



August 6, 2025

The Honorable Robert F. Kennedy, Jr.
Chairman, Make America Healthy Again Commission
Secretary, U.S. Dept. of Health and Human Services
200 Independence Ave., SW
Washington, D.C. 20201

Re: Including Electromagnetic Radiation in the Make America Healthy Again Strategy

Dear Mr. Secretary:

We write to urge you to ensure that the Make America Healthy Again Strategy, expected to be published later this month, includes clear plans to address the impacts of electromagnetic radiation and its contribution to the chronic disease epidemic in the United States.

The National Call for Safe Technology represents the interests of many individuals from across the country who have been injured or disabled by electromagnetic radiation (EMR), and those who do not want themselves or their children to be injured or disabled by EMR. We advocate for the safe deployment of communications and utility infrastructure. At least 73 individuals, entities and partner groups are joining in this submission (Joiners). The Joiners have a reach of at least 1,350,000 people across the country.

We respectfully request that the forthcoming MAHA Strategy include:

1. an unequivocal finding of the adverse biological effects of electromagnetic radiation, many of which are documented in Addendum A attached hereto;
2. an interdisciplinary research agenda, with funding commitments, to
 - a. estimate the full magnitude of EMR's contribution to chronic disease prevalence and to the burden of disease,
 - b. further elucidate its impacts, such as its potential contribution to autism spectrum and other neurodevelopmental disorders, and
 - c. develop treatment and mitigation recommendations;

3. a whole-of-government plan to mitigate known EMR harms in urban, suburban, rural, and wilderness settings;
4. a whole-of-government plan to prioritize deployment of wired broadband as a national policy imperative for the health of all Americans, especially for rural health¹ and children's health;
5. a plan for HHS to publish accurate information about the risks of EMR so that Americans can exercise informed decision-making over their personal decisions;
6. a call by the MAHA Commission for Congress to amend the Communications Act of 1934 (a) to restore local zoning discretion over the placement of wireless facilities on the basis of health effects of radiofrequency radiation, and (b) to restore tort liability for radiofrequency radiation exposures; and
7. a compulsory directive from the White House for the FCC to comply with the 2021 DC Circuit court order as follows:
 - FCC will within 15 days notify the court that
 - a) the Commission cannot provide a reasoned explanation for its decision to retain its 1996 human exposure guidelines, as the decision had no factual basis;
 - b) the Commission will within a further 30 days issue a notice of proposed rulemaking (with at least a 30-day comment period), with final rules to be issued within six months, promulgating updated, science-based human exposure limits;² and
 - c) the Commission, in keeping with past precedent, recognizes that it does not possess health expertise and will seek input from other expert agencies within the US government, including without limitation HHS input on evidence-based exposure levels that are protective of humans and children.

Robust scientific studies document the adverse biological effects from RF radiation which are clear, convincing and real. To help inform the MAHA Commission's decision-making, attached are two Addenda:

- **Addendum A** highlights the many scientific studies and findings grouped by industry, U.S. federal agencies, independent researchers and examples of chronic disease clusters from RF radiation.

¹ Most urban and suburban Americans already have access to high-speed wired broadband. Rural Americans are increasingly forced to rely on wireless connectivity.

² We know that the Secretary and Chair of the Commission is familiar with this case, as he was co-counsel in *Environmental Health Trust et al. v. FCC* (2021, No. 20-1025), and his former organization filed a petition in 2023 seeking FCC compliance with the court order. See "petition to implement DC circuit judgment and mandate, reopen notice of inquiry and perform tasks ordered by the court." April 4, 2023 <https://childrenshealthdefense.org/wp-content/uploads/dccc75f8-ecdf-4186-8805-1b55a90b1bd1.pdf>

- **Addendum B** documents the technical superiority of wired broadband for connectivity purposes, in addition to the fact that it avoids the adverse biological effects of wireless deployments set forth in Addendum A.

We look forward to working with the Commission and your Department and are available to answer any questions.

Respectfully Submitted
and on Behalf of the Joiners,



Odette J. Wilkens
Chair & General Counsel
646.939.6855

The individuals and entities listed below collectively constitute the “Joiners,” have granted permission, and join together, to submit this letter and its attachments, Addenda A and B:

National Health Federation, Scott C. Tips, President, Mossy Rock, WA

Stand for Health Freedom, Leah Wilson, Co-Founder and Executive Director, Naples, FL

Alliance for Natural Health-USA, Robert Verkerk, PhD, Executive and Scientific Director, Alexandria, VA

EMF Wellness Tucson, Lisa Smith, PhD, Tucson, AZ; Safe Tech Tucson, Tucson, AZ; The Scientific Alliance for Education, Nina Anderson, President; Wired Broadband, Inc., Odette J. Wilkens, President & General Counsel; Fred P. Sinclair, Jr., Alfred, NY; New Yorkers 4 Wired Tech, New York, NY; New York City Alliance for Safe Technology, New York, NY; Rhode Island 4 Safe Tech, Sheila Resseger, M.A., Co-Founder, Cranston, RI; Susan Molloy, M.A., Snowflake, AZ; Coloradans for Safe Technology, Andrea Mercier (mother of a severely disabled child who is adversely impacted various forms of non-ionizing radiation), Colorado Springs, CO; Coloradans for Safe Technology, Nancy VanDover, DVM, OMD, Dipl Acup, disabled by EMR; Deborah Shisler, with EMR-S, CO; La Plata for Safe Technology, Ingrid Iverson, with EMR-S, CO; Virginians for Safe Technology, Jenny DeMarco, Communications Director, and Mary Bauer, retired radio frequency engineer, Fredericksburg, VA; Safe Tech International, Sara Aminoff, Union City, CA; Safe Tech International, Kate Kheel, Taneytown, MD; Safe Tech International, Patricia Burke,

journalist, Millis, MA; Safe Tech Westchester, Ruth F. Moss, Westchester, NY; The Soft Lights Foundation, Mark Baker, President, Beaverton, OR; Amy Harlib, Concerned Citizen, New York, NY; Floris R. Freshman, published artist and composer, with EMR-S, Scottsdale, AZ; Virginia Farver, Fort Collins, CO; Gabriela Munoz, with EMR-S, Carmel, NY; EMF Safety Network, Sidnee Cox, Co-director, Windsor, CA; Rosemarie Russell, member of The Women's State Legislative Council of Utah, Hurricane, UT; Erin McDowell, Registered Nurse, with EMR-S Rocky River, OH, SWORT (Southwestern Ohio for Responsible Technology); Craig McDowell, veteran, Rocky River, OH; Southern EMF Radiation Solutions, Shari Champagne, with EMR-S, Houme, LA; Southwest Pennsylvania for Safe Technology, Mount Pleasant, PA, Susan Jennings, MPA, BA, Founder (son has EMR-S); Jen Goddard, Board Certified Doctor of Natural Health, Thriving Proof Holistic Health Practice, and 2025 United States of America Mrs. Maine Pageant, Brewer, ME; Loraine Uebele, FACHE, Kansas City, MO; Sean Polacik, Automation Control Systems Technician, OH; Linda M. Cifelli, retired Registered Nurse, Williamsburg, VA; Safer Cell Phone and Wi-Fi Project, Marne Glaser, Chicago, IL; Katherine Katzin, Takoma Park, MD; Jan Kiefer, Scottdale, PA; Fiber First LA, Charlene Hopey, Topanga, CA; Gene Wagenbreth, Topanga, CA; Eva Christina Andersson, E.U., Sweden; Alison McDonough, Canton, MA, with EMR-S; Longmont for Safe Technology, Doe Kelly, Co-Founder, with EMR-S, Longmont, CO; Sharon Behn, Arden, NC; Brenda Shafer, CA with EMR-S; Margaret Holt Baird, Esq, San Diego, CA with EMR-S; Arizonans for Safe Technology; Sustainability Management Consulting, Angela Casler, Chico, CA; Janet Drew, retired Registered Nurse, York, ME; Tammy Lee, with EMR-S, Lincoln, NE; Pennsylvanians for Safe Technology, Donna DeSanto Ott PT DPT MS FMCHC, Founder & President, PA; Sustainable Upton, Laurie Wodin, Co-Administrator, with EMR-S, Upton, MA; and Martine Victor, VT; Massachusetts for Safe Technology, Cecelia Doucette, Director, Ashland, MA; Marty Freyer, Mexico, MO; Jennifer Manzler, Certified Health & Wellness Coach, Cincinnati, OH, Southwestern Ohio for Responsible Technology (SWORT); Janet Taché, Hohenwald, TN; Susan Lee, Miami, FL; Susan Marlan, Asheville, NC; Kay Fitt, Palm Harbor, FL; Napa Neighborhood for Safe Technology, Amy Martenson; Andrew Molnar with EMR-S, Ithaca, NY; Ithacans for Responsible Technology, Ithaca, NY; Linda Becker, Lincoln, NE; Christian Uebele, Kansas City, MO; Nicholas Martin, ACHES (Adult Child Health and Environmental Support), United Kingdom; and Warren Woodward, Sedona, AZ; Janet FitzGerald, M.S., CCC-SLP (Sharon, MA); The People's Initiative Foundation, Elizabeth Barris, Topanga, CA; Linda Dance with EMR-S, Gainesville, FL; New Hampshire for Safe Technology, Debra Hodgdon, Stratham, NH; Monique Marissa Lukens, member United Teachers Los Angeles – member California Teachers Association - National Educator Association delegate, SAG-AFTRA, AEA, Los Angeles, CA.

EMR means electromagnetic radiation.

EMR-S means Electromagnetic Radiation Syndrome

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 World Health Organization in 2025 (finding increased risk of cancer, initial Class 2B carcinogen classification in 2011), 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), Ripon, CA (4 children and 4 teachers developed cancer; one child died) and Eagle, ID (atrial fibrillations from 5G cell towers).

BIOLOGICAL HAZARDS OF WIRELESS RADIATION -- SOME HIGHLIGHTS

“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.”³

~ 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 Radiofrequency (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**.⁴ 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 Working Group, chaired by the FDA, and including EPA, OSHA, NIOSH, CDC, FCC, and NIH.⁵

³ <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.

⁴ 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.

⁵ Ibid.

- b) Abruptly after these findings, the EPA was defunded from doing any further research on the biological effects of wireless radiation.⁶
2. **Industry Commissioned Study Finds Biological Effects.** A study in 2000 commissioned by a major telecom carrier 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.⁷
 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.⁸
 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.⁹
 5. **RF Radiation is a Pollutant.** The telecom industry characterizes RF radiation as a pollutant in their device protection plans and disclaim insurance liability.¹⁰
 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.¹¹

⁶ Overpowered, What Science Tells Us About the Dangers of Cell Phones and Other WiFi-Age Devices, Martin Blank, PhD, 2014 at 110-112.

⁷ 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>.

⁸ 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>.

⁹ 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>.

¹⁰ 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>.

¹¹ <https://ehtrust.org/key-issues/electromagnetic-field-insurance-policy-exclusions/>.

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.”¹²
8. **“Why Tech Leaders Don’t Let Their Kids Use Tech.”**¹³ 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.”¹⁴

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

1. **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.¹⁵
2. **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).¹⁶ NTP found malignant heart schwannomas and malignant brain gliomas.¹⁷ 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 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.”¹⁸

¹² <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/>.

¹³ “Why Tech Leaders Don’t Let Their Kids Use Tech,” <https://kidzu.co/health-wellbeing/why-tech-leaders-dont-let-their-kids-use-tech/>.

¹⁴ Ibid.

¹⁵ <https://ehtrust.org/timeline-of-development-of-safety-limits-for-wireless-radiation-in-us/>.

¹⁶ 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=vq1i363i74umg9ybydrhmn5d&st=q9l49h88&dl=0> ; see also, <https://ehtrust.org/former-niehs-director-dr-linda-birnbaum-interviewed-about-cell-phone-radiation/>.

¹⁷ <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>.

¹⁸ FDA letter to NTP, May 19, 1999, pp. 2, 3, 7, available at <https://ehtrust.org/wp-content/uploads/FDA-Nomination-for-Cell-Phone-NTP-Study-.pdf>.

- 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.”¹⁹ “Overall, the NTP findings demonstrate the potential for RFR **to cause cancer in humans**.”²⁰ [Emphasis added.]

3. 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.²¹ Despite this, the FCC does not regulate for RF frequencies below 150 KHz, except for Class A digital devices for commercial use.²² The FCC averages exposure levels are for 30 minutes,²³ which obscures the effects of the **constant peaking and pulsations of RF radiation which are the cause of adverse biological effects**, and does not account for 24/7 exposure by the population.²⁴

¹⁹ 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.

²⁰ Ibid at 11.

²¹ 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).

²² See, e.g., 47 CFR 15.107(a) and (b) on conducted limits, <https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-15/subpart-B/section-15.107>.

²³ 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\(b\)](https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-1/subpart-I/section-1.1307#p-1.1307(b)).

²⁴ 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>.

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."

- 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 about two hundred personal accounts 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 to examine long-term effects on the public, especially children. The court concluded that the FCC failed to provide a reasoned explanation for not updating its limits and ignoring the current science.²⁵ The FCC has not yet complied. The FCC has also failed to reply to three petitions seeking compliance.²⁶
- c) **FCC's Maximum Permissible Exposure Limit (MPEL)** are the limits of RF radiation for human exposure. MPEL allows for a very high human exposure limit of ten million microwatts per square meter.²⁷ The FCC has acknowledged a "worst-case" scenario of transmitters "operating simultaneously and continuously" at the MPEL with an individual "in the main transmitting beam and within a few feet of the antenna for several minutes or longer."²⁸ While the FCC dismisses this scenario as "extremely remote," it is allowing 4G and 5G cell towers to be installed²⁹ just feet from a home, business or school where individuals and children are in the main transmitting beam for many hours a day or for 24/7.

²⁵ <https://media.cadc.uscourts.gov/opinions/docs/2021/08/20-1025-1910111.pdf>

²⁶ Petitions:

- On 11/30/2021, Environmental Health Trust (EHT) filed a [Request to Reopen and Refresh Record in Remand of Emissions Guidelines Notice of Inquiry](#);
- On 6/30/2022, Environmental Working Group (EWG) filed a petition with 22,000 signatures [requesting that the FCC protect children's health by setting strict standards limiting public exposure to radiofrequency radiation](#);
- On 4/4/2023, Children's Health Defense (CHD) filed a [Petition to Implement D.C. Circuit Judgment and Mandate, Reopen Notice of Inquiry and Perform Tasks Ordered by the Court, Petition to Implement CEQ-Mandated NEPA Procedures Update and Request for Prompt Ruling](#). CHD stated: "Any continued non-action will violate the judgment and mandate and expose the Commission to further judicial review and, ultimately, a mandamus order requiring compliance."

²⁷ 47 CFR 1.1310(e)(1)(II) shows 1 mW/cm², which is equivalent to 10 million uW/m², <https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-1/subpart-I/section-1.1310>.

²⁸ FCC's *Guidelines for Cellular Antenna Site Calculations*, <https://www.fcc.gov/consumers/guides/human-exposure-radio-frequency-fields-guidelines-cellular-and-pcs-sites#:~:text=In%201996%2C%20the%20FCC%20adopted,lower%2Dpowered%20cell%20site%20transmitters.>

²⁹ *In re Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Inv.*, 33 F.C.C.R. 9088, 9104-05 (2018).

- d) **The FCC's MPEL** is based on IEEE (Institute of Electrical and Electronic Engineers) guidelines³⁰ which "have not been changed since 1991 and do not consider children."³¹ Testing was performed on "a model head with dimensions based [on] the 90th percentile of U.S. military recruits in the year 1989. The corresponding body of the head would be a six foot, two inches, 220 lb. male."³² A Specific Absorption Rate (SAR) – rate of absorption of electromagnetic radiation -- is then calculated based on thermal effects (heating tissue) of that model head.³³ However, biological effects from RF radiation are also non-thermal, documented by the studies cited herein, yet neglected in FCC testing. The FCC's limits are based on "outdated exposure metrics and circumvent important animal data" and "do not address conclusions from scientific organizations, such as the IARC."³⁴
- e) **The FCC failed to disclose** that in 2019 when it tested cell phones next to the body (which is the way that the public typically uses cell phones), the cell phones exceeded the limits of RF radiation for human exposure (discovered via FOIA).³⁵
4. **A U.S. Naval Medical Academy Research** report from 1971 by Dr. Zory Glaser³⁶ linked 23 chronic diseases to RF radiation based on over 2300 studies.³⁷ A Feb 2025 report correlates Dr. Glaser's findings from 1971 of biological effects of RF radiation and millimeter wave (5G) technology to reported cases of chronic disease.³⁸ 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.³⁹ In 1976, Dr. Glaser updated the total bibliography to 3700 reports relating to the biological effects of RF radiation.⁴⁰

³⁰ FCC guidelines are set forth at 47 CFR 1.1310, see note at (d)(4); see also, <https://www.fcc.gov/consumers/guides/human-exposure-radio-frequency-fields-guidelines-cellular-and-pcs-sites#:~:text=In%201996%2C%20the%20FCC%20adopted,lower%2Dpowered%20cell%20site%20transmitters.>

³¹ *The Effects of RF-EMF on the Child Brain*, Aaron Skaist, Vol 12, No. 2, 2019, at 2, The Science Journal of the Lander College of Arts and Sciences, <https://touro scholar.touro.edu/cgi/viewcontent.cgi?article=1218&context=sjlcas>.

³² Ibid at 3.

³³ Ibid.

³⁴ Dr. James C. Lin, distinguished former member of the International Commission on Nonionizing Radiation Protection (ICNIRP) and the Institute of Electrical and Electronic Engineers (IEEE), "RF Health Safety Limits and Recommendations [Health Matters]," IEEE Microwave Magazine, May 8, 2023, DOI: [10.1109/MMM.2023.3255659](https://doi.org/10.1109/MMM.2023.3255659).

³⁵ <https://ehtrust.org/press-release-concealed-fcc-cell-phone-radiation-tests-show-human-exposure-limits-were-exceeded/>.

³⁶ About Dr. Zory Glaser, <https://zoryglaser.com/>.

³⁷ https://www.magdahavas.com/wp-content/uploads/2010/06/Navy_Radiowave_Brief.pdf.

³⁸ 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.

³⁹ Ibid at 3.

⁴⁰ <https://ehtrust.org/wp-content/uploads/Naval-MRI-Glaser-Report-1976.pdf>.

5. **A U.S. Air Force report** from 1994⁴¹ states that “[i]t is known that electromagnetic radiation [EMR] has a biological effect on human tissue” covering a wide range including adverse cardiovascular, neurological and behavioral effects including the risk of cancer. Since 1956, the Dept. of Defense directed the Armed Forces (Army, Navy, Air Force) to study EMR. The report found that EMR can interact with human tissue’s bioelectrical function and Eastern Europe and the then Soviet Union found that human tissue may be more sensitive to EMR’s non-thermal effects.
6. **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.⁴²
 - a) The study coins the term “**radiowave disease**” to describe these effects.⁴³ 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.
 - b) The people observed working with millimeter radio wave generators had disturbances in their blood and immuno-biology.⁴⁴
 - c) Exposure in lab animals inhibited “oxygen consumption rate by the mitochondria” of the liver, spleen, heart and brain.⁴⁵
 - d) The degree of adverse effects **increased with more exposure**;⁴⁶ the lab animals had been exposed for 15 minutes a day for 60 days. When exposure ceases, disorders from low millimeter radio waves are reversible.⁴⁷ However, if adverse effects depend on duration of exposure, then Americans exposed continuously 24/7, 365 days a year, would suffer adverse biological effects without reprieve and without the ability to recover.

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

1. **The World Health Organization’s (WHO) International EMF Project Review of April 2025** of animal studies found reliable evidence that RF radiation increases the risk of cancer.⁴⁸ This reinforces the 2018 findings of cancer from the National Toxicology Program for 2G and 3G cell phones and the Ramazzini Institute for cell towers. Scientists may call for the WHO’s International Agency on Research on Cancer (IARC) to augment its RF radiation classification

⁴¹ *Radiofrequency / Microwave Radiation Biological Effects and Safety Standards, a Review (1994)*, Scott Bolen, Rome Laboratory, Griffiss Air Force Base, at 1, <https://youandemf.com/wp-content/uploads/2025/01/EMR-US-Military-Report.pdf>.

⁴² <https://mdsafetech.org/wp-content/uploads/2019/02/biological-effects-of-millimeter-wavelengths.-zalyubovskaya-declassif-by-cia-1977-biol-eff-mm-waves.pdf>.

⁴³ Ibid at 57.

⁴⁴ Ibid at 60.

⁴⁵ Ibid at 59.

⁴⁶ Ibid at 59.

⁴⁷ Ibid at 58.

⁴⁸ <https://www.sciencedirect.com/science/article/pii/S0160412025002338>.

from "possible" Class 2B in humans set in 2011 to "probable" or "known" carcinogenicity in 2025.⁴⁹

- a) **The WHO's IARC** (composed of independent scientists) classified EMF as a **Class 2B possible human carcinogen** in 2011⁵⁰ (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."⁵¹
- b) "[R]esults from animal experiments that the IARC was lacking were later provided by the U.S. National Toxicology Program (NTP). The NTP had reported two types of cancers in lab animals that were exposed, lifelong, to 2G and 3G cell phone RF radiation frequencies below 6 GHz . . . did not exceed 1°C,"⁵² i.e., did not heat tissue.
- c) Since the WHO 's 2011 IARC Class 2B classification, 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,⁵³ but does not state that, nonetheless, IARC concluded Class 2B possible carcinogenicity.
 - i. Researchers have called for the retraction of:
 - A study commissioned by the WHO, conducted by Karpidis, et al, which concluded in 2024 no hazards from wireless radiation,⁵⁴ but the study was found to be severely flawed with no scientifically valid assessment,⁵⁵ its conclusion

⁴⁹ See, e.g., <https://icbe-emf.org/who-funded-study-reports-high-certainty-of-the-evidence-linking-cell-phone-radiation-to-cancer-in-animals/>.

⁵⁰ https://www.iarc.who.int/wp-content/uploads/2018/07/pr208_E.pdf.

⁵¹ 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}.

⁵² Ibid.

⁵³ <https://www.who.int/news-room/questions-and-answers/item/radiation-5g-mobile-networks-and-health>.

⁵⁴ K. Karipidis, D. Baaken, T. Loney, M. Blettner, C. Brzozek, M. Elwood, C. Narh, N. Orsini, M. Röösl, 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.

⁵⁵ 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>)

contradicted the scientific evidence and was drawn from data showing hazards.⁵⁶ Researchers have called for the retraction of the study.⁵⁷

- Another WHO study in 2024 on RF-induced oxidative stress which identified 11,599 studies on oxidative stress within the 800-2450 MHz range, but remarkably discarded more than 99% of those studies.⁵⁸ Researchers have called for a retraction of that study, as well.⁵⁹

d) Dr. Miller, former Senior Epidemiologist and Senior Scientist at the IARC has, since 2011, stated “[t]here is sufficient evidence to now classify radiofrequency radiation as a human carcinogen,”⁶⁰ a Group 1 carcinogen (the highest level of evidence).⁶¹ The WHO’s EMF Project Review of April 2025 review reinforces that conclusion.

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 cell phones.⁶²

⁵⁶ “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=o77i19den485rdo2k4ktdzhgi&st=842p0rbv&dl=0.

⁵⁷ 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>.

⁵⁸ 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>.

⁵⁹ Ibid.

⁶⁰ 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.

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 <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}.

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]⁶³ and genotoxicity [associated with increased DNA damage]⁶⁴. Therefore, the IARC Category should be upgraded from Group 2B to Group 1, a human carcinogen⁶⁵.”⁶⁶ [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.”⁶⁷

- 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 . . . ”⁶⁸

4. **Panagopoulos, et al, Review on human-made EMF's ion forced-oscillation and voltage-gated ion channel dysfunction, oxidative stress and DNA damage (2021).** “[E]xtremely low frequency (ELF) band, and the microwave/radio frequency (RF) band which is always combined with ELF, may lead to DNA damage [which is] connected with cell death, infertility and other pathologies, including cancer.”⁶⁹

5. **New Hampshire Commission** studied the biological effects of wireless radiation and issued a report Nov. 2020⁷⁰ with former commissioner Kent Chamberlin, PhD, explaining a “key finding being that exposure to wireless communication radiation is harmful to the health of humans and

⁶³ 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.

⁶⁴ 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.

⁶⁵ 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.

⁶⁶ 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.

⁶⁷ *EnvironHealth* 21, 92 (2022). <https://doi.org/10.1186/s12940-022-00900-9>.

⁶⁸ Ibid.

⁶⁹ <https://pmc.ncbi.nlm.nih.gov/articles/PMC8562392/> Dr. Dimitris J. Panagopoulos is an EMF-biophysicist at the Choremeion Research Laboratory, Medical School, University of Athens, Greece, <https://www.researchgate.net/profile/Dimitris-Panagopoulos-3>.

⁷⁰ <http://www.gencourt.state.nh.us/statstudcomm/committees/1474/reports/5G%20final%20report.pdf>.

the environment. Those findings apply to all forms of wireless radiation, which include all generations of cellphone radiation.”⁷¹

6. **Thousands of scientific and medical studies** show neurological disorders; increased risk of cancer⁷² 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.⁷³
7. **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 arrhythmia, burning skin, trouble concentrating.⁷⁴ The significance of these reports is that non-ionizing radiation⁷⁵ from 5G — well below levels allowed by authorities — can cause health problems in individuals who had no prior history of electromagnetic sensitivity.⁷⁶ Dr. Lennart Hardell, lead 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.”⁷⁷
8. **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

⁷¹ Kent Chamberlin, PhD, Professor & Chair Emeritus, Fulbright Distinguished Chair, Univ of NH, Coll. Of Eng. and Physical Sciences, Dept of Electrical and Computer Engineering, 2-13-23 letter to NYC Community Board 12 in Queens.

⁷² *Mobile phone radiation causes brain tumors and should be classified as a probable human carcinogen (Review)*, Journal of Oncology, <https://www.spandidos-publications.com/10.3892/ijo.2015.2908>.

⁷³ 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., Kyrlyenko, O., & Kyrlyenko, S. (2016), <https://pubmed.ncbi.nlm.nih.gov/26151230/>.

⁷⁴ <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-mE3XeBxqaXPQdFxsIf9Q23bMCer9vgUBHnCvJXBrgBv-w7YdRUDwF0>; see also, “The microwave syndrome or electro-hypersensitivity: historical background,” <https://pubmed.ncbi.nlm.nih.gov/26556835/>.

⁷⁵ <https://childrenshealthdefense.org/emr/emf-key-terms-descriptions/>.

⁷⁶ <https://childrenshealthdefense.org/emr/emf-wireless-health-impacts/>.

⁷⁷ <https://www.stralskyddsstiftelsen.se/two-studies-show-that-5g-caused-the-microwave-syndrome-in-healthy-persons/>.

population.⁷⁸ Based on a population of 332.4 million people in the U.S.,⁷⁹ 120 million have symptoms, 2% of which (7 million) have severe symptoms or can't work.

9. **The Bioinitiative Report's** review of 1800 studies found biological effects of RF radiation which can occur within minutes of exposure,⁸⁰ and recommends **no more than 0.1 microwatts per centimeter squared** for human exposure⁸¹ (compared to the **FCC's MPEL of 580 microwatts** per centimeter squared for the general public⁸²). Chronic or prolonged exposure to cell towers can result in biological effects; RF radiation exposures "prevent the body from healing damaged DNA, produce immune system imbalances, metabolic disruption . . . lower resistance to disease . . . pervasive impairment of metabolic and reproductive functions."⁸³
10. **Children absorb more RF radiation and are at greater risk than adults.**⁸⁴
 - a) **From cell phones:**⁸⁵

[INTENTIONALLY LEFT BLANK]

⁷⁸ "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>.

⁷⁹ <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>.

⁸⁰ *Key Scientific Evidence and Public Health Policy Recommendations*, Supplement 2012, at 4, 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/>; see also, BioInitiative 2012 Conclusions, <https://bioinitiative.org/conclusions/>.

⁸¹ *Key Scientific Evidence and Public Health Policy Recommendations* 2007, at 22-23, https://bioinitiative.org/wp-content/uploads/pdfs/sec24_2007_Key_Scientific_Studies.pdf.

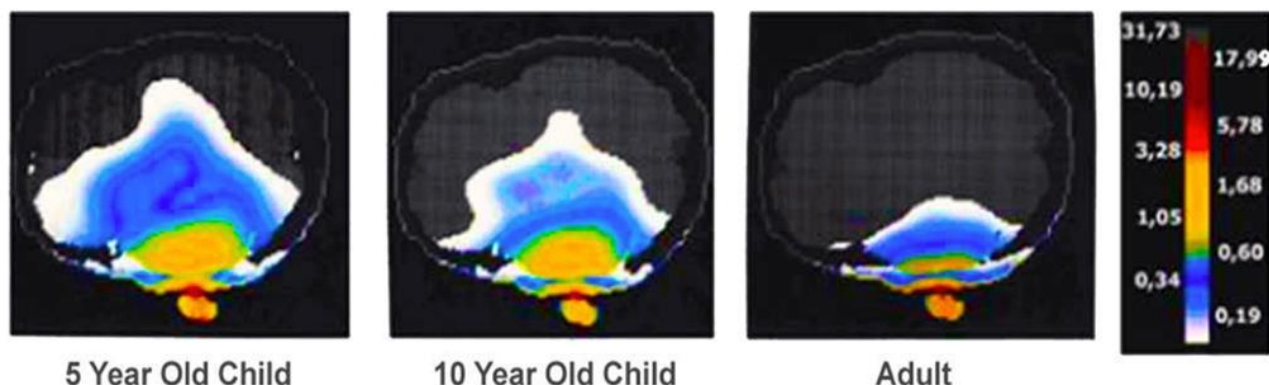
⁸² <https://www.fcc.gov/consumers/guides/human-exposure-radio-frequency-fields-guidelines-cellular-and-pcs-sites#:~:text=In%20the%20case%20of%20cellular,personnel%20working%20on%20the%20rooftop>.

⁸³ *Key Scientific Evidence and Public Health Policy Recommendations*, Supplement 2012, at 4, https://bioinitiative.org/wp-content/uploads/pdfs/sec24_2012_Key_Scientific_Studies.pdf. <https://bioinitiative.org/>; see also, BioInitiative 2012 Conclusions, <https://bioinitiative.org/conclusions/>.

⁸⁴ 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/>.

⁸⁵ 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/>.

Children are more vulnerable to RF microwave radiation.



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](#)

- 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.⁸⁶
- c) **Greater risk for fetuses:** risk of “degeneration of the protective myelin sheath that surrounds brain neurons.”⁸⁷
- d) **School-age children:** risk of “[d]igital dementia.”⁸⁸
- e) **Childhood leukemia,** increased risk.⁸⁹

⁸⁶ *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/>.

⁸⁷ *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>.

⁸⁸ Ibid.

⁸⁹ *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.

- f) **Potential dangers of cell towers near schools.**⁹⁰
- 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.⁹¹
 - 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.⁹²
 - 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.⁹³
11. **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.⁹⁴

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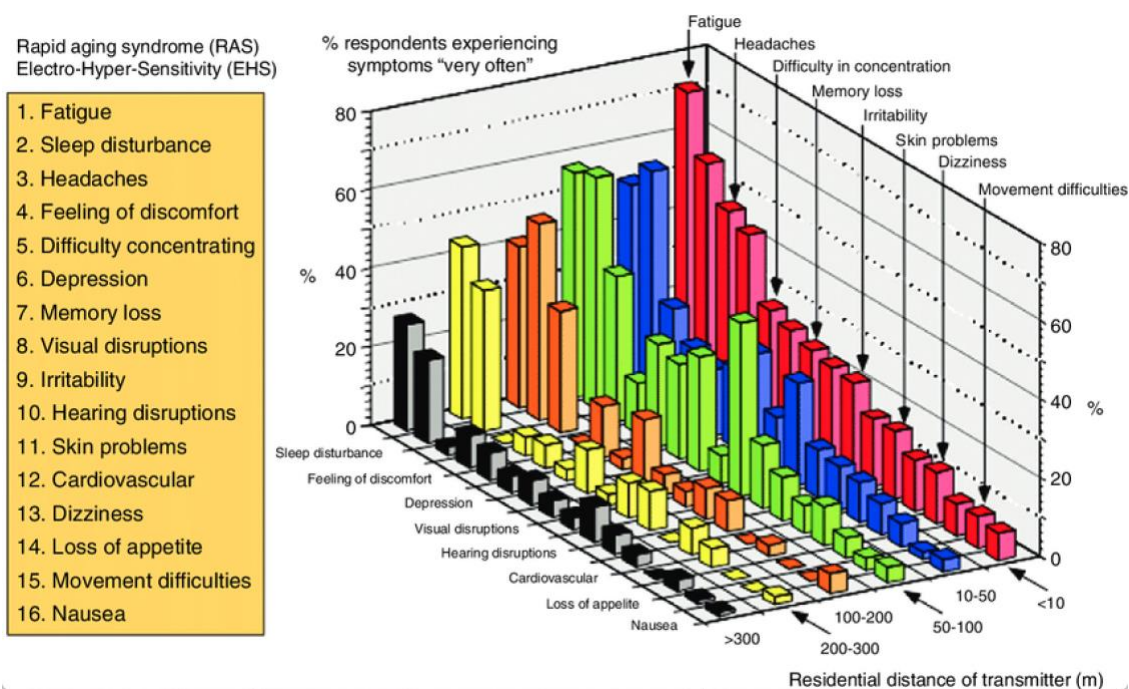
⁹⁰ Dr. Magda Havas: WiFi in Schools is Safe. True or False? <https://www.youtube.com/watch?v=6v75sKAUFdc>.

⁹¹ *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.

⁹² 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/>.

⁹³ Child With Heart Problems From Wireless: 5G Health Risks California SB 649 Hearing, https://www.youtube.com/watch?v=OgNLR9fQOX4&list=PLT6DbkXhTGoDakSqp1i_7milpwGx4xMFq.

⁹⁴ *Cell Tower Health Effects*, Physicians for Safe Technology, <https://mdsafetech.org/cell-tower-health-effects/>.



Symptoms experienced by people near cellular phone base stations; RF radiation affects the blood, heart and autonomic nervous system.⁹⁵ Source: Santini, et al (France): Pathol Biol. 2002;50:S369-73; Dr. Magda Havas, PhD.

12. **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, endocrine, and skeletal systems" and "from this perspective, **RF is a highly pervasive cause of disease.**"⁹⁶

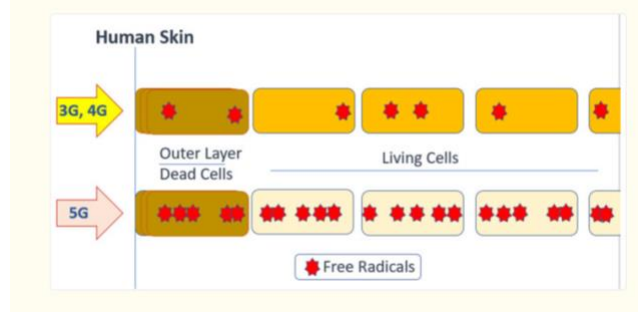
13. **5G's Biological Effects.** Contrary to claims that 5G's higher frequencies (millimeter waves) simply "bounce" off the skin, researchers have documented that the coiled portion of the skin's sweat duct can be regarded as a helical antenna in the sub-THz band and the skin, our largest organ,

⁹⁵ Dr. Magda Havas, https://www.researchgate.net/figure/Symptoms-experienced-by-people-near-cellular-phone-base-stations-based-on-the-work-of_fig2_258313941.

⁹⁶ 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>.

can intensely absorb the higher 5G frequencies.⁹⁷ 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.”⁹⁸ 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.⁹⁹

Figure 1.



14. **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 potential blockages, stroke and heart problems.¹⁰⁰
15. **“The 5G Appeal”** to the United Nations to halt the proliferation of 5G, warning of potential biological effects, was signed by experts on these effects -- 252 scientists and professionals from 43 countries, 40 scientists of which are from 15 U.S. states, including scientists and medical

⁹⁷ 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>.

⁹⁸ 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>.

⁹⁹ 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.

¹⁰⁰ "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 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/>.

professionals from Columbia and Harvard.¹⁰¹ Other scientists have joined in consensus statements.¹⁰²

16. **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.¹⁰³
17. **Increases in brain cancer** in the U.S. have been reported, with scientists attributing a high probability on RF radiation from cell phone use.¹⁰⁴
18. **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.¹⁰⁵
2. **Clusters of sickness near cell towers (not exhaustive).**
 - a. **In Pittsfield, MA**, many residents have been constructively evicted from their houses after a 115-foot 4G cell tower was installed in their area in 2020. Seventeen residents reported “headaches, ringing in the ears, dizziness, heart palpitations, nausea, and skin rashes,” and a child who had “to sleep with a bucket next to her bed in case she needs to throw up.”¹⁰⁶ These were just some of the findings of the **Board of Health** of Pittsfield, MA which then issued an emergency cease and desist order in April 2022 to turn off the cell tower which it concluded was injuring those residents, citing thousands of scientific, peer-reviewed studies of known adverse biological effects. Most of the residents have evacuated their homes.¹⁰⁷ One of those who remained has since died of cancer. Because the telecom carrier threatened to sue, the Board of Health was compelled to rescind the order. The

¹⁰¹ <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/>.

¹⁰² <https://phiremedical.org/wp-content/uploads/2020/11/2020-Non-Ionising-Radiation-Consensus-Statement.pdf>.

¹⁰³ <https://www.iaff.org/cell-tower-radiation/>.

¹⁰⁴ 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/>.

¹⁰⁵ <https://childrenshealthdefense.org/defender/marcia-haller-cell-tower-rf-radiation-sickness/>.

¹⁰⁶ <https://ehtrust.org/family-injured-by-cell-tower-radiation-in-pittsfield-massachusetts/>.

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.

residents filed suit against the city but lost on federal preemption, i.e., **no legal recourse for health claims** under Section 704 of the Telecommunications Act.

- b. **In Ripon, CA** when a cell tower was placed on the property of an elementary school, 4 children (ages 6-11) got cancer (brain, liver, kidney) and 4 teachers got breast cancer.¹⁰⁸ One of the children who contracted brain cancer (glioblastoma) when he was 10 years, after about 30 surgeries to save his life, died in Aug 2024.¹⁰⁹ After the 4th student was diagnosed with cancer, the tower was removed.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 brought an action in the 9th Circuit against the telecom carrier under the Americans with Disabilities Act to provide accommodation under the Act.¹¹²

¹⁰⁸ See beginning of video at https://www.youtube.com/watch?v=-9TMTexPb_0&t=128s .

¹⁰⁹ 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>.

¹¹⁰ <https://mdsafetech.org/2019/03/25/cell-tower-to-be-removed-after-4th-ripon-student-diagnosed-with-cancer/>.

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/>.

ADDENDUM B

WHY WIRED BROADBAND PROVIDES SUPERIOR VALUE

As this document lays out, wired broadband is the superior solution for Internet connectivity in fixed locations (for example a home, school, or office), also known as fixed broadband. Wired broadband includes coaxial cable, copper wire, and fiber (fiber to the home or the premises is known as FTTP).¹¹³ Mobile applications, on the other hand, such as making a phone call while driving, require wireless connectivity. Each technology should be deployed where it is most effective: wired for fixed applications and wireless for mobile applications. Wired and wireless technologies are not equivalent. Unfortunately, industry is trying to impose wireless for fixed applications, which will only perpetuate and worsen the digital divide.

Advantages of Fiber Networks and Services:¹¹⁴

1. Cheaper over the life of the infrastructure. Only **1% to 10%** of capital investment in a fiber network needs to be replaced every 10 years. Fiber's life span is **50-70 years**.
2. Highest speed – starting at **1000 Mbps** today (1 Gigabit, already available at 10 Gb, and upgradable to terabit speeds). **Symmetrical** download and upload speeds.
3. Lower cost – even in the most remote rural areas, in the long run wired connections are lower cost.
4. More reliable – fiber service is not degraded by line-of-sight issues or inclement weather that affects wireless.
5. Lower energy consumption – fiber consumes more than three times less energy than fixed wireless.¹¹⁵
6. Economic development – “improved access to education and health care, price stabilization, etc.”¹¹⁶
7. More secure.

Disadvantages of Fixed Wireless Networks and Services:¹¹⁷

1. Higher costs than fiber because of the ongoing need to replace wireless equipment, with **40% to 80%** of its capital investment needing to be replaced every five years.
2. Capacity constraints -- typically **asymmetrical** download and upload speeds of **100 Mbps / 20 Mbps**.

¹¹³ <https://www.fibre-systems.com/article/fiber-connect-2023-two-thirds-us-consumers-prefer-fibre?iframe=1>.

¹¹⁴ <https://www.benton.org/blog/how-fixed-wireless-technologies-compare-fiber>.

¹¹⁵ [https://pipelinepub.com/digital-transformation-2024/reducing-energy-consumption-with-fiber-sustainability-](https://pipelinepub.com/digital-transformation-2024/reducing-energy-consumption-with-fiber-sustainability-ESG#:~:text=Fiber:%20Green%20Champion%20of%20Broadband&text=How%20does%20fiber%20consume%20less,to%202.7%20tons%20for%20DOCSIS)

[ESG#:~:text=Fiber:%20Green%20Champion%20of%20Broadband&text=How%20does%20fiber%20consume%20less,to%202.7%20tons%20for%20DOCSIS](https://pipelinepub.com/digital-transformation-2024/reducing-energy-consumption-with-fiber-sustainability-ESG#:~:text=Fiber:%20Green%20Champion%20of%20Broadband&text=How%20does%20fiber%20consume%20less,to%202.7%20tons%20for%20DOCSIS).

¹¹⁶ <https://communitynets.org/content/community-network-map>.

¹¹⁷ <https://www.benton.org/blog/how-fixed-wireless-technologies-compare-fiber>.

- a. Millimeter wave frequencies can support faster speeds, but only in short ranges (less than approximately 500-1500 feet from an antenna), unsuitable for rural applications because of dispersion of homes and lack of mounting structures.
3. **Not financially sustainable:** the re-investment required every five years to maintain the network makes it inherently unsustainable.
4. **Vulnerable to obstructions**, such as line-of-sight or inclement weather, making it more complex to deliver to every household.
5. **Less efficient** - wireless signals rely on radio waves which are less efficient over long distances, require frequent access points and repeaters to maintain consistent coverage, using extra signal energy just to reach end users.¹¹⁸
6. **Scalability is a critical challenge:** an increase in users requires more spectrum, which is scarce and expensive, and more antennas. Wireless is not dedicated, but shared, prone to congestion during peak or emergencies, and therefore data caps and throttling.
7. **High energy consumption.** 5G is acknowledged by industry as “power-hungry” requiring a large amount of energy consumption.¹¹⁹ Energy consumption from “5G” infrastructure “is expected to increase 61x between 2020 to 2030 due to its energy demands.”¹²⁰
8. **Inherently more complex**, more costly, more unstable (subject to frequent revision and “upgrades”), and more constrained in what they can deliver.¹²¹
9. **Poses unique security threats.** Former FCC Chairman, Tom Wheeler, has coined the term, the “5G Cyber Paradox,” to denote that the increased efficiency of 5G architecture renders it inherently insecure and “more vulnerable to cyberattacks than [5G’s] predecessors.”¹²²
 - a. 5G is a distributed, software-based network with thousands of nodes and access points that a hacker can exploit; there is no choke point control as there is with the centralized, hardware-based switching network of 4G.¹²³
 - b. E.g., in 2018 a hacker gained access to a Nevada casino’s network through its internet connected “smart” thermostat system located in a fish tank at the casino, and was able to extract information out through the thermostat and load it into the

¹¹⁸ <https://pipelinepub.com/digital-transformation-2024/reducing-energy-consumption-with-fiber-sustainability-ESG#:~:text=Fiber:%20Green%20Champion%20of%20Broadband&text=How%20does%20fiber%20consume%20less,to%202.7%20tons%20for%20DOCSIS.>

¹¹⁹ 5G Heats Up Base Stations, <https://semiengineering.com/5g-heats-up-base-stations/>.

¹²⁰ <https://ehtrust.org/report-5g-to-increase-energy-consumption-by-61-times/>; see also “Reinventing Wires: The Future of Landlines and Networks,” at 73, National Institute for Science, Law and Public Policy, authored by Timothy Schoechle, PhD; <https://gettingsmarteraboutthesmartgrid.org/pdf/Wires.pdf>.

¹²¹ “Re-inventing Wires: The Future of Landlines and Networks,” former President of Microsoft Canada, Frank Clegg, calls the report “a reasonable voice for our turbulent world.”

¹²² 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/>.

¹²³ Ibid.; 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>.

cloud.¹²⁴ This shows that 5G architecture that is supposed to facilitate the Internet of Things (IoT) poses a serious security threat.

10. **Out of step with what most Americans want** – two-thirds of Americans prefer fiber to the home (FTTP).¹²⁵ When the Affordable Connectivity Program (ACP) ended, 90% of wireline subscribers retained their service, wireless services lost 80% of their subscribers, satellite services also had losses.¹²⁶

Economic Advantages of Fiber:

1. **FTTP has been an economic boon**, and allows communities to be self-sustaining into the future without the need for taxpayer subsidies.
2. **Chattanooga, TN's** fiber network "Gig City" has the fastest Internet in the U.S.¹²⁷
 - a. 1 Gigabit symmetrical download and upload speeds; exploring quantum speeds only made possible by fiber.¹²⁸
 - b. Economic value of its fiber network over a 10-year period from 2011 to 2020 exceeded \$2.69 billion and produced 9,516 jobs, beyond expectations.¹²⁹
 - c. Booming local economic development: "over **\$1.4 billion** new investments, startup funding, real estate development and payments-in-lieu of taxes."¹³⁰

¹²⁴ <https://www.casino.org/news/hackers-stole-las-vegas-casino-high-roller-database-via-its-fish-tank/>; <https://www.forbes.com/sites/leemathews/2017/07/27/criminals-hacked-a-fish-tank-to-steal-data-from-a-casino/>; <https://www.washingtonpost.com/news/innovations/wp/2017/07/21/how-a-fish-tank-helped-hack-a-casino/>.

¹²⁵ <https://www.fibre-systems.com/article/fiber-connect-2023-two-thirds-us-consumers-prefer-fibre?iframe=1>.

¹²⁶ <https://broadbandbreakfast.com/acp-fallout-wireline-retains-most-wireless-and-satellite-face-major-losses/>.

¹²⁷ Why Chattanooga Has the Fastest Internet in the US, <https://tech.co/news/chattanooga-fastest-internet-usa-2018-08>.

¹²⁸ How Blazing Internet Speeds Helped Chattanooga Shed its Smokestack Past, CNET.com, August 20, 2015, <https://www.cnet.com/tech/services-and-software/how-blazing-internet-speeds-helped-chattanooga-shed-its-smokestack-past/>; see also, "Gig City Goes Quantum" at <https://thenationalcall.org/resources/>.

¹²⁹ "Ten Years of Fiber Optic and Smart Grid Infrastructure in Hamilton County, Tennessee," Bento J. Lobo, Ph.D., CFA First Tennessee Bank Distinguished Professor of Finance, The University of Tennessee at Chattanooga, August 31, 2020, https://www.researchgate.net/publication/352221978_Ten_Years_of_Fiber_Optic_and_Smart_Grid_Infrastructure_in_Hamilton_County_Tennessee;

See also, *How Blazing Internet Speeds Helped Chattanooga Shed its Smokestack Past*, Cnet.com, August 20, 2015, <https://www.cnet.com/tech/services-and-software/how-blazing-internet-speeds-helped-chattanooga-shed-its-smokestack-past/>; *Chattanooga Mayor Pushes Back on 5G as Smart Cities Cure All*, MeriTalk, February 13, 2019, <https://www.meritalkslg.com/articles/chattanooga-mayor-pushes-back-on-5g-as-smart-cities-cure-all/>.

See also, for economic benefits of fiber deployment, In Kansas, Rural Chanute Built Its Own Gigabit Fiber and Wireless Network," Christopher Mitchell 10-2-21, <https://ilsr.org/chanute-rural-gigabit/>; and <https://www.soar-ky.org/prtc/>.

¹³⁰ Ibid.

- d. “Each county resident is estimated to have benefited by about \$646 per year due to the incremental value generated by the fiber optic infrastructure.”¹³¹
 - e. Fiber successes were reported as far back as 2014.¹³²
- 3. **Chanute, KS** has “a 10 Gbps fiber-optic broadband ring”¹³³ which “connects schools and other community anchor institutions with Gigabit networks”¹³⁴
 - a. Gigabit network generates \$600,000 per year for Chanute’s Electric Utility.¹³⁵
- 4. **Rural eastern Kentucky, Jackson and Owsley Counties**, with FTTP from 2014, Gigabit-capable internet has been available to every home and business.¹³⁶
- 5. **Utopia Fiber in Utah** offers residences up to **10 Gbps** speeds, businesses up to **100 Gbps** speeds; multiple service providers deliver services, promoting competition to keep prices competitive.¹³⁷ Offers **fiber dedicated to the subscriber**, i.e., not shared with anyone, and proudly promotes its advantage over wireless, that “**you don’t have to worry about pesky lagging or buffering during peak hours ever again!**”

¹³¹ Ibid.

¹³² “Fast Internet is Chattanooga’s New Locomotive,” New York Times, February 3, 2014, <https://www.nytimes.com/2014/02/04/technology/fast-internet-service-speeds-business-development-in-chattanooga.html#:~:text=Steve%20Clark%2C%20a%20senior%20vice,at%20one%20gigabit%20per%20second.>

¹³³ <https://ilsr.org/chanute-rural-gigabit/>.

¹³⁴ Ibid.

¹³⁵ Ibid.

¹³⁶ <https://www.soar-ky.org/prtc/>.

¹³⁷ <https://www.utopiafiber.com/>.