72, 51 (2025), https://doi.org/10.1186/s44147-025-00617-9.

VII. Multiple Radiation or other Components Must be Assessed

The ICRP brings attention to the unacceptable practice of restricting the scope of toxicity investigations or measurements to generate more reassuring conclusions. This underlines the ICNIRP's extensive recourse to technicalities that make exposures disappear.

A - using heat only as a toxicology index eliminates all the NIR non-thermal effects documented in the literature, classifying them as "unreliable." The literature concerned with non-thermal NIR dwarfs the literature concerned with thermal effects;
B - using SAR values averaged over many minutes means that the highest values contained in a signal, which could trigger physiological reactions by their intensity, are completely hidden (attenuated) in the final number rating the exposure. Biological effects are more correlated with peak or crest values of EMR, and this is why this metric is universally used by non-ICNIRP investigations (12.III figure);
C - the mere fact of pulsing signals, which seems to be an inevitable practice in modern digital communications, transforms the signal from a single frequency to an array of sources spread on a frequency spectrum according to the sinc function. An illustration of this phenomenon follows below.



The Radio-Frequency Identification (RFID) system uses tags hidden within objects to track them. Commerce applications are anti-theft tags at a cash counter and taking inventories in a warehouse. One can illustrate the substantial difference between a continuous sine wave emission and a RFID pulse train by performing a Fourier transform (frequency analysis) of the signal. What is authorized by FCC as a single frequency source (at left) is in fact a multitude of sources (at right) when the signal is modulated.

FCC, as a spectrum-allocating agency, can ignore the consequences of this modulation by claiming that the sidelobes generated by the modulation on each side of the carrier (graph above) are too small to cause any harm. But we have already countered this argument in 12.III above. It should be noted that to maintain function ("electromagnetic compatibility" of various devices), electronics benefits from analog and digital filters that allow efficient isolation and exclusion of unwanted EMR components such as RFID's sidelobes. But living systems have no such filters. From a biological point of view, every one of the maxima generated by pulsing is another

opportunity of stimulating a different biological mechanism, as each of the maxima can resonate with different biochemical components.[40]

There is an equivalent to this risk multiplication in chemical toxicology. Injection of a single toxicant can induce the presence of tens of different secondary intermediates and toxicants, due to the biotransformation processes by CYP450 enzymes.[41] A similar phenomenon can occur along the spectrum of pulsed NIR. When one considers the plurality of entirely different signals that increasingly pervade our present environment, from ELF to RF-MW wireless, the final perturbation of these multiple pricks to our well-being can only be guessed at. Rather than pushing experimentation with continuous waves that misrepresent the complexity of even the simplest pulsed signals, it is important to give weight to the collective impact of all components of radiation and of the exposures that are likely to be present in normal environments (for example simultaneous exposure to ELF and RF) to assess properly the real impacts of NIR.[42]

VIII. Controlled/Uncontrolled Distinction is Artificial

IEEE, ICNIRP and FCC have adopted permissible exposures 5 times higher for occupational groups compared to the general population, on the basis that occupational groups are better protected because they have "knowledge" or "control" over their exposures.[43] This quintuple dose for occupational groups is mainly useful for commercial operators to protect themselves from exposure challenges that would disrupt their operations. The physiology of workers is not different from that of the general population and there is no proof that all workers are less vulnerable than the general population to the effects of NIR.

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[40] Gurhan, H., Bajtoš, M., Barnes, F., "Weak Radiofrequency Field Effects on Chemical Parameters That Characterize Oxidative Stress in Human Fibrosarcoma and Fibroblast Cells," Biomolecules 2023, 13, 1112. https://doi.org/10.3390/biom13071112.

[41] Lynch, T, Price, A., "The effect of cytochrome P450 metabolism on drug response, interactions, and adverse effects," Am Fam Physician 2007 Aug 1;76(3):391-6, https://www.aafp.org/pubs/afp/issues/2007/0801/p391.html.

[42] Kostoff and Lau, "Modified Health Effects of Non-ionizing Electromagnetic Radiation Combined with Other Agents Reported in the Biomedical Literature," 2017, https://link.springer.com/chapter/10.1007/978-3-319-50289-2_4; Panagopoulos DJ, "Mobile telephony radiation exerts genotoxic action and significantly enhances the effects of gamma radiation in human cells," Gen Physiol Biophys, 2024 Mar;43(2):103-120, doi: 10.4149/gpb_2023036, Epub 2023 Dec 8. PMID: 38099580., https://pubmed.ncbi.nlm.nih.gov/38099580/.

[43] https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-1/subpart-I/section-1.1310.

Knowledge

For occupational exposures to chemicals, the OSHA Hazard Communication Standard[44] ensures that workers are informed about the hazards of chemicals in the workplace through requirements for labeling, Safety Data Sheets, and employee training. Safety Data Sheets include toxicological information which details the health effects expected from exposure. Industry has a long tradition of fighting the very existence of non-thermal NIR risks not only in the public but also among its employees. Workers exposed to radiation live in an occupational environment in which all NIR risks are likely to be systematically denied. Warnings provided by industry for NIR protection although likely to inform about safety clearances from equipment and their proper use, are very unlikely to contain fair information on actual non-thermal NIR health risks. Employers are more likely to limit their caution to the very improbable heat related scenarios, which means that "stochastic" NIR risks are poorly or not represented at all.

Control

Occupational exposures are limited to work hours but become members of the public at all other times. Do workers have more control over their exposures at their workstations than citizens have over the exposures from their cellular phones? More likely, the control everyone has over NIR risks is a question of personal knowledge and choice. Except for the acute risks of specific workstations that industry currently considers real (the thermal ones), the pretense that there is real control of non-thermal NIR risks within industry is an illusion. And why deny to the more exposed workers the level of protection given to the general public?

Conclusion

By aligning with the thermal opinions of ICNIRP-IEEE in NIR safety, FCC has strayed away from science. FCC's recommendations have no credibility and must urgently be updated. The recommendations do not satisfy the direction of the international radiological community, and run contrary to basic scientific principles and literature.
FCC recommendations are incompatible with:

- Physics, as the Second Law of Thermodynamics mandates ionization of living tissues, making them vulnerable to NIR,
- Biology, as the structure of Oxidative Phosphorylation creates the ideal target for electromagnetic disruption,
- Maxwell's Equations, which enable the actions of NIR fields at any level of intensity, way below thermal ones (a non-threshold dependency), and
- Radiation science, which requires a cumulative metric capable of detecting stochastic-non-thermal effects with a No-Threshold toxicity dose-response, conforming to ICRP-103.

Arguments that discredit FCC and ICNIRP discredit IEEE even more strongly because it was at the origin of the thermal "*red hot herring*" charade. It is not in the interests of industry to

[44] https://www.osha.gov/hazcom.

shortchange its workers or the public on NIR protection since that will create expensive negative health impacts.

The lies about the interaction between NIR and living systems widely spread by industry have not only increased health risks in populations. They have also been instrumental in slowing down the progress of bioelectromagnetics science and medicine. It appears that the FCC recommendations are designed to support the expansion of one industry (wireless) at the expense of others (optical fiber, LiFi). Wired telecommunications (cable and optical fiber) companies offer services that are faster, over time cheaper, more energy efficient, hack-proof, and more reliable and robust (storms, terrorism) than wireless. However, the dominance of wireless threatens the existence of the alternative wired market, leading to a monopoly that will leave behind a fragile, under-performing, and dangerous infrastructure.

Re-insurers Swiss Re and Lloyd's do not insure against electromagnetic radiation risks due to the high level of scientific "uncertainty" surrounding the long-term health effects like cancer or neurological disorders and the potential for catastrophic, long-tail liability claims. Due to these concerns, standard insurance policies, particularly general liability and property insurance plans, commonly include specific "electromagnetic field exclusions" as a market standard. Insurers often compare the risk of NIR claims to that of the asbestos crisis.[45]

Science, specifically physics and engineering, was the base for wireless developments. But deficient engineering designs that ignore human exposures should not be allowed to become the base of science through industry propaganda.

Paul Héroux, Ph.D

[45] https://www.lloyds.com/insights/risk-reports/emf#:~:text=Electromagnetic+fields+from+mobile+phones,from+mobile+phones:+recent+developments
https://www.quantadose.com/general-insurance-exclusions-for-emfs-electromagnetic-fields/#:~:text=Other+Major+Insurers-,Lloyd's+of+London,large+future+losses+or+litigation.

ATTACHMENT 2
OCEANSIDE RADIOFREQUENCY REPORT

Radio Frequency Emissions Compliance Report for Verizon Wireless

Site Name:	**CANNON SUNSET**	**Site Structure Type:**	**Stadium Light Pole**
Address:	**4940 Lake Boulevard**	**Latitude:**	**33° 10' 26.490"N**
	Oceanside, CA 92056	**Longitude:**	**117° 15' 14.962"W**
Report Date:	**June 25, 2025**	**Project:**	**NSB**

Compliance Statement

Based on information provided by Verizon Wireless and predictive modeling, the **CANNON SUNSET** installation proposed by Verizon Wireless will be compliant with Radiofrequency Radiation Exposure Limits of 47 C.F.R. §§ 1.1307(b)(3) and 1.1310. RF alerting signage and restricting access to the antenna to authorized personnel that have completed RF safety training is required for Occupational environment compliance. The proposed operation will not expose members of the General Public to hazardous levels of RF energy at ground level or in adjacent buildings.

Certification

I, Tim Alexander, am the reviewer and approver of this report and am fully aware of and familiar with the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation, specifically in accordance with FCC's OET Bulletin 65. I have reviewed this Radio Frequency Exposure Assessment report and believe it to be both true and accurate to the best of my knowledge.

SIGNED, 25 JUN 2025

General Summary

The compliance framework is derived from the Federal Communications Commission (FCC) Rules and Regulations for preventing human exposure in excess of the applicable Maximum Permissible Exposure ("MPE") limits. At any location at this site, the power density resulting from each transmitter may be expressed as a percentage of the frequency-specific limits and added to determine if 100% of the exposure limit has been exceeded. The FCC Rules define two tiers of permissible exposure differentiated by the situation in which the exposure takes place and/or the status of the individuals who are subject to exposure. General Population / Uncontrolled exposure limits apply to those situations in which persons may not be aware of the presence of electromagnetic energy, where exposure is not employment-related, or where persons cannot exercise control over their exposure. Occupational / Controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment, have been made fully aware of the potential for exposure, and can exercise control over their exposure. Based on the criteria for these classifications, the FCC General Population limit is considered to be a level that is safe for continuous exposure time. The FCC General Population limit is 5 times more restrictive than the Occupational limits.

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Table 1: FCC Limits

Frequency (MHz)	*Limits for General Population/ Uncontrolled Exposure*		*Limits for Occupational/ Controlled Exposure*	
	Power Density (mW/cm^2)	**Averaging Time (minutes)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
30-300	0.2	30	1	6
300-1500	f/1500	30	f/300	6
1500-100,000	1.0	30	5.0	6

f=Frequency (MHz)

In situations where the predicted MPE exceeds the General Population threshold in an accessible area as a result of emissions from multiple transmitters, FCC licensees that contribute greater than 5% of the aggregate MPE share responsibility for mitigation.

Based on the computational guidelines set forth in FCC OET Bulletin 65, Waterford Consultants, LLC has developed software to predict the overall Maximum Permissible Exposure possible at any location given the spatial orientation and operating parameters of multiple RF sources. The power density in the Far Field of an RF source is specified by OET-65 Equation 5 as follows:

$$S = \frac{EIRP}{4 \cdot \pi \cdot R^2} \ (\mathrm{mW/cm^2})$$

where EIRP is the Effective Radiated Power relative to an isotropic antenna and R is the distance between the antenna and point of study. Additionally, consideration is given to the manufacturers' horizontal and vertical antenna patterns as well as radiation reflection. At any location, the predicted power density in the Far Field is the spatial average of points within a 0 to 6-foot vertical profile that a person would occupy. Near field power density is based on OET-65 Equation 20 stated as

$$S = \left(\frac{180}{\theta_{BW}}\right) \cdot \frac{100 \cdot P_{in}}{\pi \cdot R \cdot h} \ (\mathrm{mW/cm^2})$$

where P_{in} is the power input to the antenna, θ_{BW} is the horizontal pattern beamwidth and h is the aperture length.

Some antennas employ beamforming technology where RF energy allocated to each customer device is dynamically directed toward their location. In the analysis presented herein, predicted exposure levels are based on all beams at full utilization (i.e. full power) simultaneously focused in any direction. As this condition is unlikely to occur, the actual power density levels at ground and at adjacent structures are expected to be less that the levels reported below. These theoretical results represent maximum-case predictions as all RF emitters are assumed to be operating at 100% duty cycle.

For any area in excess of 100% General Population MPE, access controls with appropriate RF alerting signage must be put in place and maintained to restrict access to authorized personnel. Signage must be posted to be visible upon approach from any direction to provide notification of potential conditions within these areas. Subject to other site security requirements, occupational personnel should be trained in RF safety and equipped with personal protective equipment (e.g. RF personal monitor) designed for safe work in the vicinity of RF emitters. Controls such as physical barriers to entry imposed by locked doors, hatches and ladders or other access control mechanisms may be supplemented by alarms that alert the individual and notify site management of a breach in access control. Waterford Consultants, LLC recommends that any work activity in these designated areas or in front of any transmitting antennas be coordinated with all wireless tenants.

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Analysis

Verizon Wireless proposes the following installation at this location:

- INSTALLATION OF SIX (6) NEW 8'H PANEL ANTENNAS ON DUAL MOUNT BRACKETS.
- INSTALLATION OF THREE (3) NEW 2'-4"H C-BAND PANEL ANTENNAS.
- INSTALLATION OF SIX (6) NEW RRUS

The antennas will be mounted on a 70'-0'' Stadium Light Pole with centerlines LTE 1 (44.2'), LTE 2 (39'), C-Band (48.6'), above ground level for all sectors. Proposed antenna operating parameters are listed in Appendix A. Other appurtenances such as GPS antennas, RRUs and hybrid cable below the antennas are not sources of RF emissions. No other antennas are known to be operating in the vicinity of this site.

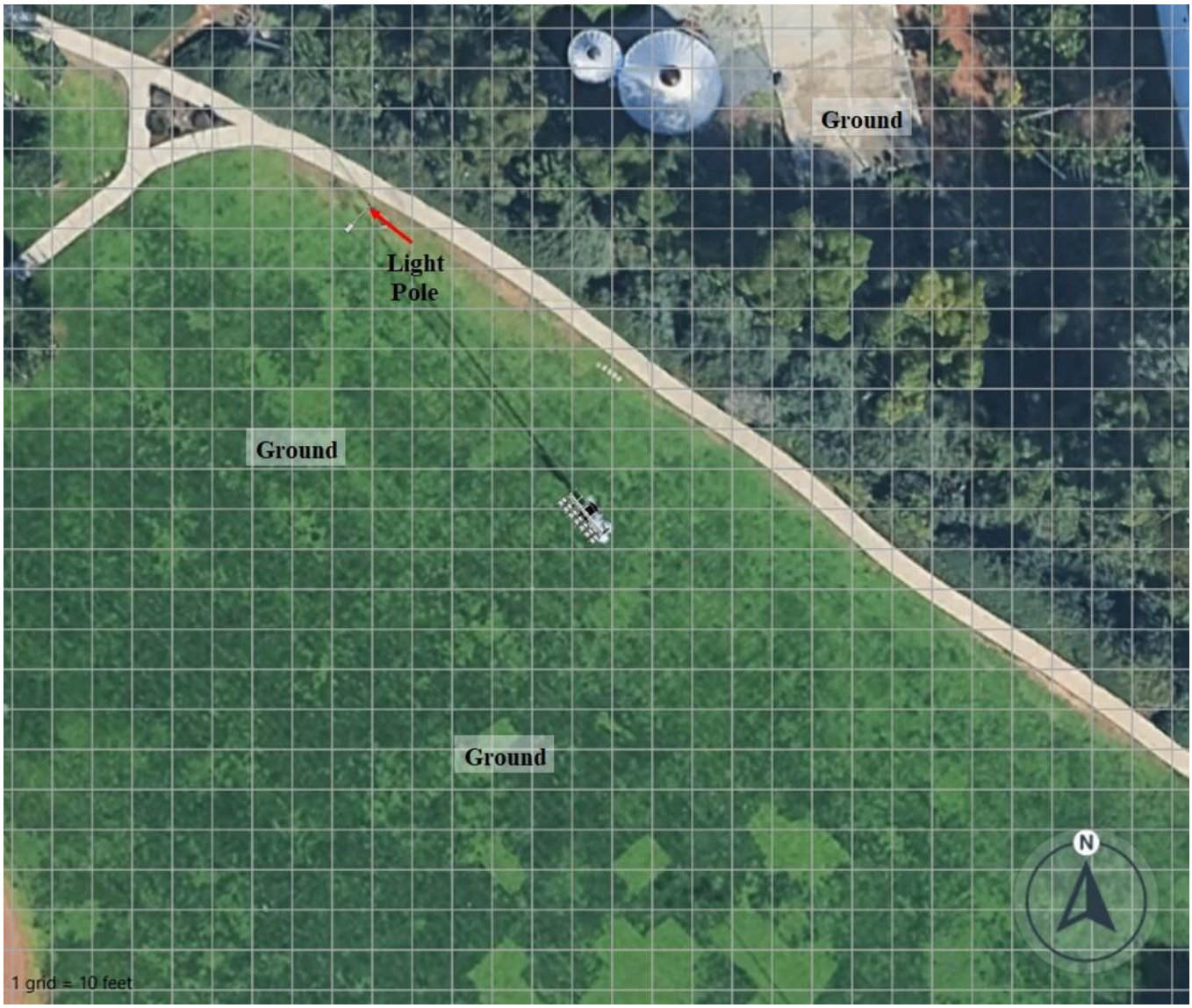

Figure 1: Antenna Locations

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Power density decreases significantly with distance from any antenna. The Panel-type antenna to be employed at this site are highly directional by design and the orientation in azimuth and mounting elevation, as documented, serves to reduce the potential to exceed MPE limits at any location other than directly in front of the antennas. For accessible areas at ground level, the maximum predicted power density level resulting from all Verizon operations is 43.0% of the FCC General Population limits. For accessible areas at Light Pole level, the maximum predicted power density level resulting from all Verizon operations is 77.06% of the FCC General Population limits (Figure 2.2). The proposed operation will not expose members of the General Public to hazardous levels of RF energy at ground level or in adjacent Structures.

On the Stadium Light Pole in front of the antennas, predicted MPE levels will exceed the FCC General Population limits within 93’ feet in front of the antennas and within 15’ feet below the C-Band antennas. The maximum predicted power density level resulting from all Verizon operations directly in front of the antennas is 29540.01% of the FCC General Population limits (5908.00% of the FCC Occupational limits). Waterford Consultants, LLC recommends RF Safety Plan for inaccessible areas (Stadium Light Pole) and posting RF alerting signage (Warning) on the pole visible upon approach that informs personnel accessing this area of basic precautions to be followed when working around antennas. This recommendation is depicted in Figure 3. Any work activity in front of transmitting antennas should be coordinated with Verizon Wireless.

The following plots show the cumulative spatial average predicted power density levels in the reference plane indicated as a percentage of the General Public Limits. Please note that 100% of the General Public Limits corresponds to 20% of the Occupational Limits.

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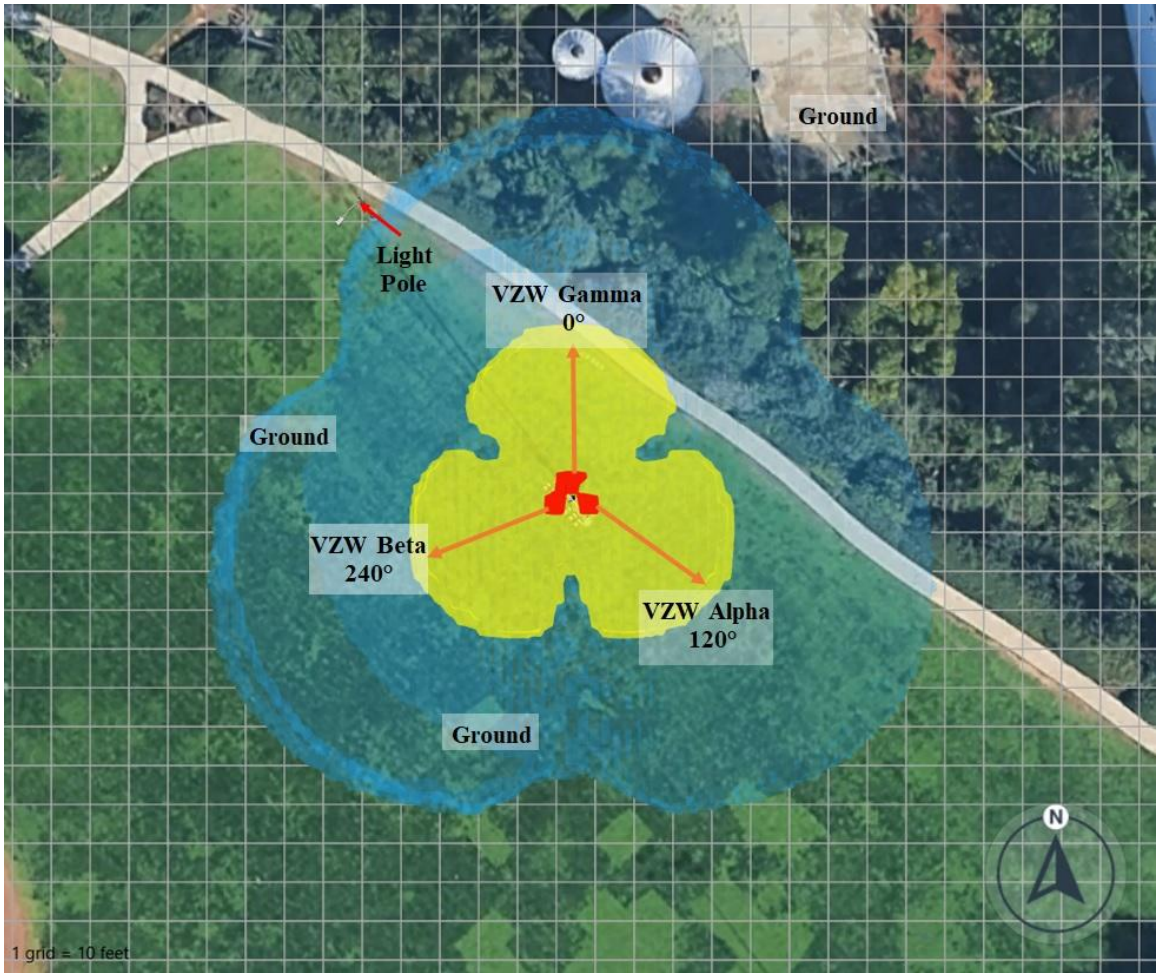
All Transmitters



Legend

Study Zone	Elev. (ft)	Type	Exposure Profile	Max MPE	Att	Carriers
Antenna Level	25.0 - 75.0	3D Area	3D Sula9 GP 5.0 res	29540.01%	0.00	VZW

100%-500%	500%-5000%	5000%+

Exposure Profile Name	Model	Exposure Area	Standard	Resolution	RCF
3D Sula9 GP 5.0 res	Sula 9	Spatial Avg. (6 ft)	FCC General Public	5	1.0

VZW

Max MPE

Grid Size: 10.00 feet **Floor = Elevation +6' | Mid-Level = Elevation +/- 3'**

Figure 1.1: Antenna Level

Legend

Study Zone	Elev. (ft)	Type	Exposure Profile	Max MPE	Att	Carriers
Light Pole	0.1 - 20.1	3D Area	3D Sula9 GP 5.0 res	77.06%	0.00	VZW

100%-500% | 500%-5000% | 5000%+

Study Zone	Elev. (ft)	Type	Exposure Profile	Max MPE	Att	Carriers
Ground	0.1	Floor	2D Sula9 GP 0.5 res	43.00%	0.00	VZW

5%-100% | 100%-500% | 500%-5000% | 5000%+

Exposure Profile Name	Model	Exposure Area	Standard	Resolution	RCF
3D Sula9 GP 5.0 res	Sula 9	Spatial Avg. (6 ft)	FCC General Public	5	1.0
2D Sula9 GP 0.5 res	Sula 9	Spatial Avg. (6 ft)	FCC General Public	0.5 ft3	1.0

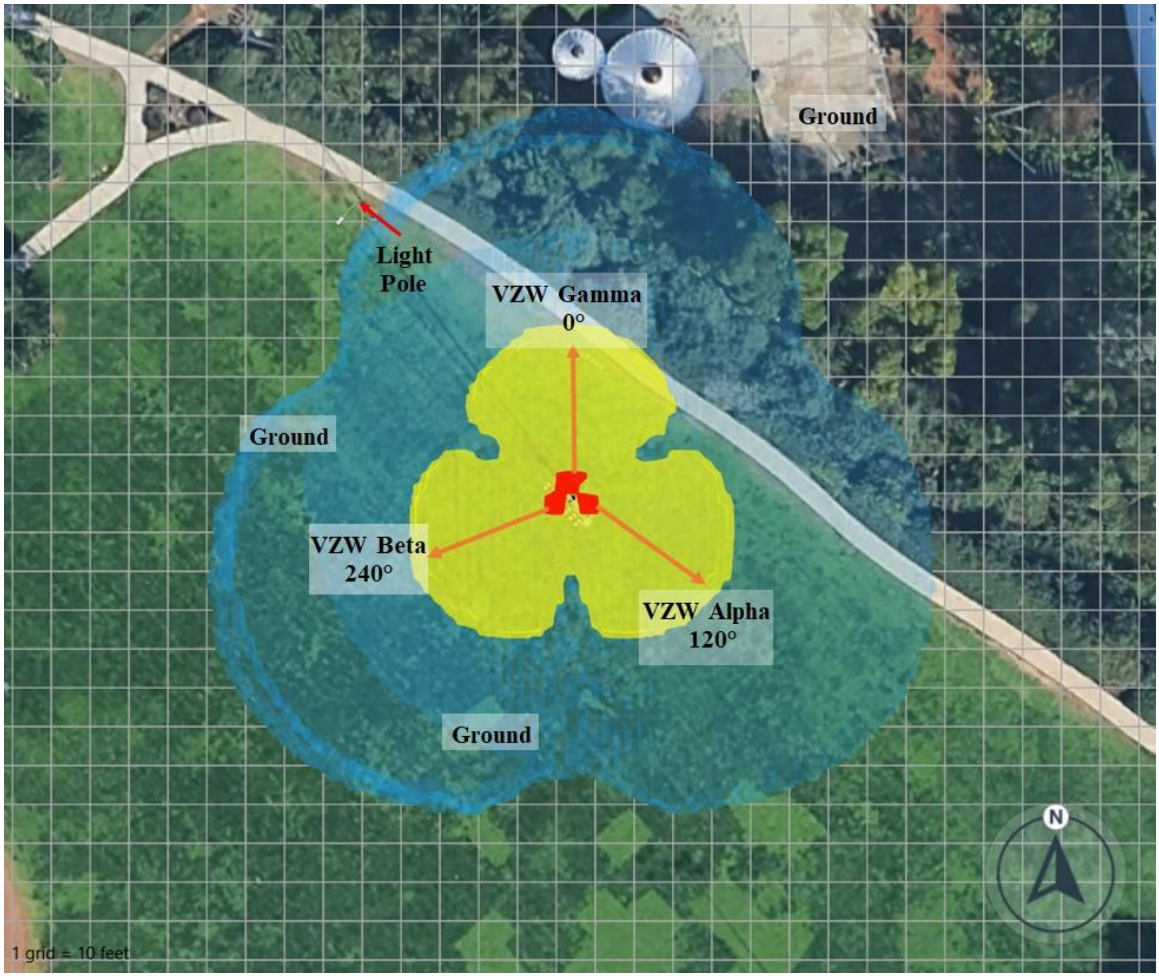
VZW

Max MPE

Grid Size: 10.00 feet **Floor = Elevation +6' | Mid-Level = Elevation +/- 3'**

Figure 1.2: All Levels

Verizon Wireless Transmitters Only



Legend

Study Zone	Elev. (ft)	Type	Exposure Profile	Max MPE	Att	Carriers
Antenna Level	25.0 - 75.0	3D Area	3D Sula9 GP 5.0 res	29540.01%	0.00	VZW

100%-500%	500%-5000%	5000%+

Exposure Profile Name	Model	Exposure Area	Standard	Resolution	RCF
3D Sula9 GP 5.0 res	Sula 9	Spatial Avg. (6 ft)	FCC General Public	5	1.0

VZW

Max MPE

Grid Size: 10.00 feet **Floor = Elevation +6' | Mid-Level = Elevation +/- 3'**

Figure 2.1: Antenna Level

Legend

Study Zone	Elev. (ft)	Type	Exposure Profile	Max MPE	Att	Carriers
Light Pole	0.1 - 20.1	3D Area	3D Sula9 GP 5.0 res	77.06%	0.00	VZW

100%-500%	500%-5000%	5000%+

Study Zone	Elev. (ft)	Type	Exposure Profile	Max MPE	Att	Carriers
Ground	0.1	Floor	2D Sula9 GP 0.5 res	43.00%	0.00	VZW

5%-100%	100%-500%	500%-5000%	5000%+

Exposure Profile Name	Model	Exposure Area	Standard	Resolution	RCF
3D Sula9 GP 5.0 res	Sula 9	Spatial Avg. (6 ft)	FCC General Public	5	1.0
2D Sula9 GP 0.5 res	Sula 9	Spatial Avg. (6 ft)	FCC General Public	0.5 ft3	1.0

VZW

Max MPE

Grid Size: 10.00 feet **Floor = Elevation +6' | Mid-Level = Elevation +/- 3'**

Figure 2.2: All Levels

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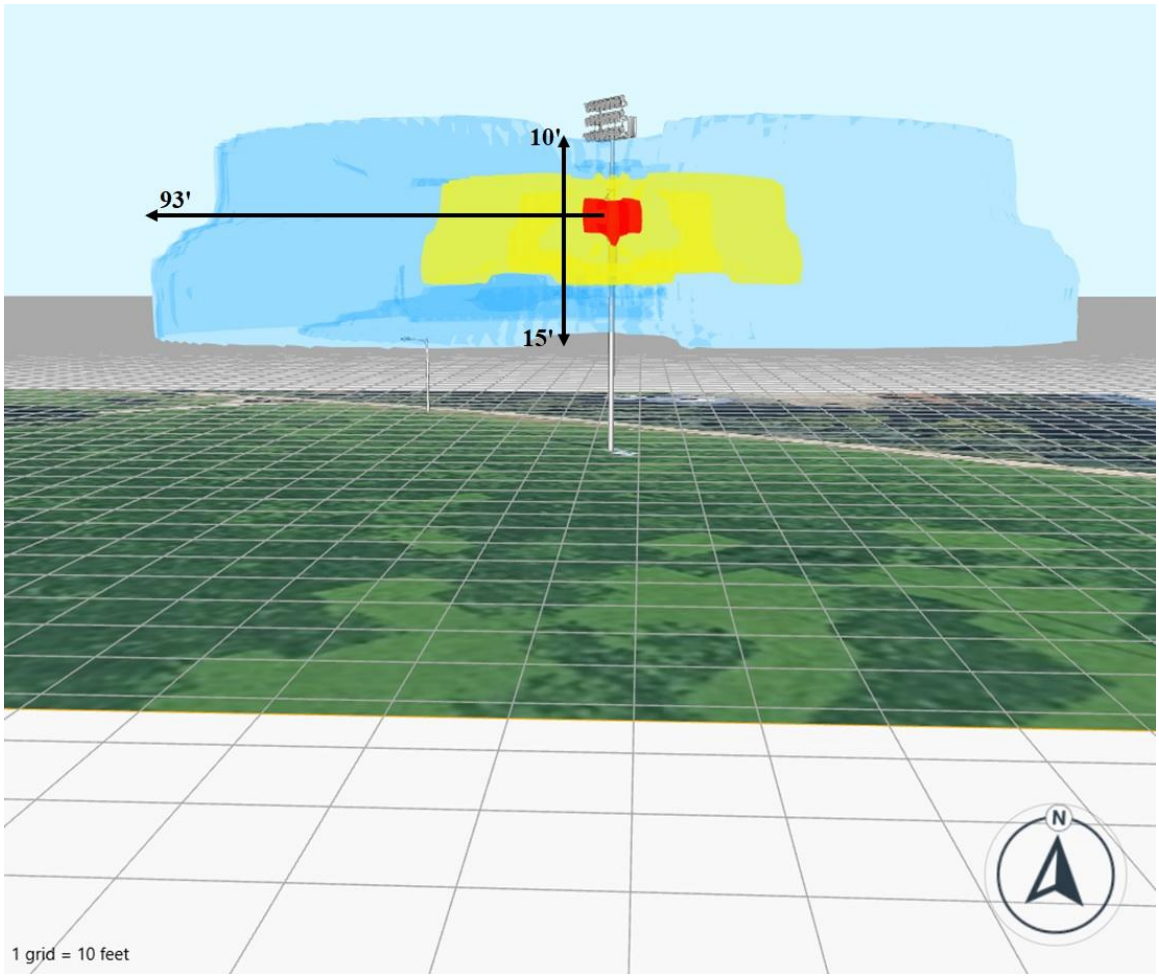


Legend

Study Zone	Elev. (ft)	Type	Exposure Profile	Max MPE	Att	Carriers
Antenna Level	25.0 - 75.0	3D Area	3D Sula9 GP 5.0 res	29540.01%	0.00	VZW

100%-500%	500%-5000%	5000%+

Exposure Profile Name	Model	Exposure Area	Standard	Resolution	RCF
3D Sula9 GP 5.0 res	Sula 9	Spatial Avg. (6 ft)	FCC General Public	5	1.0

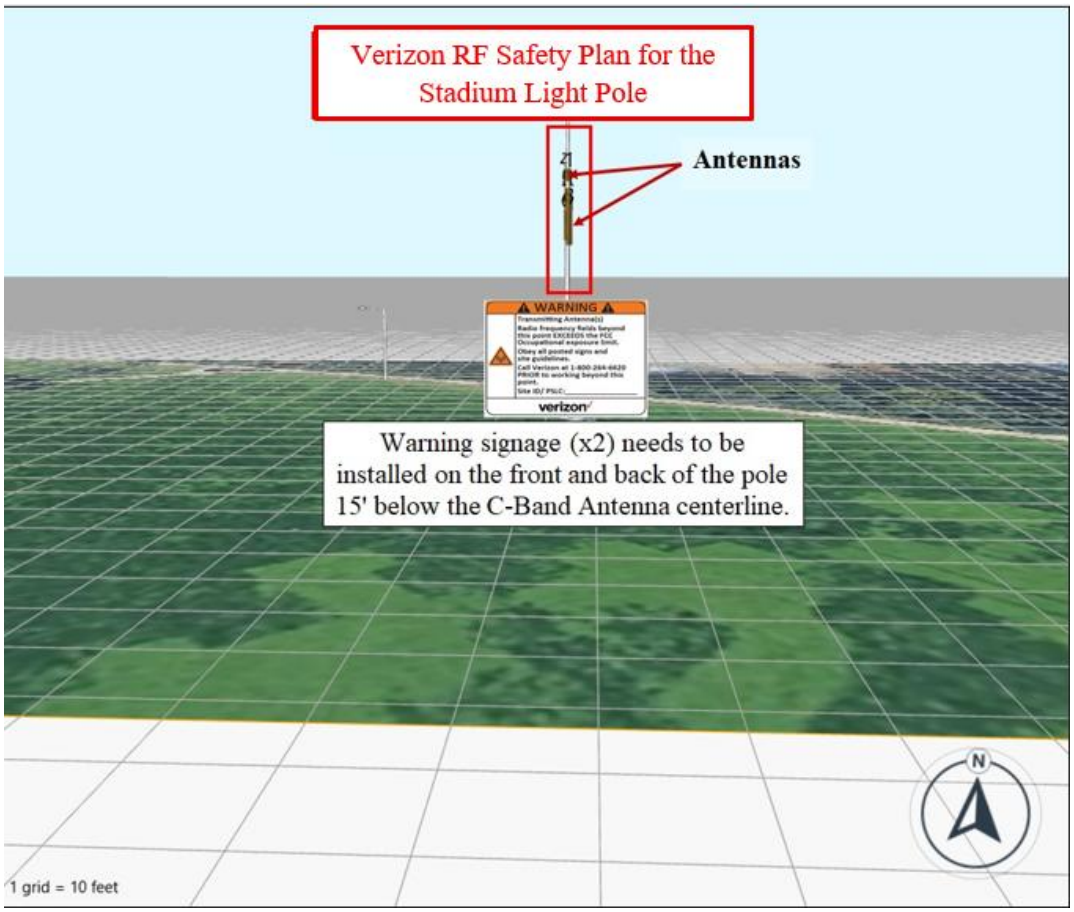
VZW

Max MPE

Grid Size: 10.00 feet **Floor = Elevation +6' | Mid-Level = Elevation +/- 3'**

Figure 2.3: Elevation Level

Compliance Requirement Diagram (Access Location)



Recommendations

Verizon Wireless

Warning signs installed on the front and back of the Stadium Light Pole.

Verizon RF Safety Plan for Stadium Light Pole

Materials

(2) Warning Signs

Proposed Barriers

Existing Signs/Barriers

Figure 3: Mitigation Recommendations

Appendix A: Operating Parameters Considered in this Analysis

ID	Carrier NAME	Antenna Model	MDT (°)	Az (°)	Freq Band	EDT (°)	HBW (°)	VBW (°)	Paths	Transmit Power (W)	Total Power (W)	Gain (dBd)	ERP (W)	Loss (dB)	Antenna Centerline Ground Level (0ft)
A1	VZW	SON_AIR6419	0	120	3700	SON	11	25	64	5	320.00	23.45	70818.96	0	48.6
A2	VZW	SON_AIR3283	0	120	1900	SON	69	17	2	80	160.00	14.48	4488.69	0	44.2
A2	VZW	SON_AIR3283	0	120	2100	SON	67	15	2	40	80.00	15.01	2535.65	0	44.2
A2	VZW	SON_AIR3283	0	120	2100_3	SON	67	15	2	40	80.00	15.01	2535.65	0	44.2
A3	VZW	SON_MX08FRO465-20	0	120	700	SON	56	16	4	60	213.90	11.25	2852.40	0.5	39
A3	VZW	SON_MX08FRO465-20	0	120	850	SON	56	16	4	60	213.90	11.25	2852.40	0.5	39
B1	VZW	SON_AIR6419	0	240	3700	SON	11	25	64	5	320.00	23.45	70818.96	0	48.6
B2	VZW	SON_AIR3283	0	240	1900	SON	69	17	2	80	160.00	14.48	4488.69	0	44.2
B2	VZW	SON_AIR3283	0	240	2100	SON	67	15	2	40	80.00	15.01	2535.65	0	44.2
B2	VZW	SON_AIR3283	0	240	2100_3	SON	67	15	2	40	80.00	15.01	2535.65	0	44.2
B3	VZW	SON_MX08FRO465-20	0	240	700	SON	56	16	4	60	213.90	11.25	2852.40	0.5	39
B3	VZW	SON_MX08FRO465-20	0	240	850	SON	56	16	4	60	213.90	11.25	2852.40	0.5	39
C1	VZW	SON_AIR6419	0	0	3700	SON	11	25	64	5	320.00	23.45	70818.96	0	48.6
C2	VZW	SON_AIR3283	0	0	1900	SON	69	17	2	80	160.00	14.48	4488.69	0	44.2
C2	VZW	SON_AIR3283	0	0	2100	SON	67	15	2	40	80.00	15.01	2535.65	0	44.2
C2	VZW	SON_AIR3283	0	0	2100_3	SON	67	15	2	40	80.00	15.01	2535.65	0	44.2
C3	VZW	SON_MX08FRO465-20	0	0	700	SON	56	16	4	60	213.90	11.25	2852.40	0.5	39
C3	VZW	SON_MX08FRO465-20	0	0	850	SON	56	16	4	60	213.90	11.25	2852.40	0.5	39

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