Documents for the Record

Committee on Energy and Commerce
Full Committee Markup
March 4, 2025

Majority:

- March 4, 2025 - Statement from the American Farm Bureau Federation
- March 4, 2025 - Statement from the National Call for Safe Technology
- March 4, 2025 - Statement from the Environmental Health Trust

American Farm Bureau Federation®
600 Maryland Avenue, SW | Suite 1000W | Washington, DC 20024

ph. 202.406.3600
www.fb.org

March 4, 2025

The Honorable Brett Guthrie
Chairman
Energy and Commerce Committee
U.S. House of Representatives
2125 Rayburn House Office Building
Washington, DC 20515

The Honorable Frank Pallone
Ranking Member
Energy and Commerce Committee
U.S. House of Representatives
2322A Rayburn House Office Building
Washington, DC 20515

Dear Chairman Guthrie and Ranking Member Pallone:

On behalf of the American Farm Bureau Federation — the nation's largest general farm organization representing nearly six million farmers and ranchers across all 50 states and Puerto Rico — I urge the committee's support for H.R. 1618, the Precision Agriculture Satellite Connectivity Act.

Precision agriculture technologies are essential for farmers and ranchers across the country, enabling them to maximize efficiency, improve sustainability, and meet the growing demand for food, fiber, and fuel. From GPS-guided tractors to real-time field monitoring, these innovations help reduce input costs, optimize yields, and implement conservation practices that protect our natural resources. However, the success of these innovations depends on reliable, high-speed connectivity, especially in underserved rural and farming communities.

H.R. 1618 recognizes the vital role satellite connectivity plays in modern agriculture, ensuring that farmers have the necessary infrastructure to fully leverage precision agriculture technologies. Advancing this legislation will support the continued growth and resilience of American agriculture.

We appreciate the leadership of Representatives Bob Latta and Robin Kelly in support of precision agriculture and urge the committee to pass this bill. Thank you for your attention to this matter, and we look forward to working with you to strengthen connectivity for rural America.

Sincerely,

Zippy Duvall
President

March 4, 2025

TO:

Hon. Brett Guthrie, Chair
House Committee on Energy & Commerce

Hon. Frank Pallone, Ranking Member
House Committee on Energy & Commerce

Hon. Richard Hudson, Chair
House Subcommittee on Communications & Technology

Hon. Doris Matsui, Ranking Member
House Subcommittee on Communications & Technology

CC:

Hon. Ted Cruz, Chair
Senate Committee on Commerce, Science & Transportation

Hon. Maria Cantwell, Ranking Member
Senate Committee on Commerce, Science & Transportation

Submitted to:

Noah Jackson
House Energy & Commerce Committee Clerk
Communications & Technology Subcommittee
Noah.Jackson@mail.house.gov
United States House of Representatives
Washington DC 20510

Re: Written Testimony for the markup on March 4, 2025 of the following bills:

HR 1455 Institute for Telecommunication Sciences (ITS) Codification Act

HR 1618 Precision Agriculture Satellite Connectivity Act

HR ____ Advanced, Local Emergency Response Telecommunications Parity Act

HR 1709 Understanding Cybersecurity of Mobile Networks Act

Dear Chairs Guthrie and Hudson, Ranking Members Pallone and Matsui, and Members of the Committee,

We are a national coalition of groups advocating for the safe deployment of communications and electrical infrastructure in the U.S. Our membership, together with the members of our partners and groups supporting our coalition, includes close to one hundred fifty thousand people across the country.

Our current moment is focused on ending the scourges of chronic disease in America. **The White House's Make America Healthy Again (MAHA) Commission on chronic disease expressly includes electromagnetic radiation as a "potential contributing cause,"** together with the American diet and corporate influence.[1] Your Committee now has an historic opportunity to address and mitigate the harms of electromagnetic radiation on Americans' health. We urge the committee throughout the 119th Congress not to pass legislation that increases wireless deployments until a) US government agencies with relevant expertise have determined safe limits for these exposures and b) Congress has restored free-market principles for wireless technology, which includes product liability for wireless exposure and local government discretion over its infrastructure. The opportunity begins now, with Tuesday's markup.

We urge you to act as follows on these bills on Tuesday:

Bill Number and Name	Recommended Action
HR 1455 Institute for Telecommunication Sciences (ITS) Codification Act	Oppose
HR 1618 Precision Agriculture Satellite Connectivity Act	Oppose
HR ____ Advanced, Local Emergency Response Telecommunications Parity Act	Amend
HR 1709 Understanding Cybersecurity of Mobile Networks Act	Amend

1. HR 1455 Institute for Telecommunication Sciences (ITS) Codification Act

Oppose

Analysis of HR 1455

- Codifies into statute the NTIA's Institute for Telecommunication Sciences (ITS) and expands its scope and powers.
- Expands new bureaucracy dedicated to taxpayers subsidizing industry R&D and puts in place the ingredients for corporate capture. The wireless industry is not exactly starved for resources – global revenue for services, equipment, devices, and semiconductors exceeds $4 trillion. What is the Committee's rationale for expanding taxpayer subsidies

[1] Executive Order 14212, see section 4a https://www.federalregister.gov/documents/2025/02/19/2025-02871/establishing-the-presidents-make-america-healthy-again-commission

to this industry? At the same time, taxpayers and All-Americans are bearing the cost of chronic disease arising from these technologies' unsafe deployment.

- Creates massive conflicts of interest at ITS. Section 106 (of the NTIA Organization Act, as amended by this bill), subsection(a)(3) applies the following to ITS:
    - Subparagraph (A) -Stevenson-Wydler Act, which allows government employees to receive up to $150,000 per employee per year per patent that they develop during their government work. Having several patents can multiply this number considerably. We have seen these Stevenson-Wydler conflicts of interest at other regulatory agencies create significant public outcry over the past few years.
    - Subparagraph (C), Bayh-Dole Act, which allows ITS to make money licensing its technology to private industry, rather than ensuring the public interest;
    - Subparagraph (D), which authorizes ITS to help deploy commercial satellites. These costs should be borne by industry, not taxpayers;
    - Subparagraph (F), under which industry can pay ITS to work for industry, not necessarily in the public interest.
- At a time of carefully examining federal expenditures and the federal bureaucracy, as well as rooting out corruption, conflicts of interest, and abuse, what is the Committee's rationale for creating and expanding a new bureaucracy which bears the ingredients for these pitfalls?

2. HR 1618 Precision Agriculture Satellite Connectivity Act

Oppose

Analysis

- Directs the FCC to use rulemaking to promote the use of satellites for what is termed "precision agriculture."
- "Precision agriculture" offers a compelling promise: reduce inputs on farms and increase output by using technology. While the aim sounds good, in practice, precision ag often is equated with deploying wireless networks on farms – an unproven idea that is likely to end in disaster for America's farmers.
- Unfortunately, precision ag advocates ignore the fact that radiofrequency radiation harms plants, animals, pollinators, and the soil microbiome. Evidence indicates **decreases** in farm yields, both for crops and livestock, with exposure to radiofrequency radiation.
- **We are not aware of a single study ever demonstrating that precision ag, using radiofrequency devices, improves farm yields.**
- To avoid this uncomfortable reality, industry typically points to studies that show a decrease in the amount of inputs used. For example, decreasing the amount of pesticide or fertilizer used on a given acre of land. We are not disputing that precision ag may be

used to decrease agricultural inputs. However, if yields drop, for example as much as 20% as was reported in one court case,[2] and the soil is destroyed, farmers will be worse off.

- Farmers who wish to experiment with irradiating their farms with wireless technology are already free to do so. They can deploy private wireless networks on their farms and bear the consequences.
    - We oppose this technology being imposed on farmers without their consent – which is what wireless and satellite deployments are doing — and which would be expanded under this bill.
    - We oppose the use of taxpayer resources, such as grants and loan programs, to deploy this technology. It threatens the food security and food sovereignty of the United States and has no factual support for its use.
- Beneficial uses of precision ag remain – many of these benefits can be achieved without expanding wireless radiation on farms. For example, big data insights from weather observations and hyperlocal data logging on farm equipment, which can later be synced with a farmer's analytic software. Achieving these benefits need not entail irradiating the entire farm, much less the planet, with more satellites.

HR ____ (Advanced Local Emergency Response Telecommunications Parity Act) -- Granting FCC Emergency Spectrum Power

Approve only with amendments:

Authority under this bill must be:

- a) limited to spectrum that is already available for commercial mobile services;
- b) only for bona fide emergencies, such as lack of coverage following natural disasters. Sample language to achieve this:
    - Strike subsection (a)(1)(A)(i)
    - Replace subsection (a)(1)(A)(ii) with the following text:
      "**in the event that such area becomes an unserved area with respect to either or both services set out in subsection (i)(5)(B)**"
    - In subsection (i)(10), replace the words "lack of infrastructure" with "**natural disaster**" and strike the words "or any other reason"
- c) time-limited, with provision for reassessment and renewal of emergency basis

Analysis:

[2] https://www.connexionfrance.com/news/french-court-orders-4g-antenna-switch-off-over-cow-health-concerns/181324

- Allows the FCC to grant commercial access to spectrum, which otherwise may be used for national security, purportedly on an emergency basis. The FCC could use this emergency power to circumvent the usual spectrum allocation process.
- The bill defines "lack of cell phone coverage" as itself an emergency, which confers extraordinary powers on the FCC to bypass the usual spectrum authorization process.
- In the event of a lack of cell phone voice coverage, federal circuits have held that FCC regulations preempt state and local zoning.[3] In other words, local governments cannot stop the construction of a cell tower which is needed to fill a gap in voice coverage. If an area lacks such coverage, it is because commercial providers are not economically motivated to do so in sparsely populated areas. This bill does nothing to address this issue. Rather, it directs the FCC to hand out spectrum (by all accounts a valuable asset) with no time limit or justification.
- With no time limit, this bill could be used as a backdoor for reallocating spectrum without going through the usual process, and unintentionally or unknowingly subverting national security interests.

HR 1709 (Understanding Cybersecurity of Mobile Networks Act)

Approve only with amendments:

- Expressly include 5G in the study of cyber security vulnerabilities of mobile networks. Amended as shown:
    - In subsection (d)(2), replace the word "exclude" with "**include**" so that this section reads as follows:

      "(2) ~~exclude~~ **include** consideration of 5G protocols and the networks in the report required by subsection (a)"

- Direct that DHS/CISA conduct this study. If it is not practical for DHS to conduct this study, at a minimum, require Department of Commerce to obtain and incorporate input from DHS.

Analysis of HR 1709:

- Expressly excludes 5G from a Department of Commerce study on cybersecurity risks without justification for doing so.
- 5G should be included because a) it comprises a substantial portion, if not the majority, of today's mobile networks and b) the significant cybersecurity risks that it poses.
- What is the Committee or the sponsor's rationale for excluding 5G from this bill? We cannot seem to find it.

[3] Sprint Spectrum v. Willoth 1999 Second Circuit, which was adopted by multiple other circuits. https://casetext.com/case/sprint-spectrum-v-willoth

    - The bill's sponsor during the 118th Congress (then HR 1123)[4] noted that the text was carried over verbatim from the original text in 2020 (HR 7204, 116th)[5] when independent research was going to be done on 5G. However, when asked in 2024, the sponsor could not point to any research or any entity doing such research.
    - The 118th sponsor also could not articulate a rationale for excluding the vast majority of our mobile infrastructure from a bill that purports to study cybersecurity of our mobile infrastructure.
- Ignores the significant security vulnerabilities of 5G networks. 5G is a distributed, software-based network of digital routers with thousands of nodes and access points that a hacker can exploit; there is no choke point control to quarantine security breaches.[6] If a hacker gains control of the 5G software managing the networks, the hacker can also control the 5G network.[7] See, e.g., the story of the Nevada casino whose database was hacked through its Internet-connected thermostat in its fish tank.[8] The FCC recognized early on the need to address the security vulnerabilities of 5G.[9] Former FCC Chairman and former CTIA CEO Tom Wheeler points out that "5G networks are more vulnerable to cyberattacks than their predecessors."[10]
- Directs the Assistant Secretary of Commerce for Communications and Information to conduct the study, whereas the Department of Homeland Security (DHS) and its Cybersecurity and Infrastructure Security Agency (CISA) have far greater domain expertise and independence from influence of the wireless industry. There is no need to create competition and incoherence among federal agencies, when one agency is already responsible for this critically important task. The mission of Department of Commerce is to promote industry,[11] whereas the mission of DHS is to protect national security.[12] CISA is better suited for the task as it is already responsible for "overseeing 16 critical infrastructure sectors, communications being one."[13]

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[4] https://www.congress.gov/bill/118th-congress/house-bill/1123/

[5] https://www.congress.gov/bill/116th-congress/house-bill/7204

[6] *Why 5G Requires New Approaches to Cybersecurity*, Tom Wheeler and David Simpson, Brookings Institute, Sept 3, 2019, https://www.wita.org/nextgentrade/why-5g-requires-new-approaches-to-cybersecurity/; see also, *Why 5G Networks Are Disrupting The Cybersecurity Industry*, Oct 29, 2021, https://www.forbes.com/sites/forbestechcouncil/2021/10/29/why-5g-networks-are-disrupting-the-cybersecurity-industry/?sh=5186fc041fe9.

[7] *Why 5G Requires New Approaches to Cybersecurity*, Tom Wheeler and David Simpson, Brookings Institute, Sept 3, 2019, https://www.wita.org/nextgentrade/why-5g-requires-new-approaches-to-cybersecurity/.

[8] https://www.forbes.com/sites/leemathews/2017/07/27/criminals-hacked-a-fish-tank-to-steal-data-from-a-casino/; https://www.casino.org/news/hackers-stole-las-vegas-casino-high-roller-database-via-its-fish-tank/.

[9] https://docs.fcc.gov/public/attachments/DOC-343096A1.pdf.

[10] *Why 5G Requires New Approaches to Cybersecurity*, Tom Wheeler and David Simpson, Brookings Institute, Sept 3, 2019, https://www.wita.org/nextgentrade/why-5g-requires-new-approaches-to-cybersecurity/.

[11] Department of Commerce's mission is to "strengthen domestic industry"

https://www.commerce.gov/about

[12] https://www.dhs.gov/mission

[13] https://www.brookings.edu/articles/protecting-the-cybersecurity-of-americas-networks/.

- Supports and accelerates increasing reliance and dependence on wireless-based infrastructure, which will impair resilience and increase vulnerability at all levels of government—federal, state, and local—to cyberattacks. Local communities are highly vulnerable and prime targets for cyber-attacks. For instance, in NYC, it was pointed out at length in a 2020 letter from the Chief Technology Officer and Chief Information Security Officer of NYC to the National Telecommunications and Information Administration (NTIA).[14] A Brookings Institution report points to the "5G Cyber Paradox," because as 5G networks "improve the efficiency and capabilities of the communications infrastructure… they introduce new security vulnerabilities that threaten both the networks and those who rely on network connectivity."[15] This can also imperil national security and homeland security. This appears to be a design flaw inherent in 5G architecture and execution. Therefore, there is ample justification that the study of the cyber security of 5G protocols and networks should be expressly **included** in the bill. No report on mobile networks could be considered comprehensive without including 5G, which makes up an increasingly large part of wireless networks today and in the future.

Additional background

Rationale

Since 2021, the FCC has ignored the US Court of Appeals DC Circuit order, issued in the successful lawsuit *Environmental Health Trust et al. v. FCC,* to provide an explanation for why the FCC decided not to update its human exposure limits for wireless radiation.[16] The FCC has not considered the latest science since 1996, as it is obligated to do under the law. Legislation that promotes further wireless deployments while the FCC fails to update its exposure limits puts all Americans at risk and is harming millions of Americans.[17]

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[14] https://www.dropbox.com/scl/fi/0cxjktjxstmb825gqih25/NYC-Comments-5G-to-NTIA-6-25-20.pdf?rlkey=dgmc3m04dxd57qfz7z1g12ckh&dl=0. The letter states, in relevant part: "Such complex systems [5G] present more opportunities for security and privacy breaches. By moving away from firmware-based technology of 4G telecommunication components to software-based 5G telecommunication components that will need to be updated, the opportunity for manipulation exists within the supply chain. Furthermore, movement away from centralized network systems to decentralized network systems increases the attack surface of a network. That increased attack surface is amplified by the anticipated introduction of the increasing number and variety of connected devices (IoT) and big data industries … The problem of IoT vulnerabilities will only become exacerbated by the increased speeds of 5G and other future wireless broadband technologies … IoT protection is historically poor and malware distribution is easily scalable, which suggests that the creation of IoT botnets ("robot networks") for malicious purposes, including large-scale distributed denial of service (DoS) attacks, is likely to increase as well. This poses a significant threat to vital digital infrastructure and resident services at all levels of government, as well as private sector enterprise."

[15] https://www.lawfaremedia.org/article/lawfare-podcast-tom-wheeler-and-dave-simpson-making-5g-secure.

[16] https://media.cadc.uscourts.gov/opinions/docs/2021/08/20-1025-1910111.pdf

[17] https://thenationalcall.org/wp-content/uploads/2024/05/Congressional-Briefing-5-19-24-FINAL.pdf

Current wireless exposure standards are based largely on 11 monkeys and 12 rats, which were exposed for less than one hour, over 40 years ago.[18] GAO first recommended that the FCC revisit these limits back in 2012 and the FCC has not yet done so.[19]

The amendments above would incentivize FCC to follow the law. Complying with laws passed by Congress and a court order is not optional for the FCC – this is an administrative agency acting with impunity while 100% of its budget is paid for by the industry it is supposed to be regulating.[20]

Making spectrum available for commercial use automatically triggers heavy-handed preemption of states' rights over wireless facilities, known as Section 6409.[21] In fact, as soon as more spectrum is made available, carriers across the country can add almost unlimited additional antenna and additional power output on their existing facilities to emit radiofrequency radiation using the new spectrum – despite no US government agency assessing these emissions for safety.[22] Hundreds of localities around the country have sued the FCC over its rules implementing section 6409.[23]

See attached summary of "Biological Hazards of Wireless Radiation" (Addendum A).

We would be happy to discuss this letter and related matters further with you.

Respectfully Submitted,

Odette J. Wilkens
Chair & General Counsel
The National Call for Safe Technology
P.O. Box 750401

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[18] https://doi.org/10.1186/s12940-022-00900-9

[19] Exposure and Testing Requirements for Mobile Phones Should Be Reassessed, GAO-12-771, Jul 24, 2012 https://www.gao.gov/products/gao-12-771

[20] https://docs.fcc.gov/public/attachments/DOC-401129A1.pdf

[21] Section 6409(a) of the Middle Class Tax Relief and Job Creation Act of 2012, Public Law 112–96, 47 USC 1455 (a).states:

"a State or local government may not deny, and shall approve, any eligible facilities request"

[22] Testimony submitted to Senate Commerce Committee, February 19, 2025 https://ehtrust.org/wp-content/uploads/EHT-Testimony-to-Senate-Commerce-Committee-2-19-2025_Final-1.pdf

[23] See, e.g., *Montgomery County et al. v. FCC* (Fourth Circuit, No. 15-1240, 2015)

T-Mobile v. San Francisco 658 F. Supp. 3d 773 (N.D. Cal. 2023)

League of California Cities et al. v. FCC (Ninth Circuit, No. 20-71765, 2024)

Forest Hills, NY 11375
www.thenationalcall.org
hello@thenationalcall.org
646.939.6855

ADDENDUM A: **Biological Hazards of Wireless Radiation – Executive Summary**

The FCC's standards for wireless radiation were established back in 1996, and have not been reviewed, updated or verified despite significant changes in the wireless technology in use today. The FCC's standards relate solely to wireless radiation's thermal impacts on a body (e.g. how the body reacts to being heated), and do not consider other known adverse biological impacts of non-thermal levels of RF radiation (such as damage to DNA or other changes to cells). The FCC's limits were established long before the existence of 2G, 3G, 4G, or 5G technology.

Congress eliminated the EPA's funding for electromagnetic research in 1996, knee capping the EPA from studying biological impacts of RF radiation for nearly 30 years. *At the very least, the FCC's standards should be reconsidered (FCC is under federal court order to do so, but has not) given current technology.*

Wireless radiation, also referred to as radio frequency (RF) radiation, produces biological effects and evidence of its hazards are clear and convincing, yet the hazards are not generally publicized, and the hazards are unnecessary to reap the benefits of wireless technology.

- **Industry Funded Research** – The wireless industry has funded studies that show adverse biological impacts. A 1990s $28.5 million study found that RF radiation produces biological effects that are potentially hazardous to humans in ways that have nothing to do with heated tissue. A 2000 study for a major telecom carrier found RF radiation has links to cancer, neurological disorders and cognitive impairment. Insurance companies will not insure for personal injury from RF radiation, reflecting their concerns about the possible magnitude of their liability, e.g., that 5G is a high, "off the leash" risk.

- **Reports from Federal Agencies** – A 2018 $30 million US National Toxicology Program (NTP) study found "clear evidence of cancer" in lab rats from wireless radiation. In 2019, the FCC admitted that RF radiation can have non-thermal impacts on humans, but it has conducted no studies to determine what those impacts might be or what changes should be made to its RF radiation emission limits. In 2021, the DC Circuit Court of Appeals ruled in *Environmental Health Trust, et al* v. *FCC* that the FCC's lack of action was arbitrary and capricious for failing to review its emission standards in light of new science and current technology and that it should consider non-cancer health impacts of wireless radiation. So far, the FCC has failed to comply with the Court order. As early as 1971, the US Naval Medical Research Academy concluded from 2300 studies that RF radiation, including millimeter (e.g. 5G), are linked to cardiac, neurological and other disorders.

- **Independent Studies** – Several major independent studies have concluded biological effects from RF radiation, including by the Int'l Agency on Research on Cancer (IARC) of the World Health Organization in 2011 (classifying wireless radiation as a Class 2B carcinogen), the Ramazzini Institute in 2018 (clear evidence of cancer in lab rats, corroborating the NTP's results) and the New Hampshire Commission in 2020 (all forms of wireless radiation are harmful). The American Academy of Pediatrics warns that children are disproportionately affected by cell phone radiation. Studies concluded increased risk for ADHD, delayed motor skills, diabetes and demyelination of fetuses' brain neurons.

- **Chronic Diseases and Clusters near Cell Towers** – Illnesses near cell towers, e.g., nausea, rashes, stroke, atrial fibrillation and a variety of cancers, have been documented near Duluth, MN (51 strokes), Pittsfield, MA (17 residents fell ill and many evacuated, one resident who remained died), Rippon, CA (4 children and 4 teachers developed cancer; one child died) and Eagle, ID (atrial fibrillations from 5G cell towers).

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BIOLOGICAL HAZARDS OF WIRELESS RADIATION -- SOME HIGHLIGHTS

March 3, 2025

"The evidence presented to the Board includes well over one thousand peer-reviewed scientific and medical studies which consistently find that pulsed and modulated RFR has bio-effects and can lead to short- and long-term adverse health effects in humans, either directly or by aggravating other existing medical conditions. Credible, independent peer-reviewed scientific and medical studies show profoundly deleterious effects on human health, including but not limited to: neurological and dermatological effects; increased risk of cancer and brain tumors; DNA damage; oxidative stress; immune dysfunction; cognitive processing effects; altered brain development, sleep and memory disturbances, ADHD, abnormal behavior, sperm dysfunction, and damage to the blood-brain barrier."[24]

~ Board of Health, Pittsfield, MA, Emergency Cease & Desist Order to remove cell tower that was sickening 17 residents simultaneously.

What the Industry Knows About the Biological Hazards of RF Radiation:

1. **Industry Funded Research Finds Biological Effects**. A 1990s research program funded by the wireless industry at $28.5 million under the independent non-profit, Wireless Technology Research, LLC (WTR), found that wireless radiation (i.e., non-thermal radiation) is **biologically active producing biological effects and potentially hazardous to human health**.[25] That means the radiation does not need to heat human tissue. (Note that the FCC limits only account for thermal, not non-thermal, adverse effects.)
    a) The research was peer-reviewed with scientific oversight by both an independent Peer Review Board at the Harvard School of Public Health and a U.S. Government Interagency

[24] https://ehtrust.org/cease-and-desist-order-against-verizon-cell-tower-by-board-of-health-pittsfield-ma/, see below the fold for link to the Order at 3, 2nd "Whereas" clause, paragraph #1.

[25] Wireless Phones and Health II: State of the Science 2002 Edition, edited by George L. Carlo; Wireless Phones and Health: Scientific Progress, edited by George L. Carlo.

Working Group, chaired by the FDA, and including EPA, OSHA, NIOSH, CDC, FCC, and NIH.[26]

b) Abruptly after these findings, the EPA was defunded from doing any further research on the biological effects of wireless radiation.[27]

2. **Industry Commissioned Study Finds Biological Effects.** A study in 2000 commissioned by T-Mobil Deutsche Telekom found links to cancer, leukemia, neurological disorders and cognitive impairment, with special caution for children and an acknowledgement of those already disabled from the radiation.[28]

3. **Industry Patents Point to Health Risks.** Telecom and cell phone manufacturers have filed patents to reduce the level of wireless exposure tied directly to health risks such as neurological disorders and cancer.[29]

4. **Risk Warnings of Litigation.** Industry annual reports warn their shareholders of litigation risk from potential personal injury claims from RF radiation and potential financial losses.[30]

5. **RF Radiation is a Pollutant.** The telecom industry characterizes RF radiation as a pollutant in their device protection plans and disclaim insurance liability.[31]

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[26] Ibid.

[27] Overpowered, What Science Tells Us About the Dangers of Cell Phones and Other WiFi-Age Devices, Martin Blank, PhD, 2014 at 110-112.

[28] T-Mobil Deutsche Telekom commissioned study by the Ecolog-Institute, April 2000, "Mobile Telecommunications and Health Review of the Current Scientific Research in View of Precautionary Health Protection," https://ehtrust.org/wp-content/uploads/ecolog2000.pdf.

[29] Swisscom patent, 2004 at https://www.dropbox.com/scl/fi/nwdfklq7r7j2wwsipv7ws/SwissCom-Patent-application-2003-2004-WO2004075583A1-1-1.pdf?rlkey=liuy6175hamj24lbuszpe7vux&st=5p2oy0ji&dl=0; "Manufacturers Own Patents to Cut Radiation," RCR Wireless, June 4, 2001 at https://www.dropbox.com/scl/fi/0rfwys743dgeqpifwu3ua/Manufacturer-own-patents-to-cut-radiation-RCR-Wireless-News.pdf?rlkey=e5hm46nyp9an6ugu4y005ldm3&st=xr7ocreh&dl=0.

[30] AT&T, Inc., 2021 Annual Report, https://investors.att.com/~/media/Files/A/ATT-IR-V2/financial-reports/annual-reports/2021/complete-2021-annual-report.pdf at 41.

Verizon's 2021 U.S. SEC Form 10–K at 17, https://www.verizon.com/about/sites/default/files/2020-Annual-Report-on-Form-10-K.PDF.

[31] Exclusions of loss from electromagnetic radiation from insurance coverage:

- Verizon, Sec B "Exclusions," Subsection 16 "Pollution," https://ehtrust.org/wp-content/uploads/device-protection-brochure-nationwide.pdf;
- AT&T, Sec II "Exclusions," Subsection H. Loss from "Pollutants," Sec IX.T. Definition of "Pollutants," https://ehtrust.org/wp-content/uploads/ATT-Multi-Device-Protection-Pack-Insurance.pdf;
- Sprint, Sec II "Exclusions," Subsection H. Loss from "Pollutants," Sec IX.P. Definition of "Pollutants," https://ehtrust.org/wp-content/uploads/Sprint-Insurance-Terms-and-Conditions-Downloaded-2019.pdf.

6. **Insurance Companies Exclude Injury Coverage for RF Radiation.** Insurance companies such as Lloyd's of London will not insure for personal injury from RF radiation because of the high risk of claims, with Swiss Re characterizing "5G" as "high," "off-the-leash" risk.[32]

7. **No 5G Pre-Market Testing.** Telecom executives during a Feb. 2019 Senate hearing confirmed no industry pre-market testing of 5G for public health or safety. Sen. Blumenthal (CT) criticized the FCC and FDA for inadequate answers on questions of public health, and concluded, "We're kind of flying blind here as far as health and safety is concerned." [33]

8. **"Why Tech Leaders Don't Let Their Kids Use Tech."[34]** The article reports that technology executives restrict or forbid their children's use of the very technology that they are providing to the public, including "the makers of smartphones and tablets, of social media channels and game boxes." Technology "titans" such as former Apple's Steve Jobs and Bill and Melinda Gates have admitted to placing restrictions on their children's use of technology. Chris Anderson, former Wired magazine editor and CEO of 3D Robotics, said that his kids "accuse me and my wife of being fascists and overly concerned about tech, and they say that none of their friends have the same rules. That's because we have seen the dangers of technology firsthand. I've seen it in myself, I don't want to see that happen to my kids."[35]

What Federal Agencies Know About the Biological Effects of Wireless Radiation and Have Disregarded:

1. **Food and Drug Administration (FDA).** The U.S. National Toxicology Program's (NTP) 2018 report concluded **clear evidence of cancer** in lab rats from wireless radiation (similar to 2G and 3G cell phones).[36] NTP found malignant heart schwannomas and malignant brain gliomas.[37] NTP is one of the most prestigious toxicology institutions in the world. In 1999, the FDA had nominated the NTP to conduct a $30 million study of RF radiation "with a high priority," to conduct animal

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[32] https://ehtrust.org/key-issues/electromagnetic-field-insurance-policy-exclusions/.

[33] https://ehtrust.org/health-effects-of-5g-wireless-technology-confirmed-at-us-senate-hearing-after-senator-blumenthal-questions-industry/; see also, https://mdsafetech.org/2019/02/13/no-research-on-5g-safety-senator-blumenthal-question-answered/.

[34] "Why Tech Leaders Don't Let Their Kids Use Tech," https://kidzu.co/health-wellbeing/why-tech-leaders-dont-let-their-kids-use-tech/.

[35] Ibid.

[36] See letter of Dr. Birnbaum, former NIH and NTP Director, and hyperlinked amicus brief https://www.dropbox.com/scl/fi/nc7l00p8zxk8tj0l2a1yr/Dr.-Linda-Birnbaum-cell-tower-letter.pdf?rlkey=vq1i363i74umg9ybydrrhmn5d&st=q9l49h88&dl=0 ; see also, https://ehtrust.org/former-niehs-director-dr-linda-birnbaum-interviewed-about-cell-phone-radiation/.

[37] https://ntp.niehs.nih.gov/whatwestudy/topics/cellphones#studies *Environmental Health Trust, et al v. FCC*, Motion for Leave to File Brief of Amicus Curiae Joseph Sandri in Support of Petitioners Urging Reversal, Aug. 5, 2020, https://ehtrust.org/wp-content/uploads/20-1025-Amicus-Brief-Joe-Sandri.pdf.

studies, stating that it was "not scientifically possible to guarantee that non-thermal levels of microwave radiation . . . will not cause long-term adverse health effects."[38]

a) Dr. Linda Birnbaum, former NIH and NTP director, has stated: "Every agent known to cause cancer in humans will also produce it in animals when adequately tested."[39] **"**Overall, the NTP findings demonstrate the potential for RFR **to cause cancer in humans**."[40] [Emphasis added.]

2. **Federal Communications Commission (FCC).**

a) The FCC admitted in 2019 that at least some types of RF radiation can cause instantaneous non-thermal adverse effects with RF radiation frequencies ranging between 3 KHz and 10 MHz.[41] The FCC averages exposure levels over 30 minutes,[42] which completely obscures the effects of the constant peaking and pulsations of RF radiation which causes adverse health effects, and does not account for 24/7 exposure by the population.[43]

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[38] Note that the following letter is no longer available at the below URL, although it was originally accessed from there. Letter from the Dept of Health and Human Services to the National Toxicology Program at the National Institute for Environmental Health Studies, May 19, 1999, https://ntp.niehs.nih.gov/sites/default/files/ntp/htdocs/chem_background/exsumpdf/wireless051999_508.pdf.

[39] Dr. Birnbaum's statement in Attorney Joe Sandri's Amicus Brief filed 8-5-2020 in connection with *Environmental Health Trust, et al v. FCC, https://ehtrust.org/fcc-amicus-briefs/* (below the fold, right column) at 9.

[40] Ibid, 11.

[41] Proposed Changes in the Commission's Rule Regarding Human Exposure to Radiofrequency Electromagnetic Fields, 34 FCC Rcd 11687, 11743-11745, ¶¶122- 124 & nn. 322-335 (2019).

[42] 47 CFR 1.1307(b)(2): "Time-averaging period is a time period not to exceed 30 minutes for fixed RF sources or a time period inherent from device transmission characteristics not to exceed 30 minutes for mobile and portable RF sources," https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-1/subpart-I/section-1.1307#p-1.1307(b).

[43] Human-made electromagnetic fields: Ion forced-oscillation and voltage-gated ion channel dysfunction, oxidative stress and DNA damage (Review) (2021) Pangopolous DJ, et al. International Journal of Oncology. August 23, 2021. https://pubmed.ncbi.nlm.nih.gov/34617575/.

Computational modeling investigation of pulsed high peak power microwaves and the potential for traumatic brain injury. Sci Adv. 2021 Oct; 7(44). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8555891/. "These studies reveal that the MAE threshold depends on the energy in a single pulse (not the average power density) for sufficiently short pulses [e.g., 32 µs in (46)], and peak power densities of 102 to 105 mW/cm2 have been known to cause auditory effects in human participants (45)."

"Diplomats' Mystery Illness and Pulsed Radiofrequency/Microwave Radiation," Dr. Beatrice Golomb. Neural Comput. 2018 Nov; 30(11):2882-2985. https://pubmed.ncbi.nlm.nih.gov/30183509/; "Reported facts appear consistent with pulsed RF/MW as the source of injury in affected diplomats."

"5G: Great risk for EU, U.S. and International Health! Compelling Evidence for Eight Distinct Types of Great Harm Caused by Electromagnetic Field (EMF) Exposures and the Mechanism that Causes Them," Martin L. Pall, PhD, https://peaceinspace.blogs.com/files/5g-emf-hazards--dr-martin-l.-pall--eu-emf2018-6-11us3.pdf.

b) The FCC received in its docket, when requesting public comment on the adequacy of its 1996 RF radiation emission limits, 11,000 pages of peer-reviewed, scientific studies showing biological effects from RF radiation and a couple hundred personal submissions of injury. When the FCC closed the docket, it declined to update its limits. The FCC was sued and in 2021 the D.C. Circuit Court of Appeals ruled against the FCC and remanded the case back to the FCC because the FCC failed to provide a reasoned explanation for not updating its limits and ignoring the current science.[44] The FCC has not yet complied.

3. **A U.S. Naval Medical Academy Research** report from 1971 by Dr. Zory Glaser[45] linked 23 chronic diseases to RF radiation based on over 2300 studies.[46] A Feb 2025 report correlates Dr. Glaser's findings from 1971 of biological effects of RF radiation and millimeter wave (5) technology to reported cases of chronic disease.[47] The 2025 report states that Dr. Glaser reported biological effects and diseases related to the central and autonomic nervous systems, genetic / chromosomal, vascular, blood, metabolic, endocrine and gastrointestinal disorders.[48] In 1976, Dr. Glaser updated the total bibliography to 3700 reports relating to the biological effects of RF radiation.[49]

4. **Central Intelligence Agency (CIA).** In 2012, the CIA declassified and approved for release a 1977 Russian study on the "Biological Effects of Millimeter Radiowaves" which found that while millimeter waves only penetrate the skin, they trigger a cascade of adverse biological effects within the body.[50]
   a) The study coins the term **"radiowave disease"** to describe these effects.[51] Adverse effects on the skin included demyelination of sections of nerve fibers (damage or destruction to the insulation around nerve fibers which disrupts normal nerve impulse transmission), fragmented neural conductors, and deformation of sensory receptors, leading to neurological disorders.

Belyaev, I., Dean, A., Eger, H. et al. "EUROPAEM EMF Guideline 2016 for the prevention, diagnosis, and treatment of EMF-related health problems and illnesses." Rev environ Health. 2016;31(3):363-397. Doi:10.1515/reveh-2016-0011.

B. W. G. (2012). "Bioinitiative Report 2012: A Rationale for Biologically-based Exposure Standards for Low-Intensity Electromagnetic Radiation."

[44] https://media.cadc.uscourts.gov/opinions/docs/2021/08/20-1025-1910111.pdf

[45] About Dr. Zory Glaser, https://zoryglaser.com/.

[46] https://www.magdahavas.com/wp-content/uploads/2010/06/Navy_Radiowave_Brief.pdf.

[47] Report: "Safety of Wireless Radiation, a Scientific View, Feb 2025, Richard Lear and Camilla Rees, https://www.researchgate.net/publication/388763046_Safety_of_Wireless_Technologies_The_Scientific_View at 12-13.

[48] Ibid at 3.

[49] https://ehtrust.org/wp-content/uploads/Naval-MRI-Glaser-Report-1976.pdf.

[50] https://mdsafetech.org/wp-content/uploads/2019/02/biological-effects-of-millimeter-wavelengths.-zalyubovskaya-declassif-by-cia-1977-biol-eff-mm-waves.pdf.

[51] Ibid at 57.

b) The people observed working with millimeter radio wave generators had disturbances in their blood and immuno-biology.[52]
c) Exposure in lab animals caused many disorders including of the liver, spleen, heart and brain, inhibiting "oxygen consumption rate by the mitochondria of those organs."[53]
d) The degree of adverse effects **increased with more exposure**;[54] the lab animals had been exposed for 15 minutes a day for 60 days. When exposure ceases, apparently disorders from low millimeter radio waves are reversible.[55] However, if adverse effects depend on duration of exposure, then Americans exposed continuously 24/7, 365 days a year, would suffer adverse biological effects, but without reprieve and without the ability to recover.

5. **Chronology of Federal Agencies** expressing since at least the 1990s that the FCC's wireless limits address only thermal (heating of human tissue), not non-thermal exposure, of RF radiation,[56] despite the fact that non-thermal exposure produces biological effects and disease.

Independent Research on Biological Effects of RF Radiation, Disregarded by Federal Agencies:

1. **The World Health Organization's (WHO) International Agency for Research on Cancer (IARC)** classified wireless radiation (2G and 3G) as a **Class 2B possible human carcinogen** in 2011,[57] (similar to lead, diesel fuel and gasoline engine exhaust). This was based on "epidemiological observations in humans which exhibited higher risks for the glioma-type of malignant brain cancer and of benign vestibular schwannoma of the vestibulocochlear nerve among heavy or long-term subscribers of cell or mobile phones."[58]

    a. "[R]esults from animal experiments that the IARC was lacking were later provided by the U.S. National Toxicology Program (NTP) report of two types of cancers in laboratory rats that were exposed, lifelong, to 2G and 3G cell phone RF radiation frequencies below 6 GHz . . . did not exceed 1°C,"[59] i.e., did not heat tissue.

    b. Since the WHO 2011 IARC cancer finding by independent scientists, other factions within the WHO have sought to produce industry-aligned pronouncements. For example, its website states a lack of causality of harm from wireless radiation[60].

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[52] Ibid at 60.

[53] Ibid at 59.

[54] Ibid at 59.

[55] Ibid at 58.

[56] https://ehtrust.org/timeline-of-development-of-safety-limits-for-wireless-radiation-in-us/.

[57] https://www.iarc.who.int/wp-content/uploads/2018/07/pr208_E.pdf.

[58] J. C. Lin, "RF Health Safety Limits and Recommendations [Health Matters]," in IEEE Microwave Magazine, vol. 24, no. 6, pp. 18-77, June 2023, doi: 10.1109/MMM.2023.3255659. keywords: {Radiation detectors;Human factors;Safety;Radiation effects;Cellular phones;Radio frequency}.

[59] J. C. Lin, "RF Health Safety Limits and Recommendations [Health Matters]," in IEEE Microwave Magazine, vol. 24, no. 6, pp. 18-77, June 2023, doi: 10.1109/MMM.2023.3255659. keywords: {Radiation detectors;Human factors;Safety;Radiation effects;Cellular phones;Radio frequency}.

[60] https://www.who.int/news-room/questions-and-answers/item/radiation-5g-mobile-networks-and-health.

However, over a decade later, a number of the IARC scientists are saying the opposite – that radiofrequency should be upgraded to a group 1 carcinogen (the highest level of evidence).[61] Dr. Miller, a former Senior Epidemiologist and Senior Scientist at the IARC has stated, **"[t]here is sufficient evidence to now classify radiofrequency radiation as a human carcinogen."** [62]

i. The WHO recently commissioned a study by Karpidis, et al, which concluded in 2024 no hazards from wireless radiation,[63] however, the study has been found to be severely flawed with no scientifically valid assessment,[64] and its conclusion contradicted scientific evidence and was drawn from data showing hazards.[65] Researchers have called for a retraction of the study.[66]

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[61] Hardell, L., Carlberg, M."Comments on the US National Toxicology Program technical reports on toxicology and carcinogenesis study in rats exposed to whole-body radiofrequency radiation at 900 MHz and in mice exposed to whole-body radiofrequency radiation at 1,900 MHz". International Journal of Oncology 54, no. 1 (2019): 111-127. https://doi.org/10.3892/ijo.2018.4606

[62] Professor Miller, MD, FRCP, FRCP (C), FFPH, FACE, is an eminent physician and expert in preventative medicine, a scientific advisor to various scientific and health authorities, and a former Senior Epidemiologist and Senior Scientist at the World Health Organization's (WHO) International Agency for Research on Cancer (IARC), https://phiremedical.org/2020-nir-consensus-statement-press-release/; see Prof. Miller's statement at 00:15:06 at https://www.youtube.com/watch?v=S16QI6-w9I8; see also Proceedings from a Symposium on the Impacts of Wireless Technology on Health, Prof. Miller at 8, https://www.womenscollegehospital.ca/wp-content/uploads/2022/06/Symposium_Document_Final_Jan_12.pdf.

[63] K. Karipidis, D. Baaken, T. Loney, M. Blettner, C. Brzozek, M. Elwood, C. Narh, N. Orsini, M. Röösli, M.S. Paulo, S. Lagorio, The effect of exposure to radiofrequency fields on cancer risk in the general and working population: A systematic review of human observational studies - Part I: Most researched outcomes

Environ Int., 191 (2024), Article 108983, 10.1016/j.envint.2024.108983.

[64] John W. Frank, Joel M. Moskowitz, Ronald L. Melnick, Lennart Hardell, Alasdair Philips, Paul Héroux, Elizabeth Kelley, *The Systematic Review on RF-EMF Exposure and Cancer by Karipidis et al. (2024) has Serious Flaws that Undermine the Validity of the Study's Conclusions*, Environment International, Vol. 195, 2025, 109200, ISSN 0160-4120, https://doi.org/10.1016/j.envint.2024.109200.

(https://www.sciencedirect.com/science/article/pii/S0160412024007876)

[65] "WHO to build neglect of RF-EMF exposure hazards on flawed EHC reviews? Case study demonstrates how 'no hazards' conclusion is drawn from data showing hazards," 7/10/24, https://www.degruyter.com/document/doi/10.1515/reveh-2024-0089/html;

"WHO's EMF Project's Systemic Reviews on the Association between RF Exposure and Health Effects Encounter Challenges," James Lin, IEEE Microwave Magazine, Jan 2025, https://www.dropbox.com/scl/fi/xq492i5ha6f2431vyxn3g/World_Health_Organizations_EMF_Projects_Systemic_Reviews_on_the_Association_Between_RF_Exposure_and_Health_Effects_Encounter_Challenges_Health_Matters.pdf?rlkey=o77i19den485rdo2k4ktdzhgj&st=842p0rbv&dl=0.

[66] Lennart Hardell, Mona Nilsson. A Critical Analysis of the World Health Organization (WHO) Systematic Review 2024 on Radiofrequency Radiation Exposure and Cancer Risks. Journal of Cancer Science and Clinical Therapeutics. 9 (2025): 09-26., https://cdn.fortunejournals.com/articles/a-critical-analysis-of-the-world-health-organization-who-systematic-review.pdf.

ii. Potential conflict of interest: note that the Karpidis study was done by the WHO's EMF Project, not by the IARC, the latter being an advisory group consisting of 29 scientists from 18 countries.[67]

iii. Another WHO study in 2024 on RF-induced oxidative stress identified 11,599 studies on oxidative stress within the 800-2450 MHz range, but discarded more than 99% of those studies.[68] Researchers have called for a retraction of the study.[69]

2. **The Ramazzini Institute** in Italy in 2018 found increased malignant heart schwannomas and malignant brain gliomas in lab animals from cell tower base stations, similar to what the NTP found from 2G/3G.[70]

Note: *"Since the IARC evaluation in 2011, the evidence on human cancer risks from RF radiation has been strengthened based on human cancer epidemiology reports [IARC Class 2B designation for RF radiation], animal carcinogenicity studies [NTP study finding clear evidence of cancer] and experimental findings on oxidative mechanisms [associated with increased DNA damage][71] and genotoxicity [associated with increased DNA damage][72]. Therefore, the IARC Category should be upgraded from Group 2B to Group 1, a human carcinogen[73]."[74] [Some internal footnotes omitted]*

3. **International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF).** "Scientific evidence invalidates health assumptions underlying the FCC and ICNIRP exposure limit determinations for radiofrequency radiation: implications for 5G."[75]

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[67] *Health risks from radiofrequency radiation, including 5G, should be assessed by experts with no conflicts of interest,* Lennart Hardell, Michael Carlberg. Oncol Lett. 2020 Jul 15;20(4):15. doi: 10.3892/ol.2020.11876.

[68] Frank, John W., Melnick, Ronald L. and Moskowitz, Joel M.. "A critical appraisal of the WHO 2024 systematic review of the effects of RF-EMF exposure on tinnitus, migraine/headache, and non-specific symptoms" Reviews on Environmental Health, 2024. https://doi.org/10.1515/reveh-2024-0069; "Another WHO RF Review Challenged, More than 99% of Studies on Oxidative Stress Discarded," Microwave News, 8/21/24, https://www.microwavenews.com/short-takes-archive/another-who-rf-systematic-review-challenged.

[69] Ibid.

[70] https://pubmed.ncbi.nlm.nih.gov/29530389/; see also J. C. Lin, "RF Health Safety Limits and Recommendations [Health Matters]," in IEEE Microwave Magazine, vol. 24, no. 6, pp. 18-77, June 2023, doi: 10.1109/MMM.2023.3255659. keywords: {Radiation detectors;Human factors;Safety;Radiation effects;Cellular phones;Radio frequency}.

[71] Yakymenko I, Tsybulin O, Sidorik E, Henshel D, Kyrylenko O, Kyrylenko S. Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation. Electromagn Biol Med. 2016;35:186–202. doi: 10.3109/15368378.2015.1043557.

[72] Smith-Roe SL, Wyde ME, Stout MD, Winters JW, Hobbs CA, Shepard KG, Green AS, Kissling GE, Shockley KR, Tice RR, et al. Evaluation of the genotoxicity of cell phone radiofrequency radiation in male and female rats and mice following subchronic exposure. Environ Mol Mutagen. 2020;61:276–290. doi: 10.1002/em.22343.

[73] Carlberg M, Hardell L. Evaluation of mobile phone and cordless phone use and glioma risk using the Bradford Hill viewpoints from 1965 on association or causation. BioMed Res Int. 2017;2017:9218486. doi: 10.1155/2017/9218486.

[74] Health risks from radiofrequency radiation, including 5G, should be assessed by experts with no conflicts of interest, LHardell, MCarlberg, Oncol Lett. 2020 Jul 15;20(4):15. doi: 10.3892/ol.2020.11876.

[75] EnvironHealth 21, 92 (2022). https://doi.org/10.1186/s12940-022-00900-9.

a. The FCC wireless radiation limits for human exposure are based **largely** on 1980s experiments "**involving 40-60 minute exposures in 5 monkeys and 8 rats**, and then applying arbitrary safety factors to an apparent threshold specific absorption rate (SAR) of 4 W/kg . . . Adverse effects observed at exposures below the assumed threshold SAR include non-thermal induction of reactive oxygen species, DNA damage, cardiomyopathy, carcinogenicity, sperm damage, and neurological effects . . . "[76]

4. **New Hampshire Commission** studied the biological effects of wireless radiation and issued a report Nov. 2020[77] with former commissioner Dr. Kent Chamberlain explaining a "key finding being that exposure to wireless communication radiation is harmful to the health of humans and the environment. Those findings apply to all forms of wireless radiation, which include all generations of cellphone radiation." (see Appendix A, Dr. Chamberlin's letter explaining their findings).

5. **Thousands of scientific and medical studies** show neurological disorders; increased risk of cancer and brain tumors; DNA damage; oxidative stress; immune dysfunction; cognitive processing effects; altered brain development, sleep and memory disturbances, ADHD, abnormal behavior, sperm dysfunction, and damage to the blood-brain barrier.[78]

6. **Eight case studies** since Jan 2023 in Sweden show adverse health impacts from exposure to 5G towers. Previously healthy individuals developed typical "microwave syndrome" symptoms shortly after the towers were installed: headaches, abnormal fatigue, heart arrythmia, burning skin, trouble concentrating.[79] The significance of these reports is that non-ionizing radiation[80] from 5G — well below levels allowed by authorities — can cause health problems in individuals who had no prior history of electromagnetic sensitivity.[81] Dr. Lennart Hardell, lead

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[76] Ibid.

[77] http://www.gencourt.state.nh.us/statstudcomm/committees/1474/reports/5G%20final%20report.pdf.

[78] A Rationale for Biologically-based Exposure Standards for Low-Intensity Electromagnetic Radiation, 2022, https://bioinitiative.org/conclusions/; see also, Adverse health effects of 5G mobile networking technology under real-life conditions, May 1, 2020, https://pubmed.ncbi.nlm.nih.gov/31991167/; Wireless Radiation (RFR) – Is U.S. Government Ignoring Its Own Evidence for Risk? March, 28, 2019, https://electromagnetichealth.org/electromagnetic-health-blog/u-s-gov-ignoring-own-evidence/; Oxidative Mechanisms of Biological Activity of Low-Intensity Radiofrequency Radiation, Electromagnetic Biology and Medicine, 35(2), 186-202, Yakymenko, I., Tsybulin, O., Sidorik, E., Henshel, D., Kyrylenko, O., & Kyrylenko, S. (2016), https://pubmed.ncbi.nlm.nih.gov/26151230/.

[79] https://mdsafetech.org/2023/11/20/5g-health-effects-5-case-reports-of-health-symptoms-after-5g-cell-towers-placed-in-sweden/; e.g., Jan 2023 study of 63 year old man and 62 year old woman where 5G antennas were installed on the rooftop of their home, https://www.gavinpublishers.com/assets/articles_pdf/Case-Report-The-Microwave-Syndrome-after--Installation-of-5G-Emphasizes-the-Need-for--Protection-from-Radiofrequency-Radiation.pdf and https://childrenshealthdefense.org/defender/5g-radiation-microwave-syndrome-symptoms/; Feb 2023 study of two previously healthy men where 5G antennas were installed on the rooftop of their business, https://www.anncaserep.com/open-access/development-of-the-microwave-syndrome-in-two-men-shortly-after-9589.pdf; April 2023 study of 52 year old woman whose apartment was 60 meters from a 5G base station, https://acmcasereport.com/pdf/ACMCR-v10-1926.pdf?fbclid=IwAR2J-mE3XeBxqaXPQdFxslf9Q23bMCer9vgUBHnCvJXBrgBv-w7YdRUDwF0; see also, "The microwave syndrome or electro-hypersensitivity: historical background," https://pubmed.ncbi.nlm.nih.gov/26556835/.

[80] https://childrenshealthdefense.org/emr/emf-key-terms-descriptions/.

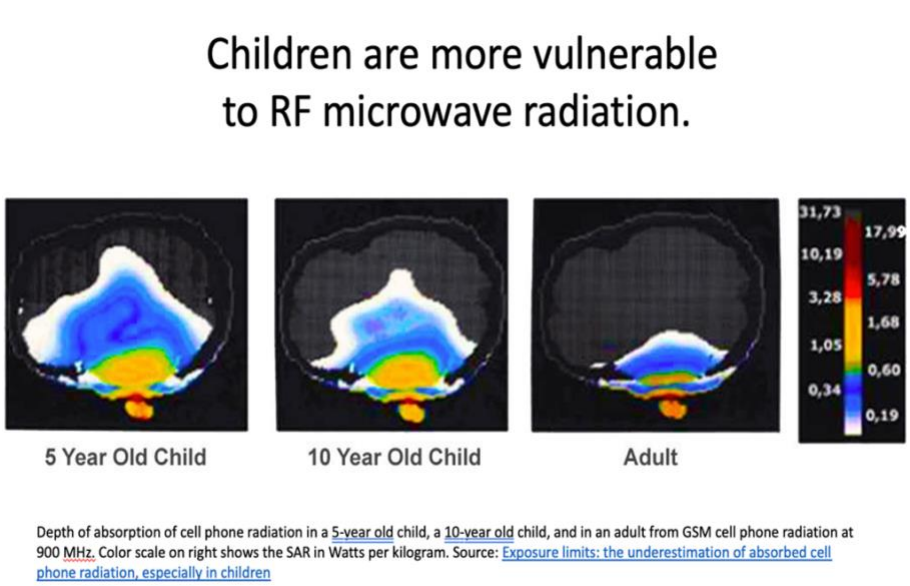
[81] https://childrenshealthdefense.org/emr/emf-wireless-health-impacts/.

author of the reports and world-renowned scientist on cancer risks from radiation, affirms these reports as "groundbreaking" because they serve as the "first warning of a health hazard."[82]

7. **One-third of Americans suffer from symptoms from RF radiation**, based on a 2019 Bevington study which analyzed the prevalence of symptoms from RF radiation within any given population. [83] Based on a population of 332.4 million people in the U.S.,[84] 120 million have symptoms, 2% of which (7 million) have severe symptoms or can't work.

8. **Children absorb more RF radiation and are at greater risk than adults**.[85]

    a. **From cell phones:**[86]



Depth of absorption of cell phone radiation in a 5-year old child, a 10-year old child, and in an adult from GSM cell phone radiation at 900 MHz. Color scale on right shows the SAR in Watts per kilogram. Source: Exposure limits: the underestimation of absorbed cell phone radiation, especially in children

[82] https://www.stralskyddsstiftelsen.se/two-studies-show-that-5g-caused-the-microwave-syndrome-in-healthy-persons/.

[83] "The Prevalence of People with Restricted Access to Work in Manmade Electromagnetic Environments," Journal of Environment and Health Science, https://mdsafetech.files.wordpress.com/2019/10/2018-prevalence-of-electromagnetic-sensitivity.pdf.

[84] https://www.commerce.gov/news/blog/2022/01/us-population-estimated-332403650-jan-1-2022#:~:text=As%20our%20nation%20prepares%20to,since%20New%20Year's%20Day%202021.

[85] Wireless technologies, non-ionizing electromagnetic fields and children: Identifying and reducing health risks," Devra Davis PhD, MPH, Linda Birnbaum PhD, Paul Ben-Ishai PhD, Hugh Taylor MD, Meg Sears MEng, PhD, Tom Butler PhD, MSc, Theodora Scarato MSW, bCurr Probl Pediatr Adolesc Health Care, 2023 Feb;53(2):101374 https://doi.org/10/1016/j.cppeds.2023.101374; see also, *Children and Wireless Radiation,* https://ehtrust.org/educate-yourself/children-and-wireless-faqs/.

[86] Exposure limits: the underestimation of absorbed cell phone radiation, especially in children, Gandhi, Morgan, Augusto de Salles, Han, Heberman, Davis, October 14, 2011, https://pubmed.ncbi.nlm.nih.gov/21999884/.

b. **American Academy of Pediatrics:** children are disproportionately affected by cell phone radiation due to their lower bone density and amount of fluid in the brain allowing for absorption of greater quantities of RF radiation than in adults.[87]

c. **Greater risk for fetuses:** risk of "degeneration of the protective myelin sheath that surrounds brain neurons."[88]

d. **School-age children:** risk of "[d]igital dementia."[89]

e. **Childhood leukemia**, increased risk**.**[90]

f. **Potential dangers of cell towers near schools.**[91]

i. **Elementary school children** exposed to high RF radiation from mobile phone base stations 200 meters from their schools "had a significantly higher risk of type 2 diabetes mellitus" than those exposed to lower RF radiation.[92]

ii. **Adolescent school children** exposed to high RF radiation from mobile phone base stations within 200 meters from their schools had "delayed fine and gross motor skills, spatial working memory and attention" than those exposed to lower RF radiation.[93]

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[87] *Key Scientific Evidence and Public Health Policy Recommendations*, Supplement 2012, at 21, David O. Carpenter, MD, Director, Institute for Health and the Environment University at Albany, Cindy Sage, MA, Sage Associates, https://bioinitiative.org/wp-content/uploads/pdfs/sec24_2012_Key_Scientific_Studies.pdf.https://bioinitiative.org/.

[88] *Why children absorb more microwave radiation than adults: The consequences,* Morgan, Kesar and Davis, Journal of Microscopy and Ultrastructure, Vol. 2, Issue 4, December 2014, 197-204, https://www.sciencedirect.com/science/article/pii/S2213879X14000583.

[89] *Why children absorb more microwave radiation than adults: The consequences,* Morgan, Kesar and Davis, Journal of Microscopy and Ultrastructure, Vol. 2, Issue 4, December 2014, 197-204, https://www.sciencedirect.com/science/article/pii/S2213879X14000583.

[90] *Key Scientific Evidence and Public Health Policy Recommendations*, 2007, at 19, David O. Carpenter, MD, Director, Institute for Health and the Environment University at Albany, Cindy Sage, MA, Sage Associates, https://bioinitiative.org/wp-content/uploads/pdfs/sec24_2007_Key_Scientific_Studies.pdf.

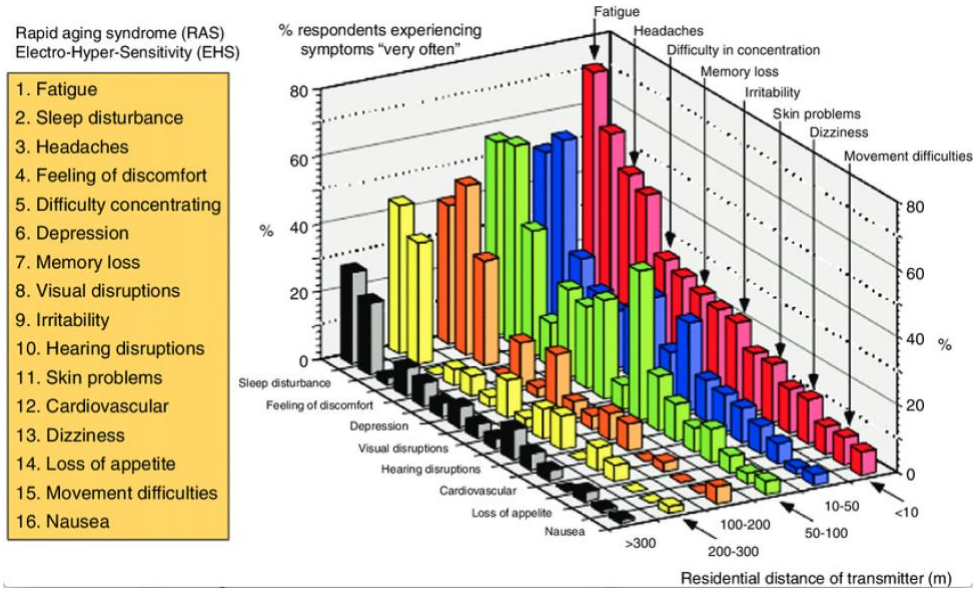
[91] Dr. Magda Havas: WiFi in Schools is Safe. True or False? https://www.youtube.com/watch?v=6v75sKAUFdc.

[92] *Association of Exposure to Radio-Frequency Electromagnetic Field Radiation (RF-EMFR) Generated by Mobile Phone Base Stations (MPBS)with Glycated Hemoglobin (HbA1c) and Risk of Type 2 Diabetes Mellitus*, Sultan Ayoub Meo et al, International Journal of Environmental Research and Public Health, 2015; https://www.researchgate.net/publication/283726472_Association_of_Exposure_to_Radio-Frequency_Electromagnetic_Field_Radiation_RF-EMFR_Generated_by_Mobile_Phone_Base_Stations_with_Glycated_Hemoglobin_HbA1c_and_Risk_of_Type_2_Diabetes_Mellitus.

[93] Meo, S. A., Almahmoud, M., Alsultan, Q., Alotaibi, N., Alnajashi, I., & Hajjar, W. M. (2018). *Mobile Phone Base Station Tower Settings Adjacent to School Buildings: Impact on Students' Cognitive Health*, American Journal of Men's Health; https://pubmed.ncbi.nlm.nih.gov/30526242/.

iii. **A ten-year old child** testified of his cardiac condition being caused by exposure to RF radiation from a router in the library where he was being tutored.[94]

9. **Neurobehavioral Symptoms Near Cell Towers.** The following chart shows a worsening of symptoms when closer to a cell tower but a lessening of symptoms when farther away from a cell tower. [95]



Symptoms experienced by people near cellular phone base stations; RF radiation affects the blood, heart and autonomic nervous system.[96] Source: Santini, et al (France): Pathol Biol. 2002;50:S369-73; Dr. Magda Havas, PhD.

10. **RF Radiation Effects.** A group of toxicology researchers from multiple universities concluded that overall, high frequency RF radiation even below the FCC limits "can result in: carcinogenicity (brain tumors/glioma, breast cancer, acoustic neuromas, leukemia, parotid gland tumors), genotoxicity (DNA damage, DNA repair inhibition, chromatin structure), mutagenicity, teratogenicity, neurodegenerative diseases (Alzheimer's Disease, Amyotrophic Lateral Sclerosis), neurobehavioral problems, autism, reproductive problems, pregnancy outcomes, excessive reactive oxygen species/oxidative stress, inflammation, apoptosis, blood-brain barrier disruption, pineal gland/melatonin production, sleep disturbance, headache, irritability, fatigue, concentration difficulties, depression, dizziness, tinnitus, burning and flushed skin, digestive disturbance, tremor, cardiac irregularities, adverse impacts on the neural, circulatory, immune,

[94] Child With Heart Problems From Wireless: 5G Health Risks California SB 649 Hearing, https://www.youtube.com/watch?v=OgNLR9fQOX4&list=PLT6DbkXhTGoDakSqp1i_7milpwGx4xMFq.

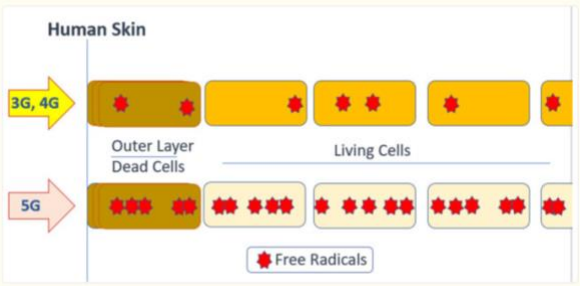
[95] *Cell Tower Health Effects*, Physicians for Safe Technology, https://mdsafetech.org/cell-tower-health-effects/.

[96] Dr. Magda Havas, https://www.researchgate.net/figure/Symptoms-experienced-by-people-near-cellular-phone-base-stations-based-on-the-work-of_fig2_258313941.

endocrine, and skeletal systems" and "from this perspective, **RF is a highly pervasive cause of disease**." [97]

11. **5G's Biological Effects.** Contrary to claims that 5G's higher frequencies (millimeter waves) simply "bounce" off the skin, researchers have documented that the coiled portion of the skin's sweat duct can be regarded as a helical antenna in the sub-THz band and the skin, our largest organ, can intensely absorb the higher 5G frequencies.[98] The millimeter wave technology of 5G will not only directly and adversely affect the skin and eyes [e.g., skin cancer, cataracts], but will, in turn, cascade into systemic signaling effects within the body, "on the nervous system, heart and immune system."[99] The free radicals accumulating on the skin from 5G (see figure below) cause oxidative stress which can lead to DNA strand breaks, cancer and atherosclerosis.[100]

Figure 1.



12. **Clumping of blood cells.** A Feb 2025 study found that when an otherwise healthy person is in close proximity to a cell phone red blood cells clumped together (rouleaux formation), which leads to blood abnormality, less oxygen transport, and potentially blockages, stroke and heart problems.[101]

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[97] Ronald N. Kostoff, Paul Heroux, Michael Aschner, Aristides Tsatsakis, "Adverse health effects of 5G mobile networking technology under real-life conditions," Toxicology Letters, Vol 323, 2020, pp. 35-40, ISSN 0378-4274, https://doi.org/10.1016/j.toxlet.2020.01.020.

[98] N. Betzalel, Y. Feldman and P. B. Ishai, "The Modeling of the Absorbance of Sub-THz Radiation by Human Skin," in IEEE Transactions on Terahertz Science and Technology, vol. 7, no. 5, pp. 521-528, Sept. 2017, doi: 10.1109/TTHZ.2017.2736345, https://ieeexplore.ieee.org/document/8016593.

[99] Ronald N. Kostoff, Paul Heroux, Michael Aschner, Aristides Tsatsakis, "Adverse health effects of 5G mobile networking technology under real-life conditions," Toxicology Letters, Vol 323, 2020, pp. 35-40, ISSN 0378-4274, https://doi.org/10.1016/j.toxlet.2020.01.020; J J B, A R M, S M J M. A New Look at Three Potential Mechanisms Proposed for the Carcinogenesis of 5G Radiation. J Biomed Phys Eng. 2020 Dec 1;10(6):675-678. doi: 10.31661/jbpe.v0i0.2008-1157. PMID: 33364204; PMCID: PMC7753259, https://pmc.ncbi.nlm.nih.gov/articles/PMC7753259/#ref7.

[100] J J B, A R M, S M J M. A New Look at Three Potential Mechanisms Proposed for the Carcinogenesis of 5G Radiation. J Biomed Phys Eng. 2020 Dec 1;10(6):675-678. doi: 10.31661/jbpe.v0i0.2008-1157. PMID: 33364204; PMCID: PMC7753259, https://pmc.ncbi.nlm.nih.gov/articles/PMC7753259/#ref7; Russell C L. 5 G wireless telecommunications expansion: Public health and environmental implications. EnvironMental Research. 2018;165:484–95. doi: 10.1016/j.envres.2018.01.016.

[101] "Hypothesis: ultrasonography can document dynamic in vivo rouleaux formation due to mobile phone exposure," Robert R. Brown, Barbara Biebrich, Front. Cardiovasc. Med. , 10 February 2025 Sec. Atherosclerosis and

13. **"The 5G Appeal"** to the United Nations to halt the proliferation of 5G, warning of potential biological effects, was signed by 252 scientists and professionals from 43 countries, 40 scientists of which are from 15 U.S. states, including scientists and medical professionals from Columbia and Harvard.[102] Other scientists have joined in consensus statements.[103]

14. **International Association of Fire Fighters** passed a resolution in 2004 that disapproved of cell towers on or near fire stations until safety can be proven.[104]

15. **Increases in brain cancer** in the U.S. have been reported, with scientists attributing a high probability on RF radiation from cell phone use.[105]

16. **Comprehensive overview** of the adverse biological effects on people and the environment is provided at https://ehtrust.org/wp-content/uploads/EHT-5G-Health-and-Environment-Open-Letter-3_2021-3.pdf.

Chronic Disease and Clusters Near Cell Towers:

1. **Near Duluth, MN**, a woman suffered 51 strokes after a nearby cell tower was "upgraded," in addition to experiencing nausea, blind spots in her vision, orientation and balance difficulties.[106]

2. **Clusters of sickness near cell towers (not exhaustive).**
    a. **The Board of Health of Pittsfield, MA** issued an emergency cease and desist order in April 2022 to turn off a 4G cell tower that injured 17 residents, most of whom evacuated their homes.[107] One of those who remained has since died of cancer. The order cited residents having reported "headaches, ringing in the ears, dizziness, heart palpitations, nausea, and skin rashes," and, e.g., a child who had "to sleep with

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Vascular Medicine, Volume 12 - 2025 | https://doi.org/10.3389/fcvm.2025.1499499; see also, https://ehtrust.org/cellphones-and-your-blood-what-you-need-to-know/.

[102] http://www.5gappeal.eu/the-5g-appeal/; see also, Dr. Martin Blank, PhD, Dept of Physiology and Cellular Biophysics, Columbia University, announcing the appeal early on and warning on wireless radiation, https://www.youtube.com/watch?v=HgECRrabuZQ; see also, https://childrenshealthdefense.org/defender/5g-rollout-harm-regulation-profit/.

[103] https://phiremedical.org/wp-content/uploads/2020/11/2020-Non-Ionising-Radiation-Consensus-Statement.pdf.

[104] https://www.iaff.org/cell-tower-radiation/.

[105] See, e.g., Brain Tumor Rates Are Rising in the US: The Role of Cellphone & Cordless Phone Use; The Incidence of Meningioma, a Non-Malignant Brain Tumor, is Increasing in the U.S.; New review study finds that heavier cell phone use increases tumor risk; Expert report by former U.S. govt. official: High probability RF radiation causes brain tumors;

Cell phone and cordless phone use causes brain cancer: New review; and https://ehtrust.org/scientific-documentation-cell-phone-radiation-associated-brain-tumor-rates-rising/.

[106] https://childrenshealthdefense.org/defender/marcia-haller-cell-tower-rf-radiation-sickness/.

[107] https://ehtrust.org/cease-and-desist-order-against-verizon-cell-tower-by-board-of-health-pittsfield-ma/, see below the fold for link to the Order, p.12.

a bucket next to her bed in case she needs to throw up."[108] Because the telecom carrier threatened to sue, the Board of Health was compelled to rescind the order. The residents filed suit against the city but lost on federal preemption, i.e., no legal recourse for health claims.

b. **In Rippon, CA** when a cell tower was placed near an elementary school, 4 children (ages 6-11) got cancer (brain, liver, kidney) and 4 teachers got breast cancer.[109] One of the children who contracted brain cancer (glioblastoma) when he was 10 years died in Aug 2024.[110] Since the tower was removed, it was reported that there were no more instances of cancer at the school.[111]

c. **In an Idaho town** after 5G cell towers were installed, it was reported that a cluster of residents developed atrial fibrillation (a-fib). One of those residents who had undergone surgery for a-fib is a plaintiff in a lawsuit against the telecom carrier which refuses to provide accommodation under the Americans with Disabilities Act.[112]

[108] https://ehtrust.org/family-injured-by-cell-tower-radiation-in-pittsfield-massachusetts/.

[109] See beginning of video at https://www.youtube.com/watch?v=-9TMTexPb_0&t=128s .

[110] See the lists of treatments and surgeries that this child endured before he died, https://www.gofundme.com/f/support-the-ferrulli-family-in-memory-of-mason.

[111] See beginning of video at https://www.youtube.com/watch?v=-9TMTexPb_0&t=128s .

[112] https://childrenshealthdefense.org/press-release/chd-files-in-series-of-lawsuits-seeking-disability-accommodation-for-people-injured-by-rf-radiation-from-cell-towers/ and https://childrenshealthdefense.org/defender/henry-hank-allen-chd-verizon-lawsuit-radiofrequency-radiation-cell-towers/.

APPENDIX A

University of New Hampshire

College of Engineering and Physical Sciences
Department of Electrical and Computer Engineering

Kingsbury Hall
33 Academic Way
Durham, NH 03824-2619

V: 603.862.1357
F: 603.862.1832
TTY: 7.1.1 (Relay NH)

www.ceps.unh.edu/ece ece.dept@unh.edu

February 13, 2023

Queens Community Board No. 12
Hon. Rene Hill, Chair of the Transportation Committee
Ms. Yvonne Reddick, District Manager
90-28 161st Street
Jamaica, New York 11432

Dear Community Board Members:

I am writing you as a former member of the New Hampshire State Commission that was tasked with exploring the Environmental and Health Effects of Evolving Wireless and 5G Technology. This Commission was formed through bipartisan legislation and was supported by the governor. The Commission was comprised of unbiased experts in fields relating to health and radiation and were highly qualified to evaluate the issue in a fair and in-depth manner. The Commission submitted its final report in November 2020, with a key finding being that exposure to wireless communication radiation is harmful to the health of humans and the environment. Those findings apply to all forms of wireless radiation, which include all generations of cellphone radiation.

My purpose in writing is to alert you to the dangers of siting a cell tower near to where people, particularly young people, live, work or recreate. I provide relevant details about the New Hampshire Commission's findings on this issue in a presentation I gave to the Lenox, MA Board of Health. Please know that the International Association of Fire Fighters (IAFF) in 2004 adopted a position statement still in effect today forbidding wireless communication facilities on or near fire stations as firefighters were being injured by the radiation. Many of the firefighters exposed to the wireless radiation could not remember where they were going during emergencies, nor how to administer CPR. As Dr. Gunnar

Heuser indicates at the EMF Medical Conference, functional MRIs showed damage to the gray matter of their brains from the radiofrequency radiation exposure.

Scientists, physicians, environmental and public health physicians, epidemiologists, pediatricians along with engineers such as myself have been calling for state and local governments to be proactive in protecting your citizens against radiation exposure. I realize that providing such protection may seem challenging. However, initiatives such as the New Hampshire Commission and the successful lawsuit brought about by the Environmental Health Trust and others are exposing the dubious claims by the FCC that wireless radiation is harmless. Given the mounting evidence regarding the clear harm of radiation, it is only a matter of time before meaningful protective regulations are put in place.

While telecom companies currently have the upper hand in that they seem to be able to force communities to accept whatever tower sites they mandate, there are actions that those communities can take to delay or stop installations where people will be excessively exposed. For example, citizens in York, Maine have delayed the installation of antennas positioned close to a neighborhood. The Board of Health in Pittsfield, Massachusetts issued a cease-and-desist order against Version regarding a cell tower that was causing illness in a surrounding neighborhood. There are many other examples where citizens and administrators have worked together to protect people against cell tower radiation. Those examples can be used to strengthen your ordinances to help protect against inappropriate cell tower siting.

I am currently working with my state legislators to pass legislation that would provide protections against excessive radiation exposure. The original legislation called for a 1,640-foot setback for all new cell towers; this setback is one of the recommendations made by the New Hampshire Commission, and the rationale for picking that distance is explained here. The legislation is currently being revised so that it can be acted on in the next legislative session.

Wireless radiation dangers are real, and they can be significant in their impact on human health and the environment. I encourage you to do whatever is within your power to protect your constituents against it.

Sincerely,

Kent Chamberlin, PhD
Professor & Chair Emeritus
Fulbright Distinguished Chair

ENVIRONMENTAL HEALTH TRUST

ehtrust.org
wildlifeandwireless.org

March 4, 2025

TO: House Committee on Energy & Commerce
Communications & Technology Subcommittee
Noah Jackson
Noah.Jackson@mail.house.gov
United States House of Representatives Washington DC 20510

FROM: Environmental Health Trust
Joseph M. Sandri
General Counsel & VP Legal Affairs
[redacted]

Submitted via email to: Noah.Jackson@mail.house.gov

RE: March 4, 2025 Hearing: Full Committee Markup of 12 Bills[1]

- HR 1455 Institute for Telecommunication Sciences (ITS) Codification Act
- HR 1618 Precision Agriculture Satellite Connectivity Act
- HR ____ Advanced, Local Emergency Response Telecommunications Parity ActDear Chairs Guthrie and Hudson, Ranking Members Pallone and Matsui, and Members of the Committee,

Dear Chairs Guthrie and Hudson, Ranking Members Pallone and Matsui, and Members of the Committee,

We thank the Committee for considering our comments on wireless policy. Environmental Health Trust (EHT) is a not-for-profit scientific think tank that promotes a healthier population and environment through research, education and policy.

Wireless technology has brought many conveniences. However, Congress and federal regulatory agencies have not yet sought precision measurements, medical and environmental impact studies, and industry incentives to impel the industry to compete on safety, and for regulators and the public to be able to enjoy maximum transparency and monitoring of the radiation impacts from network

[1] https://energycommerce.house.gov/posts/chairman-brett-guthrie-announces-full-committee-markup-of-12-bills

infrastructure and devices. Legislation that increases the number of antenna deployments, satellite deployments, and radiofrequency densification across the country put human health, our farms, and our natural resources at risk. We urge the Committee to halt legislation that will encourage antenna or RF densification until:

a) federal regulatory agencies determine safe levels of exposure for radiofrequency emissions; and
b) free-market principles are restored to the wireless industry, which includes (i) liability for wireless exposures and (ii) restoration of more complete local zoning authority over wireless facilities.[2].

- HR 1455 Codifies into statute the NTIA's Institute for Telecommunication Sciences (ITS) and expands its scope and power allowing taxpayer dollars to help reallocate spectrum and deploy commercial satellites.[3]
- HR 1618, Precision Agriculture Satellite Connectivity Act, directs the FCC to use rulemaking to promote the use of satellites for precision agriculture.[4]
- HR ____ The Advanced Local Emergency Response Telecommunications Parity Act would define "lack of cell phone coverage" as itself an emergency, which confers extraordinary powers on the FCC to bypass the usual spectrum authorization process.[5]

These bills encourage, directly or indirectly, antenna and/or RF densification across the country.

We highlight the decision of the U.S. Circuit Court of Appeals for the District of Columbia in *Environmental Health Trust, et al. v. FCC, 2021.* In reassessing its safety guidelines, the court found that the Federal Communication Commission (FCC) had failed to take into account scientific findings relevant to the impacts of radiofrequency (RF) radiation on children and on wildlife that had been submitted to the record, and *remanded* further action to the FCC. In addition, the Court noted that the FCC had not considered long-term impacts on public health or the environment nor the ubiquity of wireless devices and other major technological changes since the 1996 guidelines (in use today) were first promulgated.

The FCC's RF human exposure limits –which continue to be under federal court *remand* since August 2021– are designed only to protect against heating effects of short term exposures, not biological impacts from long term exposure.[6] An ever growing body of scientific evidence

[2] While local governments retain significant local zoning authority, the extent of federal preemption has expanded in recent years and should be rolled back.
[3] https://www.congress.gov/bill/119th-congress/house-bill/1455
[4] https://www.congress.gov/bill/119th-congress/house-bill/1618/
[5] https://d1dth6e84htgma.cloudfront.net/H_R_Advanced_Local_Emergency_Response_Telecommunications_Parity_Act_eaad2f7d04.pdf
[6] Lin, J. C. (2023). Incongruities in recently revised radiofrequency exposure guidelines and standards. Environmental Research, 222, 115369; International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF), (2022). Scientific evidence invalidates health assumptions underlying the FCC and ICNIRP exposure limit

documents adverse effects from RF radiation at exposure levels well below FCC limits[7] with research findings that include cancer, the induction of oxidative stress, epigenetic effects, impacts to neurotransmitters, memory, brain development and damage to the immune, endocrine, hematological and reproductive system. Further, studies have found impacts to tree canopy, plant growth, pollinator health and the orientation, migration and breeding of wildlife.[8] The science clearly indicates that wireless networks create harmful interference in humans as well as flora and fauna.

Further, as documented in Attachment 2 on Regulatory Gaps, there are no federal agencies with health and science expertise engaged in activities related to reviewing the science on health effects of rising environmental RF levels from network infrastructure. Other countries have long been objectively studying these health effects and they have accordingly reduced RF exposure by law often by 90% while also competently deploying next-generation networks and devices.[9]

Finally, we note that HR 651 Spectrum Pipeline Act of 2025[10] is currently under review by your committee. We similarly urge you to halt consideration of this legislation until the recommendations in this letter are implemented. Attachment 1 below outlines recommendations on spectrum policy.

With that in mind we submit these comments.

Outline of this document:
See attachments for details on each topic below.

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determinations for radiofrequency radiation: implications for 5G. Environ Health. Oct 18;21(1):92; Lopez I, Rivera M, Feliz N, Maestu C. (2022) It is mandatory to review environmental radiofrequency electromagnetic field measurement protocols and exposure regulations: An opinion article. Front. Public Health, 24 October; Davis, D., Birnbaum, L., Ben-Ishai, P., Taylor, H., Sears, M., Butler, T., & Scarato, T. (2023). Wireless technologies, non-ionizing electromagnetic fields and children: Identifying and reducing health risks. Current Problems in Pediatric and Adolescent Health Care, 53(2), 101374.

[7] Belpomme, D., Hardell, L., Belyaev, I., Burgio, E., & Carpenter, D. O. (2018). Thermal and non-thermal health effects of low intensity non-ionizing radiation: An international perspective. *Environmental Pollution*, *242*, 643–658; McCredden, J. E., Cook, N., Weller, S., & Leach, V. (2022). Wireless technology is an environmental stressor requiring new understanding and approaches in health care. *Frontiers in Public Health*, *10*; Miller, A. B., Morgan, L. L., Udasin, I., & Davis, D. L. (2018). Cancer epidemiology update, following the 2011 IARC evaluation of radiofrequency electromagnetic fields (Monograph 102). *Environmental Research*, *167*, 673–683.

[8] Levitt, B. B., Lai, H. C., & Manville, A. M. (2022b). Effects of non-ionizing electromagnetic fields on flora and fauna, Part 2 impacts: How species interact with natural and man-made EMF. Reviews on Environmental Health, 37(3), 327–406; Thill A, Cammaerts MC, Balmori A. Biological effects of electromagnetic fields on insects: a systematic review and meta-analysis. Rev Environ Health. 2023 Nov 23

[9] *Spectrum Management & Human RF Exposure – 2023 Recap*, National Spectrum Management Association(NSMA) 38th Annual Conference, National Press Club, Washington, DC, NSMA Presentations 2023 - National Spectrum Management Association : National Spectrum Management Association

[10] https://www.congress.gov/bill/119th-congress/house-bill/651/

ATTACHMENT 1: Spectrum Policy Recommendations
ATTACHMENT 2: Today's Regulatory Gap Regarding Radiofrequency Bioeffects
ATTACHMENT 3: Radio-frequency Radiation Impacts on the Environment
ATTACHMENT 4: Radio-frequency Radiation Impacts on Human Health
ATTACHMENT 5: Legal and Liability Issues of Wireless
ATTACHMENT 6: Expert Recommendations on Technology Safety
ATTACHMENT 7: Factsheet on Environmental Impacts of Satellite Proliferation

We are happy to provide the Committee with more information and resources.

Sincerely,

Joseph M. Sandri
General Counsel & VP Legal Affairs
Environmental Health Trust
[redacted]

Submitted by Rola Masri
Director of Government Outreach
Environmental Health Trust
[redacted]

cc: Kent Chamberlin, President, EHT
Devra Davis, Founder, EHT

ATTACHMENT 1: Spectrum Policy Recommendations

Like many natural resources, spectrum holds commercial value, while at the same time the way we choose to use spectrum has significant impacts on human health, the environment, national security, cybersecurity, energy consumption, and economic competitiveness. By prioritizing these concerns, the committee will unleash long-term leadership in all these categories.

Increased commercial utilization of spectrum would result in a massive proliferation of additional antennas across the country and increase the density of radiofrequency radiation in the environment without objectively understanding the costs. Whether under exclusive license, layered/shared use, or unlicensed, increased spectrum use will result in increased radiofrequency densification. People and the environment would inevitably be exposed to much higher levels of radiation across the country. In addition, the antennas triggered by the availability of additional spectrum can be largely rolled out across the country under preemption of local zoning authority, via what is known as "Section 6409" preemption.[11] A number of municipal organizations have opposed preemption of local authority over the placement of wireless facilities.[12]

EHT shares the goal of ensuring that the future of technology in the US is as robust, efficient, and sustainable as possible. We submit that responsible spectrum management considers not only the impact of spectrum decisions on networks and devices but also on the environment and all life forms, including humans, animals, plants, and microbes.

In this document, "**spectrum utilization decisions**" refers to any action by Congress to allocate, reallocate, or alter the utilization of spectrum, whether for non-federal use, shared commercial/federal use, or federal use.

Recommendation #1: Congress should not make any spectrum utilization decisions that increase RF exposure until the FCC complies with the U.S. Court of Appeals DC Circuit *remand* mandate issued in August 2021 in *EHT et al. v. FCC,* to address record evidence including long term health effects, children's vulnerability and environmental impacts of RF exposure.

Neither FCC, nor the Food and Drug Administration (FDA), have yet to address their responsibilities to ensure public health and environmental protection. The FCC has not responded to

[11] Previous C-band spectrum allocated to commercial use has triggered a wave of antenna deployments across the country. 47 USC §1455 is known as "Section 6409" of the Middle Class Tax Relief and Job Creation Act of 2012.
[12] National Association of Telecommunications Officers and Advisors (NATOA), together with the National League of Cities, National Association of Counties and US Conference of Mayors, recently wrote that "we oppose heavy-handed federal overreach into local land use, permitting, and franchise negotiation decisions." https://assets.noviams.com/novi-file-uploads/natoa/HR3557_Local_Government_Letter_20230928.pdf

the August 13, 2021, U.S. Court of Appeals for the District of Columbia Circuit *ORDER* in *Environmental Health Trust et al. v. FCC, 2021* wherein the court ordered the FCC to "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…the impacts of RF radiation on the environment." The Court also ordered the FCC to "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."

No federal agency with health or science expertise has evaluated the comprehensive body of scientific research on the human health and environmental impacts of wireless radiation. As stated by the EPA, FDA, and Department of Interior, current FCC guidelines address heating effects of short-term exposures only[13] (see Attachment 2 for more details).

Current FCC human exposure guidelines are unchanged since 1996 and were based on now antiquated limits developed by ANSI/IEEE C95.1-1992 and NCRP's 1986 Report. These limits identified the level of adverse effects based on studies which exposed a few monkeys and rats to RF radiation for less than one hour, more than 40 years ago. They do not consider the biological effects of non-thermal or long-term low-level exposures of radiofrequency radiation documented in the scientific literature.[14] Current guidelines also do not consider the documented effects of modulations and pulsation on living cells. As the DC Circuit recognized, these antiquated studies are a far cry from properly assessing the health and environmental impacts of modern technology and ubiquitous wireless devices.

[13] Guidelines of the FCC, ICNIRP and IEEE are based on protection for short term heating, not for long term exposures. In 1999, the FDA stated in its Nomination to the National Toxicology Program to study wireless radiation that, "As noted above, the existing exposure guidelines are based entirely on protection from acute injury from thermal effects of RF exposure, and may not be protective against any non-thermal effects of chronic exposures." FDA Nomination from FDA's Center from Device and Radiological Health Radio Frequency Radiation Emissions of Wireless Communication Devices (CDRH) May 19, 1999 https://ntp.niehs.nih.gov/sites/default/files/ntp/htdocs/chem_background/exsumpdf/wireless051999_508.pdf; EPA's Norbert Hankin clarified that the FCC's 1996 RF limits do not protect against all effects stating that, "federal health and safety agencies have not yet developed policies concerning possible risk from long-term, nonthermal exposures" in a 2002 letter https://ehtrust.org/wp-content/uploads/4c0f61dc30c3d6bb27d90f53a57c616e.pdf George Brozowski Regional Health Physicist of the EPA's 2014 letter stated, "The standards are intended to prevent adverse health effects that may be associated with tissue heating, but are not intended to address low intensity (non-thermal), long-term (chronic) exposures. Investigation as to whether there may be effects from exposures too low to cause heating is continuing." The US Department of the Interior stated in a 2014 letter to the NTIA that, "the electromagnetic radiation standards used by the Federal Communications Commission (FCC) continue to be based on thermal heating, a criterion now nearly 30 years out of date and inapplicable today."

[14] International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF), (2022). Scientific evidence invalidates health assumptions underlying the FCC and ICNIRP exposure limit determinations for radiofrequency radiation: implications for 5G. Environ Health. Oct 18;21(1):92.

Recommendation #2: Congress should require prior to any spectrum utilization decisions that will transform the industry to compete on safety, and thus increase human and environmental RF exposure, including and not limited to: (i) best-practice premarket testing for long term safety, (ii) that devices and networks pass such safety testing, and (iii) quarterly post-market health and environmental surveillance along with monitoring and compliance oversight. Congress should require that federal agency spectrum utilization decisions be treated as a major federal action requiring an environmental impact statement under NEPA.

NEPA Section 106 states: *"An agency shall issue an environmental impact statement with respect to a proposed agency action requiring an environmental document that has a reasonably foreseeable significant effect on the quality of the human environment."*[15]

The attachments below document the significant body of scientific evidence indicating adverse effects to humans and the environment from radiofrequency exposure resulting from spectrum allocation. As set out below, the FCC has consistently abrogated its responsibilities under NEPA.

Further, because of their unique effects, each frequency and modulation should be studied pre and post market for impacts on the environment and human health, before deployment. We recommend quantitative and qualitative risk assessments, including individual and cumulative effects, of spectrum utilization decisions. Such assessments should determine, not only the effects of the frequencies at different power levels but also the effects of the polarized wave forms when they are modulated, pulsed, and otherwise altered to fit the technological needs of non-federal entities.[16] Premarket safety testing of long-term exposure to altered frequencies on living things are essential to ensure technology is safe for people and the natural environment.

RF exposures should be monitored nationwide to understand current exposure levels as well as trends over time. A transparent, robust federal RF compliance program is needed to ensure that industry compliance testing is done correctly and that emissions are compliant. The public needs an

[15] 42 USC 4336 https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title42-section4336&num=0&edition=prelim

[16] Barnes, F., & Freeman, J. E. R. (2022). Some thoughts on the possible health effects of electric and magnetic fields and exposure guidelines. *Frontiers in Public Health*, *10*; Belyaev, I. (2010). Dependence of non-thermal biological effects of microwaves on physical and biological variables: Implications for reproducibility and safety standards. European Journal of Oncology Library, 5, 187–218; Belyaev, I. Y., & Grigoriev, Y. G. (2007). Problems in assessment of risks from exposures to microwaves of mobile communication. *Radiatsionnaia Biologiia, Radioecologiia*, *47*(6), 727–732; Panagopoulos, D. J., Johansson, O., & Carlo, G. L. (2015). Real versus Simulated Mobile Phone Exposures in Experimental Studies. *BioMed Research International*, *2015*, 607053; Panagopoulos, D. J., Johansson, O., & Carlo, G. L. (2015). Polarization: A Key Difference between Man-made and Natural Electromagnetic Fields, in regard to Biological Activity. *Scientific Reports*, *5*, 14914.; Lai, H., & Levitt, B. B. (2022). The roles of intensity, exposure duration, and modulation on the biological effects of radiofrequency radiation and exposure guidelines. *Electromagnetic Biology and Medicine*, *41*(2), 230–255; Panagopoulos, D. J. (Ed.). (2022). *Electromagnetic Fields of Wireless Communications: Biological and Health Effects* (1st ed.). CRC Press.; Panagopoulos, D. J., Karabarbounis, A., Yakymenko, I., & Chrousos, G. P. (2021). Human-made electromagnetic fields: Ion forced-oscillation and voltage-gated ion channel dysfunction, oxidative stress and DNA damage (Review). International Journal of Oncology, 59(5), 92.

oversight and enforcement program to investigate, and promptly address non-compliance with fines and mitigation.

Current industry-generated or commissioned pre-construction reports and post-construction testing are largely inadequate, if not inaccurate, in large part because the modeling protocols and programs have not been validated for real world accuracy. There are no up-to-date, minimum standards for preparing RF compliance reports, studies and evaluations nor quality control.

As of March 2025, FCC has not issued updated guidance on how to comply with RF rules, which includes newly licensed frequencies and services, since 1997. The existing guidance, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields* (FCC OET 65 (1997),[17] which provides assistance in determining whether proposed or existing transmitting facilities, operations or devices comply with limits for human exposure to radiofrequency (RF) under FCC rules, is outdated. Independent inspectors, informed by up-to-date guidance, should be required to carry out on-the-ground measurements post antenna deployments to verify compliance with human exposure limits.

Field compliance reports taking actual measurements can reach different conclusions depending on, for example, the number of measurements, location of measurements in relation to the antennas and the length of measurement in each location. Furthermore, reports are inconsistent regarding the inclusion of peak measurements versus averaged measurements, and the inclusion of actual values versus percentage of FCC limits.

Federal agencies with health and safety expertise should conduct ongoing research reviews, hazard evaluations, and quantitative risk assessments to ensure FCC limits are adequately protective. However, none of these needed regulatory safeguards are in place at this time.

Recommendation #3: United States Spectrum Policy should encourage wireless networks and devices to compete on safety, and thus ensure the public and environment is protected from harmful radio frequency interference. One example is the automobile industry which last century initially resisted competing on safety, and then embraced it and now regularly touts products that achieve high National Highway Traffic Safety Administration scores. See generally, NHTSA | National Highway Traffic Safety Administration

The Communications Act of 1934 created the FCC "for the purpose of promoting safety of life and property."[18]

[17] https://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65.pdf
[18] Section 1 (47 USC 151)
https://www.govinfo.gov/content/pkg/COMPS-936/pdf/COMPS-936.pdf

Similarly, NTIA shall, under its authorizing statute (47 USC 901(c)[19]) seek policies:

a) promoting the benefits of technological development for **all users** in the United States;
b) fostering **national safety;**
c) fostering the use of telecommunications resources in a manner that benefits **the public interest**;

Federal spectrum policy should seek to bolster coexistence not only among different spectrum users, devices, and networks, but also between technology on the one hand and all life forms on the other hand, including humans, plants, animals, and microbes. Spectrum research should include how different spectrum management techniques, and different wavelengths, (for example, pulsed, modulated, sawtooth, and other waveforms, as well as multiplexing technologies) differentially affect different lifeforms. And federal spectrum activities should include education for the public and state and local decision-makers on the impacts of RF exposure on humans, especially children, and ways to mitigate these impacts.[20] Electromagnetic related disability is recognized by the US government and multiple other entities.[21] In addition, certain segments of the population are more vulnerable to radiofrequency impacts, including children.[22]

Many countries lack the environmental standards that we have in the United States, Europe, and other developed countries. It may be cheaper to operate a factory in a country where the factory can dump chemicals into a river without being subject to government limits. However, that is not the approach we have in the US. A recurring topic in past hearings focus on whether other countries are more aggressively making spectrum available for commercial use. However, because other countries are more aggressively irradiating their own population and environment, does not mean that the United States needs to follow suit. Neither Congress nor any government agency has considered or attempted to quantify the cost to the economy in terms of morbidity, mortality, and disability resulting from the range of health conditions linked to radiofrequency exposure. The United States is

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[19] 47 USC 901
https://uscode.house.gov/view.xhtml?path=/prelim@title47/chapter8&edition=prelim

[20] Davis, D., Birnbaum, L., Ben-Ishai, P., Taylor, H., Sears, M., Butler, T., & Scarato, T. (2023). Wireless technologies, non-ionizing electromagnetic fields and children: Identifying and reducing health risks. Current Problems in Pediatric and Adolescent Health Care, 53(2), 101374; Clegg, F. M., Sears, M., Friesen, M., Scarato, T., Metzinger, R., Russell, C., Stadtner, A., & Miller, A. B. (2020). Building science and radiofrequency radiation: What makes smart and healthy buildings. Building and Environment, 176, 106324.

[21] https://ehtrust.org/resources-on-electromagnetic-sensitivity-and-accommodations/

[22] Davis, D., Birnbaum, L., Ben-Ishai, P., Taylor, H., Sears, M., Butler, T., & Scarato, T. (2023). Wireless technologies, non-ionizing electromagnetic fields and children: Identifying and reducing health risks. *Current Problems in Pediatric and Adolescent Health Care*, *53*(2), 101374; Miller, A. B., Sears, M. E., Morgan, L. L., Davis, D. L., Hardell, L., Oremus, M., & Soskolne, C. L. (2019). Risks to Health and Well-Being From Radio-Frequency Radiation Emitted by Cell Phones and Other Wireless Devices. *Frontiers in Public Health*, *7*; Redmayne, M., & Johansson, O. (2015). Radiofrequency exposure in young and old: Different sensitivities in light of age-relevant natural differences. *Reviews on Environmental Health*, *30*(4), 323–335;Sage, C., & Burgio, E. (2018). Electromagnetic Fields, Pulsed Radiofrequency Radiation, and Epigenetics: How Wireless Technologies May Affect Childhood Development. *Child Development*, *89*(1), 129–136; McCredden, J. E., Cook, N., Weller, S., & Leach, V. (2022). Wireless technology is an environmental stressor requiring new understanding and approaches in health care. *Frontiers in Public Health*, *10*.

already having trouble meeting its recruiting targets for the armed services.[23] The national security impacts of spectrum policy should include assessing the impact of such decisions on force readiness and recruitment targets.

As an example, the United States required safety features in vehicles, such as seatbelts, headrests, anti-lock brakes, and airbags, years before other countries did so. Over time, automakers have come to compete on safety features. In transportation policy, we have long recognized that vehicles emit PM2.5 particulate matter. Transportation policymakers need to consider the impact of their decisions not only on travel times and road capacity, but also on the PM2.5 emissions (and the health and environmental impacts thereof) that result from different policy decisions.

We ask Congress to consider how it can encourage the wireless industry to compete on safety. For example, Wi-Fi routers do not need to output the same amount of power while users are sleeping, as during heavy usage. Reducing such unnecessary emissions is good for public safety and energy conservation.

Recommendation #4: Spectrum should be allocated in accordance with the entire public interest, not just certain narrow corporate or agency priorities.

As spectrum is a finite resource with risks to health and the environment that carry significant negative externalities, it is essential to make spectrum recommendations in accordance with the public interest. Based on past history, for example with C-band deployment, when spectrum is reallocated from federal users to commercial users, the density of antennas and of aggregate radiofrequency emissions throughout the United States is dramatically increased.[24] At the same time, these reallocations may incur substantial cost to these federal users, and therefore ultimately to taxpayers and the public at large.

It may be that the optimal economic outcome for the United States is for federal users to retain spectrum, while commercial users increasingly rely on wired, fiber-optic broadband. For example, the Congressional Research Service reported earlier last year that for the Department of Defense to relinquish just 350 MHz of additional C-band would take 20 years and cost "hundreds of billions of dollars"[25] – which is approximately $1 billion of cost to federal users to relinquish 1 MHz of spectrum. For example, to reallocate 2500 MHz. Assuming a similar level of $1 billion of cost to relinquish 1 MHz, reallocating that amount of spectrum could incur nearly $2.5 trillion of taxpayer

[23] "The all-volunteer force is dying. Here's how to save it" By Mark Esper, former Secretary of Defense. Washington Post, 9/21/23. https://www.washingtonpost.com/opinions/2023/09/21/military-all-volunteer-force-mark-esper/
[24] Under "Section 6409" (47 USC 1455(a)), existing wireless facilities can be expanded with almost unlimited additional antennas. After C-band became available, a wave antenna deployments occurred under 6409, while claiming preemption over state and local government.
https://uscode.house.gov/view.xhtml?req=(title:47%20section:1455%20edition:prelim)
[25] https://sgp.fas.org/crs/misc/IF12351.pdf

costs – without taking into account the negative externalities incurred by commercial users. Congress should consider whether this is an efficient allocation of resources in our economy. In addition, the BEAD deployment will be complete long before spectrum is reallocated from federal users. As a result, all or nearly all Americans by that point will have access to high-speed fiber connectivity at home, work, school, community centers, and other locations – which is and will be significantly faster than that which is provided over wireless

Fiber broadband surpasses wireless technology in performance, speeds, reliability, latency, cybersecurity, privacy, scalability and has less impact on health and the environment. It would be a disservice to the American people for the government to continue to release frequencies to serve wireless broadband that is no longer viable for current and future needs.

The poor performance metrics of wireless broadband costs our states billions of dollars when residents and businesses are held up by unreliable service, low speeds, and issues with cybersecurity[26] and privacy. While wireless upload speeds unreliably peak at 50Mbps, fiber upload and download speeds start at 1000 Mbps and have the capacity to upgrade into Terabyte speeds. Wireless infrastructure fails during inclement weather or when the path of the signal is obstructed. Allowing more wireless broadband investments will perpetuate the digital divide, as bandwidth and latency demands increase.[27]

Wireless broadband presents a major cybersecurity risk. Individuals, institutions and businesses have suffered great losses as wireless signals are easily accessible to hackers. Fiber and current cable infrastructure can reliably offer superior service without these challenges.

Wireless broadband is also an energy guzzler. 5G base stations are expected to consume roughly 3 times the power of 4G base stations and more 5G base stations are required to cover the same area.[28] Energy consumption is expected to increase by 61 times from 2020 to 2030 with 5G.[29] One study done by the Federal Environment Ministry of Germany and the German Environment Agency found that video transmission through fiber optics is nearly 50 times more energy efficient than wireless.[30] Research on whole network level assessments of the operational energy use implications of 5G warns that "Energy-intensive user practices contribute to ever-growing levels of data traffic, and counteract[31] the energy-saving potential of 5G efficiency improvements."[32]

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[26] https://www.sdxcentral.com/articles/news/att-sounds-alarm-on-5g-security/2019/11/

[27] 5G DEPLOYMENT: FCC Needs Comprehensive Strategic Planning to Guide Its Efforts, GAO, June 2020 https://www.gao.gov/assets/gao-20-468.pdf

[28] https://spectrum.ieee.org/5gs-waveform-is-a-battery-vampire

[29] https://www.datacenter-forum.com/datacenter-forum/5g-will-prompt-energy-consumption-to-grow-by-staggering-160-in-10-years?fbclid=IwAR0zQ_dGvwT_phdacXuhOkllYOm_p0u95nJAac1toWs4zGUNJnotrvRki7I

[30] https://www.umweltbundesamt.de/en/press/pressinformation/video-streaming-data-transmission-technology

[31] https://www.etsi.org/images/files/ETSIWhitePapers/WP_47_GFDI.pdf

[32] Williams, Laurence and Sovacool, Benjamin K. and Foxon, Timothy J., The energy use implications of 5G: Reviewing whole network operational energy, embodied energy, and indirect effects (January 13, 2022). Renewable and Sustainable Energy Reviews 157 (2022) 112033, Available at SSRN: https://ssrn.com/abstract=4008530

In addition, technologies that are fixed in place like smart meters need not communicate wirelessly when they can be better served with a wired connection. We urge Congress not to allow spectrum allocations for stationary technologies, including fixed wireless and satellite, that can be served with wired connections.

As BEAD funding grants accelerate the build out of fiber networks to the home, wireless broadband will be less needed. We urge Congress to consider performance, speeds, reliability, latency, cybersecurity, privacy, scalability and impacts on health and the environment when making spectrum recommendations, especially when another technology is capable of better meeting the needs.

Recommendation #5: Broaden the range of stakeholders from whom it solicits input on spectrum policy to include public health, environmental health, and disability advocacy organizations, as well as the residential and commercial real estate industry, as RF Exposure measurements can impact real estate values and liabilities.[33]

Broadening the definition of stakeholders to include a wider range of groups including public health, environmental health organizations such as Environmental Health Trust, disability advocacy, as well as community groups and organizations. More outreach needs to be done with the American public so they understand this issue and can participate in the process.

ATTACHMENT 2: Today's Regulatory Gap Regarding Radiofrequency Bioeffects

Although the public and elected officials assume that federal agencies are engaged in radiofrequency oversight activities to ensure public health and environmental protection, this is inaccurate. FCC RF exposure limits are guidelines only, not federally developed safety standards.[34] Such standards are typically promulgated by agencies reviewing the totality of scientific evidence, performing risk analysis, and identifying the levels at which various adverse effects occur, as a basis for toxicant exposure limit that ensures adequate public protection. A review of federal agency involvement indicates scant research and oversight activities along with serious regulatory gaps including but not limited to:

[33] Affuso, E., Reid Cummings, J. & Le, H. Wireless Towers and Home Values: An Alternative Valuation Approach Using a Spatial Econometric Analysis. *J Real Estate Finan Econ* **56**, 653–676 (2018). https://doi.org/10.1007/s11146-017-9600-9

[34] The FCC Website Policy on Human Exposure to Radiofrequency Electromagnetic Fields states, "At the present time there is no federally-mandated radio frequency (RF) exposure standard.https://www.fcc.gov/general/fcc-policy-human-exposure

Issues related to the FCC's 1996 human exposure guidelines:

- RF guidelines were designed for humans, not animals or plants, and only for effects of high intensity short term acute exposures. The limits were not designed to protect against effects of long-term exposure.
- There is no periodic or ongoing, transparent evaluation of current scientific research to ensure FCC limits are adequate (no hazard evaluation, quantitative risk assessment of the totality of science, including impacts to brain development, reproduction or immune system) by any federal agency with health and safety expertise.

Issues related to agency authority.

- There is no agency with authority regarding impacts of ambient environmental exposures from the RF emissions of cell towers and base station antennas (including 4G, 5G) which is engaged in any scientific activities. In the case of cell phones, FDA has shared authority with FCC, although FDA has shown only limited activity.
- There is no agency with authority nor activities related to impacts of RF exposures to wildlife, animals and the natural environment (plants and trees.)

Issues related to bioeffects research and safety testing.

- There is no regulatory process for premarket safety testing (as currently done with drugs) to ensure new wireless communication frequencies, antenna systems and technologies are safe.
- There is no federal research program on biological impacts, except for a small animal study by the National Toxicology Program.[35]
- There is no agency carrying out pre-or post-market research activities related to evaluating the health and environmental impacts of new technologies (i.e, new modulations such as 5G, or higher frequencies to be used in future technologies and/or antenna systems such as beamforming etc.).
- There is no agency carrying out activities related to evaluating the health and environmental impacts of 5G modulations nor for new technologies (i.e, that will use higher frequencies as well as new beamforming antenna systems, modulations and pulsation).
- There is no agency with activities related to impacts of RF exposures to wildlife, animals and the natural environment (plants and trees.)

Issues related to cell tower oversight:

- Currently there is no federal registry for all wireless facility sites, cell towers, or small wireless facilities.

[35] NTP announced in January 2024 that "No additional RFR studies are planned." https://ehtrust.org/statement-by-devra-davis-phd-mph-on-the-u-s-government-national-toxicology-program-ceasing-research-on-cell-phone-radiation/

- The US has no measuring, monitoring or mapping of environmental RF levels.
- There is no federal oversight and enforcement program in place to ensure wireless facilities emissions are within FCC guidelines.
- There is no agency carrying out activities related to evaluating the health and environmental impacts of 5G modulations nor for new technologies (i.e, that will use higher frequencies as well as new beamforming antenna systems, modulations and pulsation).

The Environmental Protection Agency (EPA) and RF Guideline Background

FCC RF exposure limits are guidelines only, as they are not federally developed safety standards[36] whereby agencies reviewed the totality of scientific evidence, performed risk analysis and identified a level of adverse effect to base a limit that would ensure adequate public protection. Such a process never happened.

The EPA was actively engaged in research to develop proper federal safety standards for RF that would protect humans from both thermal and non-thermal impacts, as it had been tasked to do by several federal agencies. However, just as the EPA was poised to release its RF limit recommendations in 1995[37] the EPA was defunded from all such activities. The FCC then promulgated limits based on recommendations developed by industry/military connected groups (ANSI/IEEE C95.1-1992 and NCRP's 1986 Report). At that time, the EPA specifically

[36] The FCC Website Policy on Human Exposure to Radiofrequency Electromagnetic Fields states, "At the present time there is no federally-mandated radio frequency (RF) exposure standard.https://www.fcc.gov/general/fcc-policy-human-exposure

[37] In 1995 the EPA had briefed both the FCC and the National Telecommunications and Information Administration regarding its two Phases of activities related to the development of RF exposure safety standards. Phase 1 would address only short-term thermal impacts of RF radiation but "does not include modulation, chronic exposure or non thermal [heating] impacts." Phase 2 would address modulated and nonthermal exposures and result in the final guidelines. See *Memorandum from Robert F. Cleveland, Office of Engineering and Technology to FCC Secretary, Ex Parte Presentation by U.S. Environmental Protection Agency (March 22, 1995)*
Three months later, EPA informed the FCC that its final RF guidelines "are essentially complete" and entering the review phase which would include a review by the Radiofrequency Interagency Work Group as well as stakeholders. *Letter from E. Ramona Trovata, EPA, Office of Radiation and Indoor Air, to Richard M. Smith, Chief, FCC, Office of Engineering and Technology (June 19,1995)*

recommended[38] that an "updated, comprehensive review of the biological effects" be initiated as the IEEE and NCRP recommendations were based on pre-1986 studies.[39]

Although the FCC's 2013 inquiry stated, "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," there has been no updated federal review since 1996.

Yet, in 2019, when the Commission issued its decision not to update its exposure limits, it stated that it "took into account" views from other expert agencies and standard-setting organizations. The FCC interpreted the silence of federal agencies to mean agreement with the 1996 guidelines, stating in its 11/9/2020 brief that, "no other agency advocated tightening the limits" and "the agency reasonably concluded that the weight of the scientific and health evidence, and particularly the judgment of federal agencies expert in health matters, demonstrated that no changes were warranted." As mentioned earlier, the DC Circuit, in, *EHT et al. v. FCC*, rejected the FCC's conclusion as "arbitrary and capricious" and in violation of the Administrative Procedures Act.

In July 8, 2020, Lee Ann B. Veal, Director of the EPA Radiation Protection Division Office of Radiation and Indoor Air wrote[40] Theodora Scarato, EHT Executive Director, that "EPA's last review was in the 1984 document Biological Effects of Radiofrequency Radiation[41]. The EPA does not currently have a funded mandate for radiofrequency matters."

Federal agencies have not shown a review of the totality of the science (including impacts to the nervous, reproductive and immune systems of humans and animals) to issue such a "judgment." The reality is that federal agencies are not engaged in researching and evaluating the numerous biological effects of RF to humans, flora and fauna. That is why federal agencies such as the EPA did not submit meaningful input to the FCC's Inquiry. They have not been funded or directed to provide a determination or judgment.

The Federal Communications Commission (FCC)

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[38] EPA Submission to ET Docket 93-62 "Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation state, "The FCC should consider requesting the NCRP to revise its 1986 report to provide an updated, comprehensive review of the biological effects on RF radiation and recommendations for exposure criteria."

[39] As the EPA stated to the FCC, "The 1992 ANSI/IEEE standard is based on literature published before 1986, except for a few papers on RF shock and burn. The cut-off date for the literature review supporting the NCRP recommendations is 1982."

[40] *Letter from Lee Ann B. Veal, Director of the Radiation Protection Division, U.S. Environmental Protection Agency to Theodora Scarato, Executive Director, Environmental Health Trust, (July 8, 2020)https://ehtrust.org/wp-content/uploads/EPA-Director-Letter-on-EMFs-to-Theodora-Scarato-July-8-2020.pdf*

[41] U.S. Environmental Protection Agency, 1984 Report Biological Effects of Electromagnetic Radiation https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=300065H1.TXT

The FCC has minimal to non-existent regulatory activities to ensure RF compliance for wireless networks. In several other countries, government agencies monitor RF levels regularly, review industry reports, measure a certain percentage of sites for compliance every year, penalize operators for non compliance, and transparently post RF levels for the public.[42] Not in the USA.

Environmental Health Trust gave a brief presentation on the policies of other countries at the National Spectrum Managers Association 2023 Annual Spectrum Management Conference.[43]

According to the FCC, "The FCC does not have a comprehensive, transmitter-specific database for all of the services it regulates. … In some services, licenses are allowed to utilize additional transmitters or to increase power without notifying the FCC. Other services are licensed by geographic area, such that the FCC has no knowledge concerning the actual number or location of transmitters within that geographic area."[44] With no comprehensive transmitter-specific database for all the services regulated by the FCC, and the ability for licenses to utilize additional transmitters and increase power without notifying the FCC, how are radiofrequency exposure levels monitored to remain within FCC guidelines?

Furthermore, according to the FCC, "The FCC does not have the resources or the personnel to routinely monitor the exposure levels at all of the thousands of transmitters that are subject to FCC jurisdiction. … In addition, the FCC does not routinely perform RF exposure investigations unless there is a reasonable expectation that the FCC exposure limits may be exceeded."[45] With no routine

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[42] Examples of governments with a national program to monitor environmental levels of radiofrequency and/or measure cell tower emissions for compliance with government exposure limits include: France, Australia, Austria, Brussels Belgium, Switzerland, India, Israel, United Kingdom, Thailand, Croatia, Lithuania, Spain, Hungary, Italy, Netherlands, Greece, Turkey, French Polynesia, Senegal,Monaco, Bhutan, Gibraltar, Bulgaria, Tunisia, China, Bahrain, Norway , Brazil, Malta, Ireland, Romania
(France even has 5G monitoring stations, Australia Telco posts RF info at ACMA EME Checker . Countries such France, Switzerland, Greece, and Belgium now have robust RF monitoring programs with RF measurements posted online in an easy to understand website that members of the general public can easily navigate, such as a map where you simply click on antenna/tower locations to see the latest measurements and how they compare to the country's limits. Greece's National Observatory of Electromagnetic Fields is operated by the Greek Atomic Energy Commission with 500 sensors since 2015. In India, telecommunications companies are to self-certify compliance at: 1. Launch, 2. With any modification/change and 3. On a biennial basis. In addition the country also states they audit 5% to 10% of sites annually on a random basis and all reports are posted on their EMF dedicated website. https://tarangsanchar.gov.in/EMFPortal/DoT Penalties are Rs. 10 lakh per BTS per incidence. For the year 2022, they reported 320 of the 11,61,281 base stations they tested had emissions exceeding regulatory limits resulting in penalties for the telecom service providers. India's RF public exposure limits are set at 10% of ICNIRP levels.

[43] See Conference site at https://www.nsma.org/conferences/nsma-presentations-2023/ Video of Theodora Scarato at https://youtu.be/NNJUT-ZQcqE?si=GtL9k_IEezuEmiUK&t=1597

[44] FCC RF Safety FAQ https://www.fcc.gov/engineering-technology/electromagnetic-compatibility-division/radio-frequency-safety/faq/rf-safety

[45] FCC RF Safety FAQ https://www.fcc.gov/engineering-technology/electromagnetic-compatibility-division/radio-frequency-safety/faq/rf-safety

monitoring of RF exposure levels, people and the environment are at risk of exposures to RF levels that exceed current FCC guidelines.

The FCC is not ensuring that RF exposure levels are compliant as it has no monitoring or oversight program in place. The FCC has stated that, "There have been a few situations around the country where RF levels in publicly accessible areas have been found to be higher than those recommended in applicable safety standards."[46] A 2014 investigation by the Wall Street Journal "Cellphone Boom Spurs Antenna-Safety Worries[47] found "one in 10 sites violates the rules, according to six engineers who examined more than 5,000 sites during safety audits for carriers and local municipalities." Since then, FCC rules that have mandated automatic approvals for adding antennas at existing cell sites and "streamlined" placement of new 5G/4G facilities by preempting state and local authority, have resulted in massive antenna proliferation nationwide.

Studies have found that environmental RF levels generated from RF emissions of cell towers, base station network antennas, and other wireless systems have significantly increased over the last few decades, with higher levels in urban areas and in areas of closer proximity to wireless network antennas, especially in locations within the main beams of the antennas.[48] As an example, a 2018 multi-country study found ambient RF measurements in Los Angeles, California now 70 times higher than levels measured in the City in the late '70s, as part of a twelve-city study by the FCC and EPA.[49]

The FCC has never done an environmental impact statement on the individual or cumulative impacts of its spectrum auctions, which have raised $233 billion to date, nor on the allocation of these proceeds to various programs to deploy wireless networks. The FCC has not considered those

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[46] FCC RF Safety FAQ https://www.fcc.gov/engineering-technology/electromagnetic-compatibility-division/radio-frequency-safety/faq/rf-safety

[47] *"It's like having a speed limit and no police," said Marvin Wessel, an engineer who has audited more than 3,000 sites and found one in 10 out of compliance.*Cellphone Boom Spurs Antenna-Safety Worries Many Sites Violate Rules Aimed at Protecting Workers From Excessive Radio-Frequency Radiation https://www.wsj.com/articles/cellphone-boom-spurs-antenna-safety-worries-1412293055?mod=WSJ_hpp_MIDDLE_Video_second

[48] Brown, R. (2022). Assessment of radiofrequency radiation intensity on 35 Main Streets throughout Pennsylvania, USA during the fall of 2021. *American Journal of Multidisciplinary Research & Review*. 1(4). 8-20;Baltrėnas, P., Buckus, R., & Vasarevičius, S. (2012). Research and evaluation of the intensity parameters of electromagnetic fields produced by mobile communication antennas. *Journal of Environmental Engineering and Landscape Management*, *20*(4), 273–284; Bhatt, C. R., Redmayne, M., Billah, B., Abramson, M. J., & Benke, G. (2017). Radiofrequency-electromagnetic field exposures in kindergarten children. *Journal of Exposure Science & Environmental Epidemiology*, *27*(5), 497–504; Boussad Y, Chen XL, Legout A, Chaintreau A, Dabbous W. (2022) Longitudinal study of exposure to radio frequencies at population scale. Environ Int.Apr;162:107144 ; Mazloum, T., Aerts, S., Joseph, W., & Wiart, J. (2019). RF-EMF exposure induced by mobile phones operating in LTE small cells in two different urban cities. *Annals of Telecommunications*, *74*(1), 35–42.; Urbinello, D., Joseph, W., Verloock, L., Martens, L., & Röösli, M. (2014). Temporal trends of radio-frequency electromagnetic field (RF-EMF) exposure in everyday environments across European cities. *Environmental Research*, *134*, 134–142.

[49] Sagar, S. et al. (2018). Comparison of radiofrequency electromagnetic field exposure levels in different everyday microenvironments in an international context. *Environment International*, Volume 114, 297-306.

funding decisions under NEPA, and so have not considered them to be major federal action. In 1986, the FCC categorically excluded most of its actions from NEPA review.[50]

The FCC relies on licensees to measure exposure levels and prepare environmental assessments (EA) if needed and self-report any exceedances or potential exceedances.[51] It is indisputable that NEPA is a federal obligation yet the FCC has delegated to the licensees and the carriers the determination of whether a Categorical Exclusion applies. Carriers have a due diligence checklist with different requirements to check off yet this document is never submitted to the FCC if the applicant determines that the facility is categorically excluded; the FCC has no records of carriers doing their due diligence unless the review finds a potentially significant environmental effect that triggers an EA, which they submit. If nothing is triggered on the checklist, then the applicant starts building without the public having access to the checklist and measurements, and no ability to refute or comment on the project.

The Food and Drug Administration (FDA)

The FDA does not regulate, have activities related to, nor have authority regarding the RF emissions of cell towers, cell tower antennas, network infrastructure, or 5G facilities. Further, in regards to cell phones the FDA has not shown an evaluation of the totality of the science. Non cancer issues, such as headaches, oxidative stress, brain development, impacts to wildlife, and any studies on vulnerable populations such as pregnant people, children or the medically vulnerable have not been evaluated by the FDA in any report or evaluation shared with the public.

The FDA's very **limited activities** related to cell phones and cancer include a now outdated literature review (with science ending in 2018) focused solely only on cell phones and cancer.[52] This literature review, done by anonymous individuals (rather than transparently presented experts) is focused only on cancer and omits all non-cancer studies such as research on brain development, reproduction, or synergistic effects. The review focused only on cell phones and omitted research on Wi-Fi, 5G, 4G or other RF sources. The review is a literature review and not a systematic review nor is it a hazard or risk analysis nor is it an evaluation of FCC cell tower radiation limits, despite being presented in this way. Several experts sent letters to the FDA[53] criticizing the literature review for

[50] Federal Register at page 14999
https://www.govinfo.gov/content/pkg/FR-1986-04-22/pdf/FR-1986-04-22.pdf
47 CFR 1.1306
https://www.ecfr.gov/current/title-47/section-1.1306
[51] FCC Public Notice – April 27, 2000, YEAR 2000 DEADLINE FOR COMPLIANCE WITH COMMISSION'S REGULATIONS REGARDING HUMAN EXPOSURE TO RADIOFREQUENCY EMISSIONS
https://www.federalregister.gov/documents/2000/05/05/00-11237/year-2000-deadline-for-compliance-with-commissions-regulations-regarding-human-exposure-to
[52] FDA, Review of Published Literature between 2008 and 2018 of Relevance to Radiofrequency Radiation and Cancer
[53] 2019/2020 Letters to the FDA Regarding Inaccurate Information on the NTP and FDA Website

numerous reasons including the fact that it does not follow any scientifically accepted protocols for risk or hazard assessment.

The FDA's 2021 and 2022 Annual reports of the Center for Devices and Radiological Health have zero mention of the issue of cell phones or cell towers or wireless electromagnetic radiation. The 2022 to 2025 Report on Strategic Priorities has nothing on the issue of RF radiation.[54] The FDA has not shown any evidence of monitoring RF bioeffects research via new agency reports, meetings or budget allocations on the issue.

The Government Accountability Report on 5G (GAO 2020) clarified that the FDA and other organizations "only reviewed a subset of the relevant research" and stated in regards to the FDA Literature Review that "The assessment focused on cancer-related animal and human studies of frequencies below 6 GHz."

FDA Statements

> "The FDA does not regulate cell towers or cell tower radiation. Therefore, the FDA has no studies or information on cell towers to provide in response to your questions."
> Ellen Flannery, Director, FDA Policy Center for Devices and Radiological Health to a California mother with a cell tower on her street who asked the FDA about safety, July 11, 2022

> "Under the law, FDA does not review the safety of radiation-emitting consumer products such as cell phones and similar wireless devices before they can be sold, as it does with new drugs or medical devices."
> FDA Website until 2019 -

> "We don't have jurisdiction over cellphone towers since those are environmental emitters."
> Email From FDA's David Kassiday in 2016

Letter calling for a retraction of FDA signed by several scientists including Ronald Melnick PhD, former National Institutes of Health Scientist, Samuel Milham MD, former Head of the Chronic Disease Epidemiology Section, Washington State Department of Health; David Carpenter MD, Director of the Institute for Health and Environment at University of Albany's School of Public Health, former director of the Wadsworth Laboratory of the New York State Department of Health, Lennart Hardell MD, PhD, Professor Department of Oncology, Faculty of Medicine and Health Dr. Anthony Miller, Professor Emeritus of University of Toronto and World Health Organization Senior Advisor
Ronald Melnick PhD's individual letter to the FDA on the National Toxicology Program study
Albert Manville PhD, retired Senior Wildlife Biologist, Division of Migratory Bird Management, U.S. Fish & Wildlife Service, Wash. DC HQ Office (17 years); Senior Lecturer, Johns Hopkins University
Prof. Tom Butler of the University College in Cork, Ireland's letter to the FDA
Igor Belyaev, PhD, Dr. Sc. Head, Department of Radiobiology of the Cancer Research Institute, Biomedical Research Center of the Slovak Academy of Science letter to the FDA
Paul Heroux PhD, McGill University
Alfonso Balmori, BSc statement to the FDA

[54] https://www.fda.gov/media/155888/download

The Environmental Health Trust issued a "Report on FDA Activities on Cell Phones and Radiofrequency"[55] which documents the lack of adequate research review and misleading information put forward by the FDA. While the FDA webpages and cell phone cancer literature review seem to assert that safety is assured, the FDA has not adequately evaluated the totality of the science to reach any such safety or risk conclusion.

National Toxicology Program (NTP)

In 1999, the FDA requested the NTP perform large scale animal studies on cell phone radiation stating,[56] "A significant research effort, including well-planned animal experiments, is needed to provide the basis to assess the risk to human health of wireless communications devices."

The findings of the NTP's $30 million animal study were released in a 2018 final report which found that long term exposure to RF was associated with two types of cancer in male rats, schwannoma of the heart and glioma of the brain,[57] with the NTP's highest level of evidence.[58] Further, the NTP notably found significant increases in DNA damage (Smith-Roe et al., 2020), as well as the induction of cardiomyopathy of the right ventricle in male and female rats. The later Ramazzini Institute studies found elevated incidence of the same tumors the NTP found - heart schwannomas in male rats - despite the Ramazzini Institute use of much lower RF radiation exposures than the NTP which were intended to mimic cell tower base station environmental exposures (Falcioni et al., 2018; Vornoli et al., 2019).

Analysis of the NTP data according to current risk assessment guidelines concluded that U.S. government FCC limits should be lower by 200 to 400 times to protect children (Uche & Naidenko, 2021). Several published reviews conclude that the current body of evidence indicates RF radiation is a proven Group 1 human carcinogen (Miller et al 2018, Peleg et al 2018, Carlberg and Hardell 2017, Belpomme et al 2018,).

[55] https://ehtrust.org/wp-content/uploads/EHT-Report_-Report-on-FDA-Activities-Related-to-Cell-Phones-and-Radiofrequency-Radiation-2.pdf
[56] FDA CDRH nomination of NTP to Study RFR_Nomination Background: Wireless Communication Devices
[57] M. Wyde et al., 2018; M. E. Wyde et al., 2018 https://ntp.niehs.nih.gov/whatwestudy/topics/cellphones
[58] https://ntp.niehs.nih.gov/whatwestudy/testpgm/cartox/criteria

However, the FDA stated that they "disagreed" with the NTP findings[59]. The DC Circuit rejected FDA's statement, saying "we find them to be of the conclusory variety that we have previously rejected as insufficient."[60]

National Cancer Institute (NCI)

Although the NCI has a lengthy web page on cell phones, the NCI has not performed any type of safety evaluation, nor any formal research review. The NCI has repeatedly stated that "Neither the literature reviews, nor the fact sheets, make safety determinations." (Letter from NCI to Scarato).

When directly asked about cell phone safety issues by the New Hampshire Commission on 5G[61], the National Cancer Institute responded, *"As a Federal research agency, the NCI is not involved in the regulation of radiofrequency telecommunications infrastructure and devices, nor do we make recommendations for policies related to this technology…Our sister agencies, the FDA as well as the FCC, retain responsibility for reviewing guidance on safety concerns and informing the public if those circumstances change."*

The NCI signed onto a one paragraph letter in response to the FCC Inquiry on RF Human Exposure Rules in 2013 simply thanking the FCC for "FCC's interest in continuing to work closely with NIH and other federal agencies with expertise in public health for guidance and expertise on this matter." However, NCI never submitted a substantive, meaningful comment regarding the adequacy of FCC guidelines, nor a systematic research review or evaluation regarding carcinogenicity or any other health issue as the NCI has not engaged in such activities.

Centers for Disease Control (CDC)

The CDC has no research activities related to EMF bioeffects. There has been no research review or evaluation by CDC experts regarding carcinogenicity or any other health issue. While the CDC does have webpages on cell phone radiation and wireless wearables, FOIAs show several were drafted with the help of an industry consultant**.**

National Institute for Occupational Safety and Health (NIOSH)

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[59] FDA Press Release, Statement from Jeffrey Shuren, M.D., J.D., Director of the FDA's Center for Devices and Radiological Health on the National Toxicology Program's report on radiofrequency energy exposure, November 1, 2018

[60] EHT et al.v FCC, supra

[61] New Hampshire Commissioner Denise Ricciardi asked the NCI, "What is the NCI opinion on the safety of cell phones? If you have one, please share your scientific documentation. The NCI responded, "The FDA and FCC are the responsible federal agencies with authority to issue opinions on the safety of these exposures. As a Federal research agency, the NCI is not involved in the regulation of radiofrequency telecommunications infrastructure and devices, nor do we make recommendations for policies related to this technology." page 31 of the New Hampshire Commission Report on 5G https://www.gencourt.state.nh.us/statstudcomm/committees/1474/reports/5G%20final%20report.pdf

NIOSH has no current activities related to non ionizing EMFs. Although U.S. NIOSH scientists long have recommended precautionary measures to minimize risk from occupational RF exposure[62] and developed recommendations to reduce extremely low frequency EMF,[63] protective policies were never further developed or implemented.

Department of Labor, Occupational Safety and Health Administration (OSHA)

OSHA currently is not engaged in bioeffect activities.
On July 1, 2015 OSHA wrote the FCC that, "RF emissions are not on OSHA's active regulatory agenda, so we have not conducted a comprehensive literature review or risk assessment on RF hazards" and "OSHA does not appear to have a particularized program in place to ensure worker safety with regard to RF exposure from the wide variety of RF transmitters regulated by the Commission. … we are not aware that OSHA has adequate resources to ensure compliance with our limits for occupational/controlled exposure among our licensees and grantees."

OSHA was actively engaged in RF bioeffect activities in previous decades. The agency had developed elements for a Comprehensive RF Protection Program in the mid 90s[64] that was never implemented. An OSHA representative also participated in the now defunct RF Interagency workgroup.

Inaccurate Statements by Elected Officials

[62] December 1979 Radiofrequency (RF) Sealers and Heaters (80-107) | NIOSH | CDC
"Absorption of RF energy may also result in "nonthermal" effects on cells or tissue, which may occur without a measurable increase in tissue or body temperature. "Nonthermal" effects have been reported to occur at exposure levels lower than those that cause thermal effects. While scientists are not in complete agreement regarding the significance of reports of "nonthermal" effects observed in laboratory animals, NIOSH believes there is sufficient evidence of such effects to cause concern about human exposures. NIOSH and OSHA recommend that precautionary measures be instituted to minimize the risk to workers from unwarranted exposure to RF energy."
[63] See "Precautionary Strategies to Reduce Worker Exposures to Extremely Low Frequency (ELF) Magnetic Fields, a Possible Carcinogen" by Joseph D. Bowman, PhD, of the Engineering and Physical Hazards Branch at the National Institute for Occupational Safety (NIOSH) Slide presentation to the Collaborative on Health and the Environment (Bowman 2016). Listen to the presentation at https://www.healthandenvironment.org/partnership_calls/18482
[64] Presentation on April 12, 1995 by Robert A. Curtis, Director US DOL/OSHA Health Response Team to the National Association of Broadcasters at the Broadcast Engineering Conference Las Vegas, NV
https://www.osha.gov/radiofrequency-and-microwave-radiation/role-of-rf-measurements

There is a lack of appropriate oversight in Congress due to the FDA and FCC's lack of full transparency regarding RF safety and their regulatory activities. Agencies should transparently state that they have not reviewed the research on health issues such as impacts to memory, epigenetic impacts and impacts to the environment (including pollinators). Agencies should also clearly state that the regulations do not address long term effects. The FDA should clarify that it has no authority nor judgment regarding health impacts from environmental levels of RF exposure from network antennas (including 5G, 4G, small cells, macro cell towers, or unlicensed antennas). The Congressional Committees tasked to provide oversight are not even aware this issue is in need of accountability.

Inaccurate statements by elected officials regarding the involvement of federal agencies on 5G and RF bioeffects.

U.S Senator Schumer's February 6, 2023 Letter states "*Rest assured that as additional studies on microwave radiation and RF exposure are published by scientists and reviewed by government agencies…"Many other federal agencies, such as the EPA, FDA, NIOSH, OSHA have been actively involved in monitoring and investigating issues related to RF exposure."* Yet EPA, NIOSH, and OSHA are not actively involved.

U S. Representative Scott Fitzgerald's November 5, 2021 letter states that, "In addition to the FCC, Federal health and safety agencies such as the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), the National Institute for Occupational Safety and Health (NIOSH) and the Occupational Safety and Health Administration (OSHA) have been actively involved in monitoring and investigating issues related to radio frequency (RF) exposure." Yet EPA, NIOSH, and OSHA are not actively involved.

Representative Doris Matsui stated in a December 20, 2023 letter[65] that "*the monitoring and investigation of RF exposure on public health is a collaborative effort between several federal agencies. Since 1996, the FCC has required all wireless communications devices sold in the United States to meet minimum guidelines for safe human exposure to RF energy. RF exposure standards are developed by subject matter experts such as the Institute of Electrical and Electronics Engineers (IEEE) and the National Council on Radiation Protection and Measurements (NCRP) and are used by federal, state and local governments to regulate the teleservice industry and protect public health. These regulators and experts have not found conclusive, significant or causal evidence to suggest that 5G is harmful to humans."* Yet there is no collaborative effort in regards to bioeffects.

[65] https://ehtrust.org/wp-content/uploads/Representative-Doris-Matsui-Letter-on-5G-December-20-2023.pdf

Senator Diane Feinstein, September 6, 2021, stated, without evidence, "Since 1996, it has been the FCC's policy to cooperate with industry, expert agencies, and health and safety organizations to ensure that guidelines continue to be appropriate and scientifically valid." Yet expert agencies such as *EPA, NIOSH, and OSHA* with health and science expertise are not working with FCC on this topic.

ATTACHMENT 3: Radiofrequency Radiation Impacts on the Environment

No U.S. agency or international authority has ever acted to review research on wireless radiation effects on the environment nor set exposure limits to ensure protections for birds, bees, trees and wildlife.[66,67] It is a critical regulatory gap.

In 2014, the U.S. Department of Interior wrote a letter to the NTIA detailing several published studies showing impacts of wireless radiofrequency radiation (RFR) to birds stating that, "There is a growing level of anecdotal evidence linking effects of non-thermal, non-ionizing electromagnetic radiation from communication towers on nesting and roosting wild birds and other wildlife." It further stated, "However, the electromagnetic radiation standards used by the Federal Communications Commission (FCC) continue to be based on thermal heating, a criterion now nearly 30 years out of date and inapplicable today."[68]

Significant research has accumulated indicating serious environmental effects of RF, yet with no review by federal agencies. On August 13, 2021, the United States Court of Appeals for the District of Columbia Circuit ruled in our case against the FCC (*EHT et al. v FCC*),[69] stating "we find the Commission's order arbitrary and capricious in its complete failure to respond to comments concerning environmental harm caused by RF radiation." 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 of a response does not meet the Commission's obligation to provide a reasoned explanation for terminating the notice of inquiry."[70] Despite the 2021 court order, the FCC has remained silent. It has taken no action to justify its refusal to update its 1996 wireless radiation exposure guidelines .

[66] Levitt, B. B., Lai, H. C., & Manville, A. M. (2021). Effects of non-ionizing electromagnetic fields on flora and fauna, Part 3. Exposure standards, public policy, laws, and future directions. *Reviews on Environmental Health*.
[67] Levitt BB, Lai HC and Manville AM II (2022) Low-level EMF effects on wildlife and plants: What research tells us about an ecosystem approach. Front. Public Health 10:1000840. doi: 10.3389/fpubh.2022.1000840
[68] https://www.ntia.doc.gov/files/ntia/us_doi_comments.pdf
[69] Final Court Decision EHT et. al v. the FCC 8/13/2021 https://www.cadc.uscourts.gov/internet/opinions.nsf/FB976465BF00F8BD85258730004EFDF7/$file/20-1025-1910111.pdf
[70] https://www.cadc.uscourts.gov/internet/opinions.nsf/FB976465BF00F8BD85258730004EFDF7/$file/20-1025-1910111.pdf

In 2021 and 2022 a three-part landmark research review by U.S experts of over 1,200 studies on the effects of non-ionizing radiation to wildlife entitled "Effects of non-ionizing electromagnetic fields on flora and fauna" found adverse effects in all species studied at even very low intensities. Findings included impacts to orientation, migration, reproduction, mating, nest, den building and survivorship.[71] [72] [73]

In a review published in *Environment International* on the ecological effects of RF-EMF, 70% of the studies reviewed found RF had a significant effect on birds, insects, other vertebrates, organisms, and plants, with development and reproduction in birds and insects being the most strongly affected.[74] Biologists caution that non ionizing electromagnetic radiation is a critical factor in the decline of pollinator and insect populations.[75]

A 2023 systematic review and meta-analysis of studies on the biological effects on insects of non-ionizing electromagnetic fields, including cell tower and Wi-Fi radiation, was published in the journal Reviews on Environmental Health, finding the "vast majority of studies found effects, generally harmful ones" with toxic effects such as impacts to reproduction and immune health occurring at legally allowed exposure levels. [76]

Pollinators at Risk: Higher Exposures to Insects From 5G and Higher Frequencies

- The study "Exposure of Insects to Radio-Frequency Electromagnetic Fields from 2 to 120 GHz" by Thielens et al 2018 published in Scientific Reports found that for the 4 insects studied (western honeybee, australian stingless bee, beetle, locust), exposure at and above 6 GHz could lead to an increase in absorbed power between 3–370% (a factor if over 3 times.) The researchers concluded that "this could lead to changes in insect behavior, physiology, and morphology over time…"

- A follow up study on the honeybee entitled "Radio-Frequency Electromagnetic Field Exposure of Western Honey Bees" published in Scientific Reports by Thielens et al (2020)

[71] Levitt, B. B., Lai, H. C., & Manville, A. M. (2021). Effects of non-ionizing electromagnetic fields on flora and fauna, Part 3. Exposure standards, public policy, laws, and future directions. *Reviews on Environmental Health*.

[72] Levitt, B. B., Lai, H. C., & Manville, A. M. (2021). Effects of non-ionizing electromagnetic fields on flora and fauna, part 1. Rising ambient EMF levels in the environment. *Reviews on Environmental Health*, *37*(1), 81–122.

[73] Levitt, B. B., Lai, H. C., & Manville, A. M. (2021). Effects of non-ionizing electromagnetic fields on flora and fauna, Part 2 impacts: How species interact with natural and man-made EMF. *Reviews on Environmental Health*, *37*(3), 327–406.

[74] Cucurachi, S., Tamis, W. L. M., Vijver, M. G., Peijnenburg, W. J. G. M., Bolte, J. F. B., & de Snoo, G. R. (2013). A review of the ecological effects of radiofrequency electromagnetic fields (RF-EMF). *Environment International*, *51*, 116–140.

[75] Balmori A. (2021) Electromagnetic radiation as an emerging driver factor for the decline of insects. Science of the Total Environment. 767: 144913

[76] Thill A, Cammaerts MC, Balmori A. Biological effects of electromagnetic fields on insects: a systematic review and meta-analysis. Rev Environ Health. 2023 Nov 23

modeled exposure in various life cycle stages (worker, drone, larva, and queen) and combined the data with in-situ measurements of environmental RF-EMF exposure near beehives in Belgium in order to estimate realistic exposure and absorbed power values. Again, they found even a relatively small shift of 10% of environmental incident power density from frequencies below 3 GHz to higher frequencies will lead to a relative increase in absorbed power of a factor higher than 3.

- In a subsequent study, researchers modeled the exposures of 2.5 to 100 GHz into the honeybee brain and vital organs in Estimation of the Specific Absorption Rate for a Honey bee Exposed to Radiofrequency Electromagnetic Fields from 2.5 to 100 GHz," by Jeladze et al (2023) and found relatively higher SAR values are observed at 12, 25, and 40 [GHz] frequencies in the 4.8 - 8 W/Kg range, especially for the brain tissue. The SAR values varied depending on exposure parameters such as the direction of the incident plane wave, polarization, frequency, and body peculiarities. The authors conclude that, *"based on the obtained results, we can conclude that the exposure to high-frequency RF-EMFs on honey bees might have an undesired impact, which can cause an attenuation of the vital functions of this important insect."*

- "Radio-frequency exposure of the yellow fever mosquito (A. aegypti) from 2 to 240 GHz," published in PLOS Computational Biology, which found that for the given incident RF power, the absorption increases with increasing frequency between 2 and 90 GHz with a maximum between 90 and 240 GHz. Even at the same incident field strength, the power absorption by the mosquito is 16 times higher at 60 GHz than at 6 GHz.
  For 120 GHz, this increase is even larger compared to 6 GHz, with a factor 21.8. The absorption was highest in the region where the wavelength matches the size of the mosquito. The authors conclude that, "In the future, the carrier frequency of telecommunication systems will also be higher than 6 GHz. This will be paired with higher absorption of EMF by yellow fever mosquitoes, which can cause dielectric heating and have an impact on behavior, development and possibly spread of the insect."

Impacts on Plants

A 2017 review "Weak radiofrequency radiation exposure from mobile phone radiation on plants" found physiological and/or morphological effects in 89.9% of studies reviewed.[77]

[77] Halgamuge, M. N. (2017). Review: Weak radiofrequency radiation exposure from mobile phone radiation on plants. *Electromagnetic Biology and Medicine*, *36*(2), 213–235

> "Additionally, our analysis of the results from these reported studies demonstrates that the maize, roselle, pea, fenugreek, duckweeds, tomato, onions and mungbean plants seem to be very sensitive to RF-EMFs. Our findings also suggest that plants seem to be more responsive to certain frequencies, especially the frequencies between (i) 800 and 1500 MHz ($p < 0.0001$), (ii) 1500 and 2400 MHz ($p < 0.0001$) and (iii) 3500 and 8000 MHz ($p = 0.0161$)."

Trees are also at risk from wireless. A field monitoring study spanning nine years involving over 100 trees found damage on the side of the trees facing transmitting cell antennas.[78] Researchers have released subsequent reports documenting continued impacts to tree canopy from cell tower antennas.[79,80] Other RF effects include impacts to leaf, shoot, seedlings of Aspen trees. [81]

Environmental Health Trust has developed a website focused on the science of wildlife and wireless at wildlifeandwireless.org.

ATTACHMENT 4: Radiofrequency Radiation Impacts on Human Health

Extensive published scientific evidence indicates that wireless radiofrequency (RF) radiation at levels far below FCC limits can cause cancer,[82] increased oxidative stress,[83] genetic damage,[84]

[78] Waldmann-Selsam, C., Balmori-de la Puente, A., Breunig, H., & Balmori, A. (2016). Radiofrequency radiation injures trees around mobile phone base stations. *Science of The Total Environment*, *572*, 554–569.
[79] Breunig, Helmut. "Tree Damage Caused By Mobile Phone Base Stations An Observation Guide." (2017).
[80] 2021 Report "Tree damage caused by mobile phone base stations"
[81] Haggerty, K. (2010). Adverse Influence of Radio Frequency Background on Trembling Aspen Seedlings: Preliminary Observations. *International Journal of Forestry Research*, *2010*, 836278.
[82] Miller, A. B., Morgan, L. L., Udasin, I., & Davis, D. L. (2018). Cancer epidemiology update, following the 2011 IARC evaluation of radiofrequency electromagnetic fields (Monograph 102). *Environmental Research*, *167*, 673–683. https://doi.org/10.1016/j.envres.2018.06.043
[83] Yakymenko, I., Sidorik, E., Kyrylenko, S., & Chekhun, V. (2011). Long-term exposure to microwave radiation provokes cancer growth: Evidence from radars and mobile communication systems. *Experimental Oncology*, *33*(2), 62–70.https://pubmed.ncbi.nlm.nih.gov/21716201/.
[84] Falcioni, L., Bua, L., Tibaldi, E., Lauriola, M., De Angelis, L., Gnudi, F., Mandrioli, D., Manservigi, M., Manservisi, F., Manzoli, I., Menghetti, I., Montella, R., Panzacchi, S., Sgargi, D., Strollo, V., Vornoli, A., & Belpoggi, F. (2018). Report of final results regarding brain and heart tumors in Sprague-Dawley rats exposed from prenatal life until natural death to mobile phone radiofrequency field representative of a 1.8 GHz GSM base station environmental emission. *Environmental Research*, *165*, 496–503. https://doi.org/10.1016/j.envres.2018.01.037

structural and functional changes of the reproductive system,[85] memory deficit,[86] behavioral problems[87], and neurological impacts.[88]

EHT et al. v. FCC the U.S. Court of Appeals for the D.C. Circuit 2021[17] also ruled the FCC ignored scientific evidence on negative health effects from long term wireless radiation exposure at current allowable levels, especially in regards to children, whom the American Academy of Pediatrics states[89] are more vulnerable to wireless radiation. The court ordered the FCC to examine the record evidence regarding long term exposure to children, health effects unrelated to cancer and environmental impacts. To date, the FCC has not responded. This landmark ruling highlights how no federal health agency has reviewed the full body of current research to ensure current safety standards are protective.

The state of New Hampshire commissioned a study on the Environmental and Health Effects of Evolving 5G Technology and issued a final report[90] in 2020 with 15 recommendations including: requiring setbacks of all wireless transmitters from residences, businesses and schools, adopting a statewide position to encourage fiber optics to the premise, acknowledging the need for further studies to outline clinical symptoms related to RF exposure, developing RF safety limits to protect the environment, among other recommendations.

In 2022, the Pittsfield, Massachusetts Board of Health sent a cease-and-desist order to shut down a Verizon cell tower. The order [91] issued to Verizon states "Whereas, soon after the facility was activated and began transmitting, the City started to receive reports of illness and negative health symptoms from residents living nearby the facility,...The negative health symptoms the affected residents have reported include complaints of headaches, sleep problems, heart palpitations, tinnitus (ringing in the ears), dizziness, nausea, skin rashes, and memory and cognitive problems, among other medical complaints. … Whereas, as further documented below, the neurological and dermatological symptoms experienced by the residents are consistent with those described in the

[85] Kim S, Han D, Ryu J, Kim K, Kim YH. Effects of mobile phone usage on sperm quality - No time-dependent relationship on usage: A systematic review and updated meta-analysis. Environ Res. 2021 Nov;202:111784. doi: 10.1016/j.envres.2021.111784. Epub 2021 Jul 30. PMID: 34333014

[86] Swiss Tropical and Public Health Institute. "Mobile phone radiation may affect memory performance in adolescents, study finds." ScienceDaily. ScienceDaily, 19 July 2018. <www.sciencedaily.com/releases/2018/07/180719121803.htm>.

[87] Divan HA, Kheifets L, Obel C, Olsen J. Cell phone use and behavioral problems in young children. J Epidemiol Community Health. 2012 Jun;66(6):524-9. doi: 10.1136/jech.2010.115402. Epub 2010 Dec 7. PMID: 21138897.

[88] Hiie Hinrikus, Jaanus Lass & Maie Bachmann (2021) Threshold of radiofrequency electromagnetic field effect on human brain, International Journal of Radiation Biology, 97:11, 1505-1515, DOI: 10.1080/09553002.2021.1969055

[89] AAP Letter to the FCC Chairman calling for the FCC to open up a review of RF guidelines (7/12/2012), AAP Letter to US Representative Dennis Kucinich in Support of the Cell Phone Right to Know Act 12/12/2012, AAP to FCC Commissioner Mignon Clyburn and FDA Commissioner Margaret Hamburg calling for a review of RF guidelines 8/29/2013

[90] https://www.gencourt.state.nh.us/statstudcomm/committees/1474/reports/5G%20final%20report.pdf

[91] https://ehtrust.org/wp-content/uploads/Pittsfield-Health-Board-Cell-Tower-Order-to-Verizon-April-11-2022-FINAL-REDACTED.pdf

peer-reviewed scientific and medical literature as being associated with exposure to pulsed and modulated Radio Frequency ("RF") radiation, including RF from cell towers."

A major 2022 review of the existing scientific literature on cell tower radiation and health found associations with radiofrequency sickness, cancer and changes in biochemical parameters.[92] For example, a study published in Electromagnetic Biology and Medicine on people living near cell antennas found significant biochemical changes in the blood. This study evaluated effects in the human blood of individuals living near mobile phone base stations compared with healthy controls living more than 300 meters from a base station. The group living closer to the antennas had statistically significant higher frequency of micronuclei and a rise in lipid peroxidation in their blood; these changes are considered biomarkers predictive of cancer.[93]

According to Dr. Linda Birnbaum, Scientist Emeritus and Former Director of the National Institute of Environmental Health Sciences and National Toxicology Program of the National Institutes of Health, "Aware that the FCC's 1996 limits lacked the underpinning of solid scientific data regarding long term health effects, the FDA requested large-scale studies by the National Toxicology Program (NTP) and in 2018 the NTP studies found clear evidence of an association with cancer in male rats.[94] Additionally, the NTP found heart damage and DNA damage, despite the fact that the animals were carefully exposed to non-heating RFR levels long assumed to be safe. The Ramazzini Institute animal studies[95] used even lower RFR lower exposures to approximate cell tower emissions and also found increases of the same tumor type. The NTP studies were carefully controlled to ensure exposures did not significantly heat the animals. The animal study findings in combination with human studies indicate adverse effects from non heating levels of radiofrequency.

A review paper on corporate risk entitled "Limiting Liability with Positioning to Minimize Negative Health Effects of Cellular Phone Towers" reviewed the "large and growing body of evidence that human exposure to RFR from cellular phone base stations causes negative health

[92] A. Balmori (2022). Evidence for a health risk by RF on humans living around mobile phone base stations: From radiofrequency sickness to cancer. *Environ. Res., 214 (2022), Article 113851* https://doi.org/10.1016/j.envres.2022.113851

[93] Zothansiama, Zosangzuali, M., Lalramdinpuii, M., & Jagetia, G. C. (2017). Impact of radiofrequency radiation on DNA damage and antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations. *Electromagnetic Biology and Medicine*, *36*(3), 295–305. https://doi.org/10.1080/15368378.2017.1350584.

[94] National Toxicology Program Radiofrequency Radiation https://ntp.niehs.nih.gov/whatwestudy/topics/cellphones/index.html

[95] Falcioni et al., Report of final results regarding brain and heart tumors in Sprague-Dawley rats exposed from prenatal life until natural death to mobile phone radiofrequency field representative of a 1.8 GHz GSM base station environmental emission, Environmental Research, Volume 165, 2018, Pages 496-503 DOI: 10.1016/j.envres.2018.01.037

effects." The authors recommend restricting antennas near homes and within 500 meters of schools and hospitals to protect companies from future liability.[96]

ATTACHMENT 5: Legal and Liability Issues of Wireless

U.S. mobile operators have been unable to get insurance to cover liabilities related to damages from long term exposure to radiofrequency emissions for well over a decade.[97]

It is notable that in 2000, the Ecolog Institute Report on radiofrequency health effects, commissioned by T-Mobile and DeTeMobil Deutsche Telekom MobilNet, recommended an RF exposure limit 1000x lower than the FCC's current power density limit after reviewing the research on biological effects, including impacts to the immune system, central nervous system, hormones, cancer, neurotransmitters and fertility.[98]
Insurers rank 5G and electromagnetic radiation as a "high" risk,[99] comparing the issue to lead and asbestos.[100] A 2019 Report[101] by Swiss Re Institute, a world leading provider of insurance, classifies 5G mobile networks as a "high", "off-the-leash" risk stating, "Existing concerns regarding potential negative health effects from electromagnetic fields (EMF) are only likely to increase. An uptick in liability claims could be a potential long-term consequence" and "as the biological effects of EMF in general and 5G in particular are still being debated, potential claims for health impairments may come with a long latency."

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[96] Pearce, J. M. (2020). Limiting liability with positioning to minimize negative health effects of cellular phone towers. *Environmental Research*, *181*, 108845. https://doi.org/10.1016/j.envres.2019.108845.
[97] Roseanne White Geisel, (2007) Insurers exclude risks associated with electromagnetic radiation, Business Insurance
[98] Review of the Current Scientific Research in view of Precautionary Health Protection, Commissioned by T-Mobil DeTeMobil Deutsche Telekom MobilNet GmbH. (2000) Translated into English https://ehtrust.org/wp-content/uploads/T-mobile-RF-Radiation-Ecolog-2000-Report-.pdf
[99] https://ehtrust.org/key-issues/reports-white-papers-insurance-industry/
[100] Lloyd's of London Report on Electromagnetic Fields "Electromagnetic fields from mobile phones: recent developments." Lloyd's Emerging Risks Team Report, November 2010; **2016 Austrian Accident Insurance Institute (AUVA) ATHEM Report** "Investigation of athermal effects of electromagnetic fields in mobile communications." ; Business Insurance (2011) **White paper explores risks that could become 'the next asbestos'**
See also Factsheets on Legal Liability of Cell Towers at https://ehtrust.org/wp-content/uploads/Legal-Liability-Cell-Tower-Radiation-Health-Effects-3.pdf
[101] Swiss Re 5G Report"Off the leash – 5G mobile networks" https://www.swissre.com/institute/research/sonar/sonar2019/SONAR2019-off-the-leash.html PDF https://ehtrust.org/wp-content/uploads/Swiss-Re-SONAR-Publication-2019-excerpt-1.pdf

Due to their understanding of the magnitude of this future financial risk most insurance plans have "electromagnetic field exclusions" applied as the market standard.[102] As an example, Portland Oregon Public School Insurance states,[103] "Exclusions: This insurance does not apply to: Bodily injury, personal injury, advertising injury, or property damage arising directly or indirectly out of, resulting from, caused or contributed to by electromagnetic radiation, provided that such loss, cost or expense results from or is contributed to by the hazardous properties of electromagnetic radiation."

Wireless and non-ionizing electromagnetic radiation are defined as a type of "pollution" by wireless companies themselves. According to pg. 10 of the Verizon Total Mobile Protection Plan, "Pollution" is defined as "The discharge, dispersal, seepage, migration or escape of pollutants. Pollutants means any solid, liquid, gaseous, or thermal irritant or contaminant including smoke, vapor, soot, fumes, acid, alkalis, chemicals, artificially produced electric fields, magnetic field, electromagnetic field, sound waves, microwaves, and all artificially produced ionizing or nonionizing radiation and/or waste." Similar definitions for pollution are in the product protection plans for AT&T, Sprint, Verizon, and T-Mobile.

Wireless companies inform shareholders of RF risk[104] but not the communities impacted by the infrastructure.[105] Companies clearly inform shareholders that companies may incur significant financial losses related to non-ionizing electromagnetic fields. Corporate investor warnings by companies such as T-Mobile, AT&T, Verizon, Vodafone and Crown Castle are contained in their Annual Reports, and Form 10-K (or Form 20-F or 40-F for foreign companies) with the Securities and Exchange Commission (SEC). For example, Crown Castle states in their 10-K tax filing that:

> *If radio frequency emissions from wireless handsets or equipment on our communications infrastructure are demonstrated to cause negative health effects, potential future claims could adversely affect our operations, costs or revenues.*
>
> *The potential connection between radio frequency emissions and certain negative health effects, including some forms of cancer, has been the subject of substantial study by the scientific community in recent years. We cannot guarantee that claims relating to radio frequency emissions will not arise in the future or that the results of such studies will not be adverse to us.*

[102] Electromagnetic Field Insurance Policy Exclusions Cell Phone Radiation and EMFs - Environmental Health Trust
[103] page 30 https://ehtrust.org/wp-content/uploads/Portland-Public-School-2017-18-Excess-Liability0D0A-policy-1.pdf
[104] Corporate Company Investor Warnings in Annual Reports 10k Filings Cell Phone Radiation Risks - Environmental Health Trust
[105] https://ehtrust.org/key-issues/corporate-company-investor-warnings-annual-reports-10k-filings-cell-phone-radiation-risks/

Public perception of possible health risks associated with cellular or other wireless connectivity services and wireless technologies (such as 5G) may slow or diminish the growth of wireless companies and deployment of new wireless technologies, which may in turn slow or diminish our growth. In particular, negative public perception of, and regulations regarding, these perceived health risks may slow or diminish the market acceptance of wireless services and technologies. If a connection between radio frequency emissions and possible negative health effects were established, our operations, costs, or revenues may be materially and adversely affected. We currently do not maintain any significant insurance with respect to these matters."

Verizon stated in its 10-K for 2022 under the section "Legal and Regulatory Risks" that:

"We are subject to a substantial amount of litigation, which could require us to pay significant damages or settlements. We are subject to a substantial amount of litigation and claims in arbitration, including, but not limited to, shareholder derivative suits, patent infringement lawsuits, wage and hour class actions, contract and commercial claims, personal injury claims, property claims, environmental claims, and lawsuits relating to our advertising, sales, billing and collection practices. In addition, our wireless business also faces personal injury and wrongful death lawsuits relating to alleged health effects of wireless phones. or radio frequency transmitters. We may incur significant expenses in defending these lawsuits. In addition, we may be required to pay significant awards or settlements."

ATTACHMENT 6: Expert Recommendations on Technology Safety

This section includes recommendations from the following groups:

1. GAO
2. American Academy of Pediatrics
3. California Department of Health
4. Connecticut Department of Public Health
5. North Carolina Public Health Department
6. Maryland State Children's Environmental Health and Protection Advisory Council
7. Santa Clara Medical Association
8. California Medical Association
9. Scientists With Expertise in Biological Effects of Electromagnetic Radiation
10. New Hampshire State Commission on 5G Health and Environment

United States Government Accountability Office

A 2012 Government Accountability Office (GAO) Report titled "Telecommunications: Exposure and Testing Requirements for Mobile Phones Should Be Reassessed"[106] stated that "By not formally reassessing its current limit, FCC cannot ensure it is using a limit that reflects the latest research on RF energy exposure…" and that "Some consumers may use mobile phones against the body, which FCC does not currently test, and could result in RF energy exposure higher than the FCC limit." This report resulted in two GAO recommendations for the FCC:

> Recommendation 1: "The Chairman of the FCC should formally reassess the current RF energy exposure limit, including its effects on human health, the costs and benefits associated with keeping the current limit, and the opinions of relevant health and safety agencies, and change the limit if determined appropriate."
>
> Recommendation 2: "The Chairman of the FCC should reassess whether mobile phone testing requirements result in the identification of maximum RF energy exposure in likely usage configurations, particularly when mobile phones are held against the body, and update testing requirements as appropriate."

According to the GAO report "Despite many years of consideration, FCC still has no specific plans to take any actions that would satisfy our recommendations. Accordingly, we are closing the recommendations as not implemented."

The American Academy of Pediatrics

The American Academy of Pediatrics (AAP) has written several letters to the FCC calling on them to update wireless safety limits to protect children [107]stating that, "Current FCC standards do not account for the unique vulnerability and use patterns specific to pregnant women and children. It is essential that any new standard for cell phones or other wireless devices be based on protecting the

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[106] *Exposure and Testing Requirements for Mobile Phones Should Be Reassessed Report to Congressional Requesters.* United States Government Accountability Office, 2012.

[107] The American Academy of Pediatrics Letters to the FCC https://ehtrust.org/wp-content/uploads/American-Academy-of-Pediatrics-Letters-to-FCC-and-Congress-.pdf
AAP Letter to the FCC Chairman calling for the FCC to open up a review of RF guidelines (7/12/2012)
AAP Letter to US Representative Dennis Kucinich in Support of the Cell Phone Right to Know Act 12/12/2012
AAP to FCC Commissioner Mignon Clyburn and FDA Commissioner Margaret Hamburg calling for a review of RF guidelines 8/29/2013

youngest and most vulnerable populations to ensure they are safeguarded throughout their lifetimes."

In response to the U.S. National Toxicology Program animal study findings of cancer and DNA damage[108] from cell phone radiation, the AAP also issued the cell phone safety tips specifically for families[109] to reduce exposure to wireless radiation including, "If you plan to watch a movie on your device, download it first, then switch to airplane mode while you watch in order to avoid unnecessary radiation exposure."

The American Academy of Pediatrics states regarding cell towers[110] that, "An Egyptian study confirmed concerns that living nearby mobile phone base stations increased the risk for developing: Headaches, Memory problems, Dizziness, Depression, Sleep problems."

California Department of Health

The California Department of Health released an advisory on how to reduce cell phone radiation[111] stating children may be more at risk and "Although the science is still evolving, some laboratory experiments and human health studies have suggested the possibility that long-term, high use of cell phones may be linked to certain types of cancer and other health effects." Recommendations include, "Parents should consider reducing the time their children use cell phones and encourage them to turn the devices off at night."

Connecticut Department of Public Health

The Connecticut Department of Public Health states in its FAQs on Cell Phones that it is "wise" to reduce cell phone radio frequency to one's brain.[112]

North Carolina Public Health Department

The North Carolina Public Health Department lists the full cancer findings of the NTP study[113], the FDA stance, and also the American Academy of Pediatrics recommendations to reduce cell phone radiation stating "there is some concern that exposure to non-ionizing radiation, also called radio frequency radiation, that is emitted by cell phones may result in an increased risk of cancer or other health effects"

Maryland State Children's Environmental Health And Protection Advisory Council

[108] Cell Phone Radio Frequency Radiation
[109] Cell Phone Radiation & Children's Health: What Parents Need to Know - HealthyChildren.org
[110] Electromagnetic Fields: A Hazard to Your Health? - HealthyChildren.org
[111] California Department of Public Health, Cell phone advisory (2017)
[112] Connecticut Department of Public Health,Cell Phone Factsheet 2015
[113] North Carolina Department of Health and Human Services,Cell Phones 2020 .

The Maryland State Children's Environmental Health And Protection Advisory Council, whose 19 member Commission includes experts in public health, pediatricians, state health and environment agencies and legislators issued a report recommending reducing wireless exposure to children in schools and homes.[114]

Santa Clara Medical Association

The Santa Clara Medical Association Best Practices for Technology in schools[115] recommends reducing Wi-Fi exposure and restricting cell towers near schools.

California Medical Association

In 2014, the California Medical Association passed two resolutions regarding wireless standards: 1. To "support efforts to reevaluate microwave safety exposure levels associated with wireless communication devices, including consideration of adverse non-thermal biologic and health effects from non-ionizing electromagnetic radiation used in wireless communications"; and 2. To "support efforts to implement new safety exposure limits for wireless devices to levels that do not cause human or environmental harm based on scientific research."

Scientists With Expertise in Electromagnetic Radiation

Numerous medical groups have called for policies to reduce children's exposure[116]. For example, the EMF Scientists are over 259 scientists from 41 countries who have peer-reviewed publications on electromagnetic fields who made a 2015 appeal to the United Nations[117] and all member States in the world to encourage the World Health Organization "to exert strong leadership in fostering the development of more protective EMF guidelines, encouraging precautionary measures, and educating the public about health risks, particularly risk to children and fetal development." A recent paper published in Environment Magazine [118] argues that government regulation and protection from the increased levels of RF is well past due.

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[114] The Maryland State Children's Environmental Health and Protection Advisory Council Wi-Fi in School Report, Letter to the Federal Communications Commission May 1, 2019 and "Guidelines to Reduce Electromagnetic Field Radiation"

[115] Santa Clara County Medical Association Best Practices for Safe Technology in Schools

[116] Reykjavik Iceland Appeal on Wireless in School; Scientist 5G Appeal to the EU(2017) Nicosia Declaration (2017);m the International Society of Doctors for Environment 5G Appeal (2018); 2020 Consensus Statement of UK and International Medical and Scientific Experts and Practitioners on Health Effects of Non-Ionising Radiation.

[117] https://ehtrust.org/wp-content/uploads/European_Journal_on_Oncology_December_2015.International_EMF_Scientist_Appeal-2.pdf and EMF Scientist

[118] Ben-Ishai, P. (2024). Applying the Precautionary Principal To Wireless Technology: Policy Dilemmas and Systemic Risks Environment: Science and Policy for Sustainable Development, Volume 66, 2024, P: 5-18.

New Hampshire State Commission on 5G Health and Environment

In 2019 the New Hampshire government passed House Bill 522 "An act establishing a commission to study the environmental and health effects of evolving 5G technology."[119] The Commission released its Final Report on Commission to Study the Environmental and Health Effects of Evolving 5G Technology[120] in 2020 with findings that safety assurance for wireless technology "come into question because of the thousands of peer-reviewed studies documenting deleterious health effects associated with cellphone radiation exposure." In its report the Commission issued 15 recommendations:

1. Support statewide deployment of fiber optic cable connectivity with wired connections inside homes.
2. New Hampshire schools and libraries should replace Wi-Fi with hardwired connections.
3. Require setbacks for new wireless antennas from residences, businesses, and schools.
4. New Hampshire health agencies should educate the public on minimizing radiofrequency radiation (RFR) exposure with public service announcements on radio, television, and print. "Warnings concerning the newborn and young as well as pregnant women"
5. Establish RFR free zones in commercial and public buildings
6. New measurement protocols needed to evaluate high data rate, signal characteristics associated with biological effects and cumulative effects of multiple radiation sources.
7. RFR signal strength measurements for cell sites should be done by independent contractors.
8. NH professional licensure to offer education so home inspectors can include RFR intensity measurements.
9. Warning signs to be posted in commercial and public buildings.
10. State should measure RFR and post maps with measurements for the public.
11. Require 5G structures to be labeled for RFR at eye level and readable from nine feet away.
12. Engage agencies with ecological knowledge to develop RFR safety limits that will protect the trees, plants, birds, insects, and pollinators.
13. Under the National Environmental Policy Act, FCC should do an environmental impact statement as to the effect on New Hampshire and the country as a whole from 5G and the expansion of RF wireless technologies.
14. Cell phones and wireless devices should be equipped with updated software that stops cell phones from radiating when positioned against the body.

[119] https://www.gencourt.state.nh.us/bill_status/legacy/bs2016/
[120] https://www.gencourt.state.nh.us/statstudcomm/committees/1474/reports/5G%20final%20report.pdf

15. A resolution to US Congress to require the FCC to commission an independent health study and review of safety limits.

ATTACHMENT 7: Fact Sheet on Environmental Impacts of Satellite Proliferation

The attached factsheet describes the impact of satellites on the environmental and other impacts.[121]

[121] Fact sheet also available at https://ehtrust.org/wp-content/uploads/Satellite-federal-bills-EHT-factsheet-11-1-23.pdf

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FACT SHEET: FEDERAL LEGISLATION ON WIRELESS COMMUNICATIONS

Satellite Proliferation: Hundreds of Thousands of US Launches With No Environmental Review.[1]

Bills Pending

HR 1338 / **S.4010** Requires FCC to process satellite applications, with an approach similar to HR 3557. Imposes shot clocks, automatic approvals of applications, and automatic renewals.

HR 1339 Requires the FCC to pursue additional regulations to promote satellite use for precision agriculture.

S. 1648 (PASSED both chambers) **/ HR 682** Allows commercial satellite launches to use spectrum that is currently reserved for national security.

Context: Over 1 Million Satellites Planned

Satellite operators plan over one million satellites globally in the coming years.[2] By comparison, in 2018, prior to the recent wave of expansion, just over 1,300 satellites were active from all previous history.[3] In the US alone, the FCC has received 70,000 applications since 2016 and granted approximately 10,000.[4] With a lifespan of only five years per satellite,[5] the US is on a path to launching 14,000 satellites per year, just to maintain US-licensed networks.

Regulatory Gap

- In 1986, FCC determined that, "based upon the Commission's experience," its authorizations and licensing of satellites were categorically excluded under the National Environmental Policy Act,[6] although the FCC has provided no justification for maintaining this exclusion despite evidence of significant environmental effects of individual and cumulative satellite deployments.[7]
- In 2022, GAO recommended that FCC justify its NEPA categorical exclusion; FCC has not yet complied.[8]
- No federal agency has conducted a comprehensive review of the current body of science on the health and environmental impacts of wireless radiofrequency (RF) radiation,[9] despite significant evidence of serious biological harm.[10] The US Court of Appeals for the DC Circuit has twice ruled the FCC failed to address environmental effects of its actions.[11]

Environmental and Other Impacts of Satellites

- Increase radiofrequency (RF) radiation across the entire planet.[12]
- Release chemical and particulate emissions from satellite launches, which may affect climate and the ozone layer.[13]
- Spread alumina[14] and other toxic metals[15] upon reentry, as each satellite eventually falls to earth and disintegrates.
- Increase the risk of orbital debris, which is a growing threat to space infrastructure, as documented by GAO and others.[16]
- Increase light and radio pollution from satellites, which adversely impacts astronomy and dark skies.[17]
- Increase RF radiation on farms (particularly when combined with other bills pending in Congress[18]) despite known harms to plants,[19] birds, animals, and insects[20] (particularly pollinators and bees[21]), and despite zero assessment of the harms from this radiation or the threat to farm yields.[22]
- Create liability for US taxpayers under international law, as the FCC has not required satellite companies to bear this liability.[23]

Pending Bills Would Fast-track Satellite Deployment, Despite:

- No review of environmental or agricultural impacts
- No national security impact assessment, such as from orbital debris and spectrum sharing.[24]

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Environmental Procedures at the FCC: A Case Study in Corporate Capture (2022)
https://www.fcc.gov/ecfs/document/1222046629894/7

[2] One million (paper) satellites, *Science* 2023
https://www.science.org/doi/10.1126/science.adi4639

[3] Union of Concerned Scientists Satellite Database
https://www.ucsusa.org/resources/satellite-database
As of Nov. 7, 2022, only 14,450 satellites had been launched in all of human history, with 6,800 currently active according to the European Space Agency (ESA).
https://www.space.com/spacex-starlink-satellites.html

[4] https://www.osstp.org/fcc-analysis

[5] https://www.space.com/spacex-starlink-satellites.html

[6] Federal Register at page 14999
https://www.govinfo.gov/content/pkg/FR-1986-04-22/pdf/FR-1986-04-22.pdf

[7] *The Balance Group v. FCC* (opening brief, DC Circuit, 2020), page 29
https://www.thebalancegroup.net/uploads/7/0/4/2/7042138/viasat.bg_--_opening_brief.pdf

[8] GAO noted that "*because large constellations of satellites did not exist [in 1986], FCC's experience up to that point would not have involved the consideration of this technology*." Satellite Licensing: FCC Should Reexamine Its Environmental Review Process for Large Constellations of Satellites (November 2022)
https://www.gao.gov/products/gao-23-105005

[9] https://ehtrust.org/wp-content/uploads/5G-and-Cell-Tower-Radiation-Briefing-1.pdf

[10] https://ehtrust.org/science/top-experimental-epidemiological-studies/

[11] *Environmental Health Trust v. FCC* (DC Circuit, 2021)
https://www.cadc.uscourts.gov/internet/opinions.nsf/FB976465BF00F8BD85258730004EFDF7/$file/20-1025-1910111.pdf
Keetoowah Band of Cherokee Indians v. FCC (DC Circuit, 2019)
https://www.cadc.uscourts.gov/internet/opinions.NSF/4001BED4E8A6A29685258451005085C7/$file/18-1129-1801375.pdf

[12] Global coverage map:
https://orbitalindex.com/feature/starlink-coverage/

[13] Large Constellations of Satellites: Mitigating Environmental and Other Effects (September 2022)
https://www.gao.gov/products/gao-22-105166

[14] See note 7

[15] NOAA scientists link exotic metal particles in the upper atmosphere to rockets, satellites
https://research.noaa.gov/2023/10/16/noaa-scientists-link-exotic-metal-particles-in-the-upper-atmosphere-to-rockets-satellites/

[16] See note 13 above for GAO report, September 2022.
https://www.space.com/starlink-satellite-conjunction-increase-threatens-space-sustainability
See S. 447, currently pending, which seeks to mitigate orbital debris.

[17] *International Dark Sky Association v. FCC* (2022)
https://darksky.org/news/ida-appeals-fcc-approval-of-spacex-gen2-satellite-constellation/
See also, Astronomer makes prediction on satellite pollution, *CNN*, June 11, 2022
https://www.cnn.com/videos/world/2022/06/11/satellite-pollution-threatens-night-sky-fisher-pkg-ndwkd-vpx.cnn

[18] See all bills promoting wireless radiation and antenna proliferation with precision agriculture HR 1339, S.2542, HR 1697/S.734, HR 4351, HR 5062

[19] https://ehtrust.org/electromagnetic-fields-impact-tree-plant-growth/

[20] https://ehtrust.org/environmental-effects-of-wireless-radiation-and-electromagetic-fields/

[21] https://ehtrust.org/published-research-adverse-effect-wireless-technology-electromagnetic-radiation-bees/

[22] https://ehtrust.org/radiofrequency-radiation-effects-on-agronomy-agricultural-crops-and-crop-yields

[23] In 2018, the FCC recognized that under international treaties the US government is liable for damages that US satellites cause abroad, including falling debris. See paragraphs 76-80.
https://www.fcc.gov/document/fcc-launches-review-rules-mitigate-orbital-space-debris-0
In 2020, the FCC decided not to require satellite companies to carry insurance (paragraph 135). FCC has not required satellite companies to indemnify the US government (paragraph 136) for liability (paragraph 177), and acknowledged that: *"[T]hose costs would be borne by U.S. taxpayers."* (paragraph 178)
https://www.fcc.gov/document/fcc-updates-orbital-debris-mitigation-rules-new-space-age-0

[24] Letter to Congressional committees, National Call for Safe Technology (September 19, 2023)
https://drive.google.com/file/d/1dfjM0yvGM08XjPV9XU2s6SRwEKFSbcJo/view