

Why Are Other Countries' Limits 10 to 100 Times Lower Than America's? An Open Letter to HHS

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On September 21, 2026, the U.S. Department of Health and Human Services asked the public what it knows about radio-frequency energy from phones, Wi-Fi, cell towers, and other wireless technology, and what the government should do about it. Comments are due October 21, 2026, in public docket HHS-OASH-2026-0397. This letter is my comment. I write as an individual.

A number of countries that set their own limits for radio energy in homes and public places chose numbers 10 to 100 times lower than ours. At the far end, Russia's limit is about 100 times lower, among the strictest in force, and Switzerland's limit at homes and schools matches it. China's limit is 25 times lower. India holds its cell towers to a limit 10 times lower. Given that chasm, was the U.S. approach the right one?

The answer: they kept a margin we did not

The countries that set their limits far below ours told their people the same thing: they were keeping a margin beyond proven harm, for effects science has not ruled out. Italy wrote its lower limit into law as a caution against "possible long-term effects."^[23] Switzerland's highest court calls its limits a safety margin against non-thermal effects of long-term exposure.^[24] India cut its tower limit to one-tenth as a matter of "abundant precaution."^[25] Brussels says its limit compensates for what research does not yet know.^[7] China adds a safety factor to the international guideline under the precautionary principle.^[26] Russia set its limit from the level at which the body first begins to react, not where it is harmed.^[14]

The United States made the opposite choice. Its limits guard against one effect, heating, starting from the level at which heated laboratory animals showed disrupted behavior, and the FCC has declined to change them for anything else.^{[10][11]}

What I am asking HHS to do

Responding to Question 5(n).

- **Re-examine the U.S. approach.** Determine whether a limit built only to prevent heating is the right basis for protecting the public, given that other nations independently chose limits up to 100 times lower.
- **Review the nations that chose lower limits.** Review the published record from every nation that chose a lower limit, covering what each one studied, how it reasoned and why it chose its number, and evaluate each approach against our own.
- **Answer the third question.** Study whether the radio energy now broadcast into the environment, at levels far below heating, triggers biological effects we have not yet studied: non-thermal trigger effects, set off by the signal itself rather than by how much energy is absorbed.

- **Use the lower-limit nations to answer it.** Compare the U.S. population against Russia and the other nations with far tighter limits, measure the radio energy people actually receive, normalize the data to a common basis, and determine whether those populations are adversely affected or benefited.
- **Measure cohorts across all ages, not just schools.** Track the health effects in each cohort and tie them to both the power levels people receive and the length of their exposure, and publish the readings.
- **Test the signal, not only the dose.** Fund studies that hold dose constant while varying the signal itself, and record signal features in any exposure classification.
- **Be ready to find benefits as well as harms.** Design the study to find both adverse and beneficial effects and treat them differently, and do not ban or heavily restrict devices broadly because of a finding on one measure, such as dose rate.
- **Include wildlife, insects and plants.** Extend the same independent study to effects on wildlife, insects and plants, as part of the same biological question.
- **Study the skin before higher frequencies spread.** Find out what energy absorbed at the skin surface triggers beyond the skin before these frequencies are widely deployed.
- **Finish the court-ordered review.** Support the Federal Communications Commission (FCC) in finally explaining how its limits protect against harms other than cancer, including for children and long-term exposure.
- **Fund it independently.** Whoever designs and runs this work must have no financial ties to the wireless industry and no history in the revolving door between that industry and the agencies that regulate it.

How far apart the limits are

Responding to Question 5.

Limits for radio energy in homes and public places at Wi-Fi frequencies (2.4 GHz):

Country	Public limit (W/m ² , 2.4 GHz)	How many times lower than the U.S.
United States	10	baseline
Russia	0.1	100 times lower
Switzerland (cell sites near homes and schools)	0.095	about 100 times lower
Poland (until 2020)	0.1	100 times lower
China	0.4	25 times lower
Brussels (indoors)	0.50	20 times lower
Italy (since 2024)	0.59	about 17 times lower
India (cell towers)	1	10 times lower

Sources: U.S. [1]; Russia [3]; Switzerland [6]; Poland [9]; China [4]; Brussels [7]; Italy [5]; India [8].

The comparison is the background radio energy in a room or public place, from all sources together: Wi-Fi, Bluetooth, cell towers. Russia has no separate Bluetooth rule.[1][3]

A factor of 100 is not a rounding difference. Either one country is far too cautious or not cautious enough.

The gap itself is the warning sign

In a sound safety system, independent experts who study the same evidence and set their own safety margins land close together. That agreement is how we know the margin is right. When the answers spread across a factor of 100, the science behind the numbers is not settled. Outliers should be investigated.

Most countries adopted the international guideline published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), which uses the same number as the United States for these frequencies.[2][20] Adopting one shared guideline is not the same as reaching the answer independently. Many governments that examined the question themselves went lower, several by a factor of 100. Next to them, the United States sits at the top of the range. It has no lower limit for homes, schools, or hospitals.

The history is not in question: the FCC adopted today's limits in 1996 from heating-based standards written in 1986 and 1992, and has not changed them since.[10][11] The question is whether that approach was right. Did these nations see something about health and safety that led them so much lower, and did our approach miss it?

Was the U.S. approach the right one?

Responding to Questions 5(p), 6 and 12.

There are three questions about radiation and the body.

The first is ionizing radiation, which strips electrons from atoms and can damage DNA; wireless signals do not reach that level.[21]

The second is heating, the only effect U.S. limits address, which asks how much energy the body absorbs. The limits start from the level at which laboratory animals, absorbing radio energy until their bodies heated, showed disrupted behavior: 4 watts per kilogram of body weight. That threshold was divided by 10 for workers and by 50 for the public.[10][11] The U.S. public limit in the table follows from that heating threshold.

The third asks something different: not how much energy is absorbed, but whether the signal itself triggers biological responses we have not yet studied, at levels far below heating. These are non-thermal trigger effects: biological responses set off by the signal itself, its presence, shape or pattern, rather than by how much energy is absorbed. Energy is absorbed at every level; the question is what the signal sets in motion. No U.S. limit was designed to answer it. The World Health Organization said so directly in 2002: exposure limits are based on short-term effects, because the evidence on long-term, low-level exposure was "considered to be insufficient to establish quantitative limits." [20]

The FCC opened a review in 2013 and closed it in 2019 without changing a number.[11] In 2021, a federal appeals court found that the FCC had failed to explain how its limits protect against harms other than cancer, and ordered it to address children, long-term exposure, and how common wireless devices have become.[12] Five years later, that explanation still has not been given. The FCC asked for public comment on the court's questions only in September 2026, and has told the court it needs at least nine more months after comments close on October 22, 2026.[13]

My request: HHS should determine whether a heating-only approach is the right basis for protecting the public. To answer that, it should review why the nations that chose lower limits did so, and conduct an independent study of age-spanning cohorts in the U.S. and those nations. That study should measure the power levels people actually receive and how long they are exposed, normalize the data to a common basis, and determine whether those populations are adversely affected or benefited, including by non-thermal trigger effects.

The third question: what the signal itself may trigger

Today, radio energy is broadcast into the environment somewhat indiscriminately: around the clock, into homes, schools, and public spaces, reaching everyone in range whether they use the device or not. Modern wireless signals pulse, switch on and off, and change shape many times a second. The main limits average that energy over 6 or 30 minutes, so the pattern disappears into an average.

Given that, we should ask not only how much energy people receive but what kind: the signal's shape, waveform, pulsing and switching patterns, and whether any of those, apart from dose, may disrupt the body's systems through non-thermal trigger effects. Today's limits measure only dose, averaged over time, so they cannot answer that question. The record shows it is open:

- In 2011, the World Health Organization's cancer agency classified radio-frequency fields as "possibly carcinogenic to humans." [16]
- In 2018, the National Toxicology Program found clear evidence of heart tumors in male rats exposed for two years to 2G and 3G phone signals at whole-body levels well above the U.S. public limit. [17]
- The 2021 court ruling found the FCC had not explained protection against harms other than cancer. [12]
- In one Russian Academy of Sciences study of low-intensity millimeter waves in mice, pulsing the signal restored an anti-inflammatory effect at carrier frequencies where the steady signal had none. ICNIRP states there is no evidence that pulsed and steady signals act differently. [27][2]

One example of what such a signal could reach: every cell holds a voltage across its membrane, measured in thousandths of a volt, and nerves and the heart run on electrical impulses. [22] The question is broader than that. It covers biological effects in general, including ones no one has yet looked for.

My request: HHS should recognize that biological systems may respond to more than dose. It should fund studies that hold dose constant while varying the signal itself (shape, waveform, pulsing, on-off timing and modulation) to find whether any of those features trigger biological

effects on their own, harmful or beneficial. Any exposure classification HHS creates should record those signal features, not just power and time.

Be ready to find benefits as well as harms

Responding to Question 18.

A proper study that looks beyond dose and time, at waveform, pulsing, shape and modulation, may find that some signals benefit health, not only harm it. The study should not assume that every effect it finds is harmful. The pulsed-signal study above found an anti-inflammatory effect, not harm.[27] Pulsed-field devices already show that a pulsed field can be put to medical use. Since 1979, the FDA has approved PEMF (pulsed electromagnetic field) bone-growth stimulators to treat fractures that have failed to heal.[30] Federal device rules also recognize nonthermal shortwave therapy: pulsed radio-frequency energy at 13.56 or 27.12 MHz, used to treat postoperative pain and swelling "by means other than the generation of deep heat." [31]

So the outcome must treat the two differently. A finding of harm should lead to protection aimed at the signal features that cause it. A finding of benefit should be recognized and studied further. It would be short-sighted to ban or heavily restrict devices broadly because of a finding on one measure, such as dose rate, and sweep up PEMF devices already sold for health benefits.

My request: HHS should design the study to find both adverse and beneficial effects, and treat them differently in its outcome. It should not ban or heavily restrict devices broadly because of a finding on one measure, such as dose rate, including PEMF devices already sold for health benefits.

How the strictest limits were set

Russia's limit, among the strictest in force, comes from a different approach. Soviet health authorities set a public limit in 1970, revised it in 1978, and set today's value in 1984. Russia kept that value in 1996 and still uses it.[3][14] Soviet and Russian scientists based their limits on studies of long-term, low-level exposure in animals and workers, looking at the nervous system and the immune system rather than heating.[14][15] A 2012 review written by Russian and Western scientists together put it plainly: the Soviet limits "were always much lower than those in the USA and other countries." [15]

Russia did not reach its number by accident, and neither did China, Switzerland, Italy, Brussels, or India. Each made a deliberate choice to set a lower ceiling than the United States.

My request: HHS should review the published record from every nation that chose a lower limit, covering what each one studied, how it reasoned and why it chose its number, and then evaluate each approach against our own. The question is not whether those nations were right, but whether our heating-only approach was enough.

Use our sister nations to answer the third question

Responding to Questions 5(o), 7, 10 and 16.

Use the lower-limit nations to answer it. Compare the U.S. population against Russia and the other nations with far tighter limits, measure the radio energy people actually receive, normalize the data to a common basis, and determine whether those populations are adversely affected or benefited. Their populations have lived for years, some for decades, under ceilings 10 to 100 times lower than ours. If ambient radio energy triggers biological effects at everyday levels, the effect may show up between populations living under such different rules. If a careful study finds no difference, that is worth knowing too.

These populations cannot be compared raw. Each nation measures exposure and records health outcomes differently, and each differs in pollution, smoking, diet, income, healthcare access and age. HHS should develop a method to normalize these data to a common basis, so that results can be replicated across nations, and then compare exposure against health outcomes across all of them, with the U.S. as one population among many.

Using all of these populations together makes the answer stronger. If several places with lower limits, each different in pollution, diet, and health care, all show the same pattern against the United States, that pattern cannot be blamed on one country's quirks. Candidates include Russia, China, Italy, Switzerland, Brussels, and India. According to the Polish government, Poland's public limit matched Russia's until January 1, 2020, when it was raised to the ICNIRP level.[9] Poland's official justification for the change cites growing mobile data use, the rollout of next-generation networks, and alignment with EU Council Recommendation 1999/519/EC; on health, it states that the only established effects are tissue heating and nerve stimulation, and cites a 2019 Swedish research review.[34] HHS should review the published record to ask what drove Poland to make that decision.

A legal limit is a ceiling. The study must measure the radio energy people actually receive in each population, not compare the rules on paper.

My request: HHS should conduct an independent study of age-spanning cohorts in the United States, Russia, and the other nations with lower limits. It should measure the power levels people actually receive and how long they are exposed, normalize the data to a common basis so the results can be replicated across nations, and determine whether those populations are adversely affected or benefited, including by non-thermal trigger effects. Adverse and beneficial effects should be reported separately and treated differently.

Wildlife, insects and plants

Responding to Question 14.

The same study should look beyond people. Radio energy reaches wildlife, insects and plants just as it reaches us, and the question is the same biological one: whether the signal triggers responses we have not yet studied. Data from other living systems could help answer questions about biological systems beyond people, including our own. One question is worth asking. Chlorophyll, which plants use to capture light, is built much like heme, the part of hemoglobin that carries oxygen in our blood. Both are ring molecules holding a metal ion at the center: magnesium in chlorophyll, iron in heme.[32] If radio energy were found to interact with one, would it touch the other?

The 2021 court decision also faulted the FCC for failing even to acknowledge comments on the impact of radio-frequency radiation on the environment, including the Department of the Interior's concern for migratory birds near communication towers.[12]

My request: the independent study should include effects on wildlife, insects and plants, as part of the same biological question.

6G, oxygen, and the skin

Responding to Question 13.

Oxygen in the air absorbs radio energy near 60 GHz, which shortens how far those signals travel.[18] That is a range effect in the air. The frequencies under international study for 6G are well away from that band, and 57 to 71 GHz is already used in the United States for short-range devices.[19]

At very high frequencies, such as 60 GHz, radio energy is absorbed in the top half-millimeter of skin.[2] But where energy is absorbed is not the same as where its effects end. Energy absorbed in the skin does not stay in the skin. In controlled animal experiments, millimeter waves applied only to the skin relieved pain through the body's own opioids, raising opioid levels in the brain, and the effect disappeared when the nerve from the exposed skin was cut.[28] ICNIRP itself states that the skin's blood vessels can carry heat deep into the body, and that it knows of no research assessing that effect at these frequencies.[29] Beyond skin heating, we do not know what effects energy absorbed at the surface may trigger, and HHS should study whether such mechanisms come into play before these frequencies are widely deployed.

My request: before these frequencies come into wide use, HHS should study what energy absorbed at the skin surface triggers beyond the skin, and evaluate whether skin-surface measures and the growing number of small transmitters are adequately covered.

Every age, and the right to know

Responding to Questions 7, 8, 9, 11 and 15.

People cannot judge their exposure if all they are told is "it complies."

- Families and local governments should be able to get the frequency, the limit that applies, how long it is averaged, and the actual reading where people are, including homes, classrooms, and workplaces.
- Measurements should record the signal's shape, pulsing and on-off timing, and the distance, not only the average.
- For neighborhoods with many antennas and small cells, HHS should say how to add them up.
- HHS should state whether limits built on a heating threshold are the right yardstick for a child spending a full day near transmitters.

My request: Measure cohorts across all ages, not just schools. Track the health effects in each cohort and tie them to both the power levels people receive and the length of their exposure, and publish the readings.

Research priorities and who should do what

Responding to Questions 16 and 17.

In priority order:

- Determine whether the heating-only approach is enough, starting with a review of the published record from every nation that chose a lower limit.
- Conduct the independent cohort study across the U.S. and the lower-limit nations: all ages, measured power levels and length of exposure, data normalized to a common basis, to determine whether those populations are adversely affected or benefited.
- Fund studies that hold dose constant while varying the signal's shape, waveform, pulsing, on-off timing and modulation, looking for both harm and benefit.
- Study what energy absorbed at the skin surface triggers beyond the skin, before higher frequencies are widely deployed.
- Include wildlife, insects and plants in the same independent study.
- Report adverse and beneficial effects separately and treat them differently, without broad bans or heavy restrictions based on one measure such as dose rate.
- Publish measured exposure readings for every age group studied.

Fund it independently. Whoever designs and runs this study must have no financial ties to the wireless industry and no history in the revolving door between that industry and the agencies that regulate it. Their conflicts must be disclosed publicly, and their methods and data must be open for anyone to replicate.

Perspective

Responding to Question 2.

I am responding as an individual, not for a company, a healthcare provider, an industry group, or my employer. My degrees and IEEE membership are listed only to show my field of study.

Responding to Question 3.

In this open letter, I will decline to answer, because this is an open letter.[33]

Jon Brooks

Sources and notes

1. U.S. limits: 47 CFR 1.1310, Table 1. Above 1,500 MHz, the general-population limit is 1.0 mW/cm² (10 W/m²), averaged over 30 minutes; occupational 5 mW/cm² (50 W/m²), 6 minutes. Devices held near the body are tested by specific absorption rate (SAR): 1.6 W/kg averaged over any 1 gram of tissue; 0.08 W/kg whole-body. Devices of 1 milliwatt or less are exempt from routine evaluation but not from the limits, 47 CFR 1.1307(b)(3)(i)(A). Wi-Fi at 2.4 and 5 GHz is subject to the same limits as any other transmitter at those frequencies. <https://www.law.cornell.edu/cfr/text/47/1.1310> and <https://www.ecfr.gov/current/title-47/section-1.1307>
2. ICNIRP guidelines, 1998 and 2020. Whole-body public reference level above 2 GHz: 10 W/m² (2020: averaged over 30 minutes), equal to the FCC figure. The 2020 guidelines state: "The only substantiated adverse health effects caused by exposure to radiofrequency EMFs are nerve stimulation, changes in the permeability of cell membranes, and effects due to temperature elevation." Table 10 gives a skin (dermis) penetration depth of 0.49 mm at 60 GHz; above 6 GHz the limits address absorbed power density at the surface. The 2020 guidelines also state: "there is no evidence that continuous (e.g., sinusoidal) and discontinuous (e.g., pulsed) EMFs result in different biological effects." ICNIRP's local SAR limit (2 W/kg

over 10 grams) uses a different average from the FCC's 1 gram.
<https://www.icnirp.org/cms/upload/publications/ICNIRPmfgdl.pdf> and
<https://www.icnirp.org/cms/upload/publications/ICNIRPrgd12020.pdf>

3. Russia, SanPiN 1.2.3685-21, Table 5.42: 10 microwatts per square centimeter (0.1 W/m²) for 300 MHz to 300 GHz in dwellings, public buildings, and populated areas; 25 for scanning antennas. No 6- or 30-minute averaging period is stated. 10 divided by 0.1 gives 100 at both 2.4 and 5 GHz. Paragraph 125 separately sets 100 microwatts per square centimeter at the head of a land-mobile radio user, 300 MHz to below 2,600 MHz; it is not a Bluetooth or Wi-Fi rule. Consolidated text as republished:
https://sudact.ru/law/postanovlenie-glavnogo-gosudarstvennogo-sanitarnogo-vracha-rf-ot_1430/sanpin-1.2.3685-21/v/gigienicheskie-normativy-fizicheskikh-faktorov-v/tablitza-5.42/
4. China, GB 8702-2014: 0.4 W/m² from 30 to 3,000 MHz (10 divided by 0.4 is 25); f/7,500 W/m² from 3,000 to 15,000 MHz (about 0.67 at 5 GHz, my arithmetic). Environmental limit for the public; user exposure from a person's own wireless terminal is outside its scope.
<https://www.mee.gov.cn/ywqz/fgbz/bz/bzwb/hxxhj/dcfbsbz/201410/W020141022352826534956.pdf>
5. Italy, Law 30 December 2023 no. 214, effective 30 April 2024: attention value and quality objective of 15 V/m and 0.59 W/m² (10 divided by 0.59 is about 17), replacing 6 V/m (about 0.1 W/m²). Applies in buildings occupied 4 hours a day or more and intensely frequented outdoor areas. <https://www.arpae.it/it/temi-ambientali/campi-elettromagnetici/normativa/normativa-nazionale/normativa-nazionale-radiofrequenze-e-microonde>
6. Switzerland (NISV): installation limits of 4, 5, and 6 V/m for mobile installations above 6 W effective radiated power, at places of sensitive use such as homes, schools, and hospitals; 6 V/m applies at 1,800 MHz and above and is about 0.095 W/m² (6 squared divided by 377, my arithmetic; 10 divided by 0.095 is about 105). The general limit everywhere people can be is on the order of ICNIRP.
<https://www.bafu.admin.ch/de/mobilfunkanlagen-grenzwerte>
7. Brussels-Capital Region, Ordinance of 1 March 2007 as amended 2 March 2023, cumulative from all sources: from 2 to 300 GHz, 0.4992 W/m² indoors (places people regularly stay, including homes, schools, and hospitals) and 1.2539 W/m² outdoors; at the 900 MHz reference, 9.19 V/m (0.2243 W/m²) indoors and 14.57 V/m (0.5635 W/m²) outdoors. 10 divided by 0.4992 is 20 (my arithmetic). Bruxelles Environnement: "Pour compenser les éventuelles erreurs ou données encore inconnues de la recherche, les autorités appliquent un principe de précaution" (to compensate for possible errors or data still unknown to research, the authorities apply a precautionary principle). Earlier limits: 3 V/m (from 2009), 6 V/m (2014).
<https://environnement.brussels/citoyen/documentation-et-outils/etat-des-lieux-de-lenvironnement/exposition-aux-ondes-electromagnetiques> and <https://environnement.brussels/citoyen/reglementation-et-inspection/obligations-et-autorisations/quelles-sont-les-normes-legales-dexposition-aux-ondes-electromagnetiques>
8. India, Department of Telecommunications: base stations at one-tenth of ICNIRP, 1 W/m² from 2 to 300 GHz, in all areas; handsets 1.6 W/kg over 1 gram since 1 September 2013, the same as the U.S.
<https://dgtelcom.gov.in/emf-radiation>
9. Poland: from January 1, 2020, public limits were aligned with the ICNIRP and EU reference levels, including 10 W/m² for 2 to 300 GHz in places accessible to the public (regulation Dz.U. 2019 poz. 2448); the earlier public limit in the microwave range was 0.1 W/m². Polish government summary:
<https://www.gov.pl/web/5g/dopuszczalne-wartosci-pola-elektromagnetycznego-w-polsce>
10. FCC, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Report and Order, FCC 96-326, ET Docket 93-62, 11 FCC Rcd 15123 (August 1996): "Both the ANSI/IEEE and NCRP exposure criteria are based on a determination that potentially harmful biological effects can occur at an SAR level of 4 W/kg as averaged over the whole-body," with safety factors giving 0.4 W/kg (occupational) and 0.08 W/kg (general population). NCRP Report No. 86 (1986); ANSI/IEEE C95.1-1992 (content equivalent to IEEE C95.1-1991).
https://transition.fcc.gov/Bureaus/Engineering_Technology/Orders/1996/fcc96326.pdf
11. FCC 19-126, Resolution of Notice of Inquiry, ET Docket 13-84 (released December 4, 2019). Paragraph 6: the 1996 guidelines "remain in effect today." Paragraph 10: the Commission found "no appropriate basis for and thus decline[d] to initiate a rulemaking to reevaluate the existing RF exposure limits," terminating the inquiry opened in 2013. Paragraph 97: the margin is "thermally based on a whole-body SAR threshold of 4 W/kg and is intended to protect against behavioral disruption." Footnote 7 names NCRP Report No. 86 and ANSI/IEEE C95.1-1992. <https://docs.fcc.gov/public/attachments/FCC-19-126A1.pdf>

12. Environmental Health Trust v. FCC, 9 F.4th 893 (D.C. Cir. 2021), No. 20-1025, decided August 13, 2021. The court remanded for "a reasoned explanation for its determination that its guidelines adequately protect against harmful effects of exposure to radiofrequency radiation unrelated to cancer," and stated it took "no position in the scientific debate." On the environment, the court held that the Commission "completely failed even to acknowledge, let alone respond to, comments concerning the impact of RF radiation on the environment," citing a Department of the Interior letter on the impact of radiation from communication towers on migratory birds (slip opinion, pages 22-23). <https://media.cadc.uscourts.gov/opinions/docs/2021/08/20-1025-1910111.pdf>
13. FCC Public Notice DA 26-997, ET Docket 13-84, released September 17, 2026; 91 FR (FR Doc. 2026-19364, September 22, 2026); comments due October 22, 2026: <https://www.federalregister.gov/documents/2026/09/22/2026-19364/fcc-seeks-comment-on-rf-exposure-issues-subject-to-dc-circuit-remand-in-environmental-health-trust-v>. FCC Opposition to Petition for Writ of Mandamus, In re Children's Health Defense, No. 26-1121 (D.C. Cir., filed September 25, 2026): the Commission "would require a minimum of nine months from the October 22, 2026 deadline for comments ... to consider, prepare, and adopt an adequate explanation responding to the Environmental Health Trust remand." Copy: <https://ehsciences.org/wp-content/uploads/2026/09/26-1121-FCC-Response-Sept-25-2026-to-Writ-if-Mandamus-Documents-1.pdf>
14. Yu. G. Grigoriev (chair, Russian National Committee on Non-Ionizing Radiation Protection), "Methodology of Standards Development for EMF RF in Russia and by International Commissions: Distinctions in Approaches," book chapter 15 (Taylor & Francis, 2017-2018). Soviet public limits: SanPiN 848-70 (1970), 1 microwatt per square centimeter; SanPiN 1823-78 (1978), 5; VSN 2963-84 (1984), 10, for 300 MHz to 30 GHz; retained in 1996 for 300 MHz to 300 GHz. Method: "the Russian standards for the population had previously been installed on the basis of the threshold value that has been set on the basis of compensatory/adaptive response within the physiological norm, not on the basis of pathological effects," then reduced by a safety factor. <https://www.radiationresearch.org/wp-content/uploads/2017/06/Chapter-15-Grig.-Methodology-of-Standards-Development-for-EMF-RF-in-Russia-and-by-International-Commissions-Distinctions-in-Approaches..pdf>
15. M. Repacholi, Y. Grigoriev, J. Buschmann, C. Pioli, "Scientific basis for the Soviet and Russian radiofrequency standards for the general public," Bioelectromagnetics 33:623-633 (2012), doi:10.1002/bem.21742: "the exposure limits in the USSR standards were always much lower than those in the USA and other countries." Soviet studies of chronic low-level exposure (2,375 MHz, 30 days) on the immune system and offspring "served in part as the basis for setting exposure limits in the former USSR": F. Poulietier de Gannes et al., Radiation Research 172:617-624 (2009), doi:10.1667/RR1541.1.
16. IARC Press Release No. 208, May 31, 2011: Group 2B, based on limited evidence for glioma and acoustic neuroma in wireless phone users. https://www.iarc.who.int/wp-content/uploads/2018/07/pr208_E.pdf
17. National Toxicology Program findings, news release of November 1, 2018: clear evidence of cancerous heart tumors in male rats; some evidence of brain and adrenal tumors in male rats; equivocal for female rats and for mice. Whole-body exposures of 1.5 to 6 W/kg (rats), 10 minutes on and 10 off, about 9 hours a day, up to two years; the FCC whole-body public limit is 0.08 W/kg. <https://www.nih.gov/news-events/news-releases/high-exposure-radio-frequency-radiation-associated-cancer-male-rats>
18. ITU-R Recommendation P.676 (attenuation by atmospheric gases). Computed from its line-by-line model at sea-level pressure and 15 C: about 15 dB per kilometer at 60 GHz, or half the power about every 200 meters (my computation). Oxygen carried in blood is chemically bound in red blood cells and is not the oxygen gas this attenuation describes. <https://www.itu.int/rec/R-REC-P.676>
19. 6G study bands under World Radiocommunication Conference 2027 agenda item 1.7 (Resolution 256, WRC-23): 4.4 to 4.8 GHz, 7.125 to 8.4 GHz, and 14.8 to 15.35 GHz. U.S. unlicensed operation in 57 to 71 GHz: 47 CFR 15.255. <https://www.law.cornell.edu/cfr/text/47/15.255>
20. World Health Organization, Establishing a Dialogue on Risks from Electromagnetic Fields (2002), ISBN 92 4 154571 2, page 3: "the majority of national standards are based on the guidelines set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP)"; "Exposure limits are based on effects related to short-term acute exposure rather than long-term exposure, because the available scientific information on the long-term low level effects of exposure to EMF fields is considered to be insufficient to establish quantitative limits." <https://www.who.int/publications/i/item/9241545712>
21. FCC Office of Engineering and Technology, OET Bulletin 56, fourth edition (1999): "Ionization is a process by which electrons are stripped from atoms and molecules. This process can produce molecular changes that can lead to damage in biological tissue, including effects on DNA"; X-rays and gamma rays are ionizing;

- "The photon energies of RF electromagnetic waves are not great enough to cause the ionization of atoms and molecules."
https://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet56/oet56e4.pdf
22. The body's electrical activity. Purves et al., Neuroscience, "How Ionic Movements Produce Electrical Signals": "Electrical potentials are generated across the membranes of neurons, and, indeed, all cells." <https://www.ncbi.nlm.nih.gov/books/NBK11054/> Alberts et al., Molecular Biology of the Cell, "Ion Channels and the Electrical Properties of Membranes": nerve cells use ion channels "for receiving, conducting, and transmitting signals." <https://www.ncbi.nlm.nih.gov/books/NBK26910/> StatPearls, "Physiology, Resting Potential": "All cells within the body have a characteristic resting membrane potential"; a typical value is approximately -73 mV (thousandths of a volt). <https://www.ncbi.nlm.nih.gov/books/NBK538338/> StatPearls, "Physiology, Sinoatrial Node": the sinoatrial node "initiates an action potential that results in an electrical impulse traveling through the heart's electrical conduction system to cause myocardial contraction." <https://www.ncbi.nlm.nih.gov/books/NBK459238/> M. Levin, "Bioelectric signaling: Reprogrammable circuits underlying embryogenesis, regeneration, and cancer," Cell 184(8):1971-1989 (2021), doi:10.1016/j.cell.2021.02.034: "Endogenous distributions of membrane potentials, produced by ion channels and gap junctions, are present across all tissues." ICNIRP 2020 describes nerve stimulation by induced electric fields at frequencies up to 10 MHz and membrane permeability changes from intense, brief pulses.
 23. Italy, framework law 22 February 2001 no. 36, art. 3: the attention value "costituisce misura di cautela ai fini della protezione da possibili effetti a lungo termine" (is a measure of caution for protection against possible long-term effects); art. 1 cites the precautionary principle of the EU Treaty. <https://www.parlamento.it/parlam/leggi/010361.htm> . DPCM 8 July 2003, art. 3: 6 V/m "a titolo di misura di cautela per la protezione da possibili effetti a lungo termine." https://www.portaleagentifisici.it/filemanager/userfiles/DOCUMENTAZIONE/CEM/normativa/DPCM-8luglio2003_RF.pdf?lq=iT
 24. Switzerland, Federal Supreme Court, BGE 128 II 378, consideration 6.2.2: the installation limits, which cut permitted field strength at places of sensitive use by a factor of 10, are "eine Sicherheitsmarge gegen allfällige gesundheitsschädigende nichtthermische Effekte einer langfristigen Strahlungsexposition" (a safety margin against possible harmful non-thermal effects of long-term exposure). <https://www.fallrecht.ch/bge/c2128378.html> . BGE 126 II 399: adopting the ICNIRP values alone would leave protection incomplete with respect to possible non-thermal effects. https://mcp.opencaselaw.ch/entscheid/bge_126%20II%20399 . NISV/ONIR of 22 December 1999 (AS 2000 213). <https://www.fedlex.admin.ch/eli/oc/2000/38/de>
 25. India, Telecom Regulatory Authority of India, information paper of 30 July 2014: the Inter-Ministerial Committee found that studies "have not been able to confirm a cause and effect relationship" and recommended lowering tower limits to one-tenth "as a matter of abundant precaution"; effective 1 September 2012. https://www.trai.gov.in/sites/default/files/2024-10/EMF_Information_Paper_30.07.2014.pdf and <https://www.pib.gov.in/newsite/erecontent.aspx?relid=92395>
 26. China, Ministry of Ecology and Environment, 15 September 2025: GB 8702-2014 is based on the ICNIRP standard "并按照预防原则在此基础上增加了额外的安全系数" (with an additional safety factor added on that basis according to the precautionary principle). https://www.mee.gov.cn/hdjl/cjw/202509/t02050915_1130139.shtml . The standard's foreword encourages owners to follow the precautionary principle to reduce public exposure (note 4).
 27. A. B. Gapeyev, E. N. Mikhailik, N. K. Chemeris (Institute of Cell Biophysics, Russian Academy of Sciences), "Features of anti-inflammatory effects of modulated extremely high-frequency electromagnetic radiation," Bioelectromagnetics 30:454-461 (2009), doi:10.1002/bem.20499: in mice, continuous exposure at 0.1 to 0.7 mW/cm² (the U.S. public limit at these frequencies is 1 mW/cm²) reduced inflamed-paw edema by about 19% at 42.2 to 42.6 GHz; at "ineffective" carrier frequencies of 43.0 and 61.22 GHz, pulse modulation at 0.07 to 0.1 Hz and 20 to 30 Hz restored the effect "up to a maximal level"; the abstract does not state the power density used in the modulated runs. <https://pubmed.ncbi.nlm.nih.gov/19431156/>
 28. A. A. Radzievsky, M. A. Rojavin, A. Cowan, S. I. Alekseev, A. A. Radzievsky Jr., M. C. Ziskin, "Peripheral neural system involvement in hypoalgesic effect of electromagnetic millimeter waves," Life Sciences 68:1143-1151 (2001), doi:10.1016/S0024-3205(00)01016-X: 61.22 GHz applied to the footpad skin of mice produced hypoalgesia; cutting the sciatic nerve to the exposed area "completely abolished the hypoalgesic effect." <https://pubmed.ncbi.nlm.nih.gov/11228098/> A. A. Radzievsky et al., "Electromagnetic millimeter wave induced hypoalgesia: frequency dependence and involvement of endogenous opioids," Bioelectromagnetics 29:284-295 (2008), doi:10.1002/bem.20389: exposure of the nose area, with opioid-

receptor blockers reducing the effect and endogenous opioids measured in central nervous system tissue (enkephalin raised in midbrain and hypothalamus). <https://pubmed.ncbi.nlm.nih.gov/18064600/>

29. ICNIRP 2020 guidelines (note 2), "Temperature rise" section: frequencies within the guidelines "cause heating within the dermis, and the extensive vascular network within the dermis can transport this heat deep within the body. It is therefore appropriate to also protect against body core temperature rise above 6 GHz. ICNIRP is not aware of research that has assessed the effect of 6 to 300 GHz EMFs on body core temperature." <https://www.icnirp.org/cms/upload/publications/ICNIRPrfgdl2020.pdf>
30. U.S. Food and Drug Administration, Orthopaedic and Rehabilitation Devices Panel, "Non-Invasive Bone Growth Stimulators" executive summary (September 2020), Table 1: premarket approvals for pulsed electromagnetic field devices, including P790002 (November 6, 1979), P850007 (February 21, 1986) and P030034 (December 23, 2004); the devices generate "a modulated electromagnetic field" near the treatment site through an external coil. <https://www.fda.gov/media/141850/download> . P850007 indication: "treatment of an established nonunion acquired secondary to trauma." <https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P850007S027> . Product code LOF, now Class II under 21 CFR 890.5870: <https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpcd/classification.cfm?id=LOF> . These devices use low-frequency pulsed fields.
31. 21 CFR 890.5290(b), nonthermal shortwave therapy: a device that "applies to the body pulsed electromagnetic energy in the RF bands of 13.56 MHz or 27.12 MHz" for "adjunctive use in the palliative treatment of postoperative pain and edema of soft tissue by means other than the generation of deep heat within body tissues." <https://www.ecfr.gov/current/title-21/section-890.5290> . Example clearance: K192234 (cleared January 31, 2020), 27.12 MHz carrier pulsed at 1,000 Hz, peak spatial power density 73 microwatts per square centimeter, for adjunctive treatment of musculoskeletal pain. <https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPMN/pmn.cfm?ID=K192234>
32. D. A. Bryant, C. N. Hunter, M. J. Warren, "Biosynthesis of the modified tetrapyrroles: the pigments of life," *Journal of Biological Chemistry* 295(20):6888-6925 (2020), doi:10.1074/jbc.REV120.006194: chlorophylls and hemes are both modified tetrapyrroles "derived from a common template," differing in "the nature of the centrally chelated metal ion"; "Heme is technically an Fe-containing porphyrin," and chlorophyll holds magnesium (Mg²⁺). Heme is the oxygen-binding group of hemoglobin. <https://pmc.ncbi.nlm.nih.gov/articles/PMC7242693/>
33. I have benefited from PEMF (pulsed electromagnetic field) technology and from both radiated and conducted RF. Some radio-frequency and conducted-frequency energy is beneficial to the body. This paper highlights those benefits in the section "Be ready to find benefits as well as harms."
34. Poland, Ministry of Health, draft regulation on permissible levels of electromagnetic fields in the environment with its official justification (uzasadnienie), project MZ 872, draft of 14 November 2019, adopted as Dz.U. 2019 poz. 2448: average monthly mobile data use is forecast to grow almost 25-fold by 2025, from 3.5 to 85 GB per SIM, and "in the next 2-3 years mobile networks will not be able to handle the growing demand for data transmission; wide-scale deployment of next-generation networks will also be impossible"; expanding networks "will be possible only if the limits now in force in Poland are changed and harmonized with the values recommended by the European Union, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and the World Health Organization (WHO)"; "the only established adverse health effects associated with exposure to RF fields from 3 kHz to 300 GHz concern tissue heating and nerve stimulation"; it cites the Swedish Radiation Safety Authority's 2019 research review (report 2019:08). Translations mine. <https://legislacja.rcl.gov.pl/projekt/12327201/katalog/12641417> ; copy of the draft and justification: https://www.inforlex.pl/download/uzasadnienia_pdf,DZU,2019,245,2448-u.pdf