

Comment on Docket HHS-OASH-2026-0397

Request for Information on Electromagnetic Fields (EMFs), Radiofrequency (RF) Radiation, and Wireless Radiation Exposure

U.S. Department of Health and Human Services, Office of the Assistant Secretary for Health

To Whom It May Concern:

Thank you for the opportunity to comment on electromagnetic fields (EMFs), radiofrequency (RF) radiation, and wireless radiation exposure. My comments focus on how HHS's existing public communication about RF/EMF can be improved so that it reflects the current exposure environment, in particular the rapid growth of communications satellites in low Earth orbit, and so that it clearly separates demonstrated findings from open research questions. I respond to the RFI's numbered questions below.

Question 2: Perspective

I submit these comments as an individual member of the public with a technical and regulatory background. I hold a B.A. in physics from the University of California, Berkeley (1970). I worked at the California Energy Commission from 1976 to 1983 on power plant siting and environmental impact reports, and then spent 24 years (1983 to 2007) at the California Public Utilities Commission reviewing energy utility matters, including rate cases. I am also an attorney. My comments are based on established electromagnetic principles, peer-reviewed research cited below, and my experience with public agency review processes.

Question 9: Information to Disclose, and Improving Existing Public Communication

Existing federal public-facing material on RF exposure generally describes terrestrial sources: cell towers, broadcast transmitters, Wi-Fi, and personal devices. Since approximately 2020, very large numbers of communications satellites have been launched to provide telephone, internet, navigation, and data services. As these constellations grow, the cumulative RF environment at the Earth's surface may change in ways that differ from terrestrial sources. The public would benefit from understanding the relative contribution of satellite transmissions, both individually and in combination with ground infrastructure.

I recommend that HHS improve its existing communication efforts as follows:

1. **Add satellite constellations as a named RF source.** Public summaries should identify space-based transmitters alongside terrestrial sources, with a short description of how they operate (frequency bands, steered beams, and orbital motion).

2. **Explain relative contributions.** Provide plain-language comparisons of the typical RF contribution at ground level from satellite downlinks versus terrestrial sources such as nearby cell sites, Wi-Fi, and handheld devices, with the measurement or modeling basis for each comparison stated.
3. **Separate demonstrated findings from hypotheses.** Each summary should distinguish (a) what is established and measured, (b) where scientific consensus exists, (c) where uncertainty remains, and (d) what is a hypothesis under study. Labeling these categories consistently would help the public weigh claims they encounter elsewhere.
4. **Publish transparent data.** Link summaries to the underlying measurement data, models, and methods so that independent researchers and local governments can review and reproduce them.
5. **Provide plain-language summaries** covering: major RF sources; relative contribution of satellite versus terrestrial sources; current consensus and uncertainty; research priorities; and long-term monitoring methods.

Question 13(d): Satellite-Based Communications and Cumulative Exposure

To support accurate communication, HHS should describe satellite emissions in terms of demonstrated, well-understood mechanisms. Using the Starlink constellation as an example, the following are established electromagnetics, documented by the operator or by independent research:

- **Phased-array downlink beams.** Satellites transmit in Ku- and Ka-band (with E-band also used) through electronically steered phased-array antennas carrying orthogonal frequency division multiplexing (OFDM) data.
- **Independently characterized signal.** A University of Texas at Austin team developed a blind signal identification technique and characterized the Starlink Ku-band downlink (10.7 to 12.7 GHz), including its synchronization sequences (Humphreys et al., 2023).
- **Opportunistic positioning and timing.** Researchers have shown that these signals, although designed for broadband service, can be used for positioning, navigation, and timing using Doppler and timing measurements (Humphreys et al., 2023, and references therein).
- **Optical inter-satellite links.** Satellites communicate with each other by laser links; SpaceX states capacities of up to roughly 200 Gbps per link. These are optical, not RF, links between spacecraft.
- **Unintended emissions from onboard electronics.** A Curtin University survey using a Square Kilometre Array (SKA-Low) prototype station reported 112,534 detections of 1,806 unique Starlink satellites at low radio frequencies (the SKA-Low range), including unintended broadband emission, some in frequency bands the International Telecommunication Union protects for radio astronomy (Grigg et al., 2025). Unintended emissions of this kind are a familiar electromagnetic compatibility issue, commonly arising from sources such as clock harmonics, switching power supplies, signal leakage, imperfect shielding, and re-radiation.

- **Doppler and beam tracking.** Because satellites in low Earth orbit move at roughly 7 km/s, signals show Doppler shifts, and user terminals hand off between satellites as beams are steered and re-pointed.

All of these phenomena are explained by standard electromagnetic theory. No non-standard-physics effects (for example, exotic propulsion, mind control, geophysical manipulation, or non-electromagnetic interactions) have been demonstrated. Saying so plainly in HHS communication would help the public distinguish documented emissions from speculation.

The unintended-emission findings are relevant to HHS for a specific reason: exposure assessments that consider only a transmitter's licensed frequencies may not capture the full emission profile of a large constellation. I do not suggest that these emissions are known to affect human health; the point is that the source characterization used in public communication should be complete.

Questions 7 and 8: Exposure Characterization and Methodology

I recommend HHS address:

- What methods can measure and model the satellite contribution to individual and community RF exposure, given moving sources, steered beams, and frequencies spread across many bands.
- Whether current exposure assessment frameworks account for combined terrestrial and space-based exposures, or treat them separately.

Question 10: Surveillance Systems

HHS should identify what long-term surveillance systems are appropriate to monitor health outcomes associated with an evolving RF environment, paired with environmental monitoring of the RF environment itself. Publicly available, consistently collected ground-level RF measurements over time would let researchers relate any observed outcome trends to actual changes in exposure rather than to assumptions.

Question 14: Environmental Effects (Presented as a Research Question)

The post-2020 expansion of satellite networks has coincided in time with heightened concern about climate change and extreme weather events. I am not aware of evidence of a causal link between satellite communications, RF emissions, and climate change, and I do not claim one. The temporal overlap does, however, illustrate why public communication must distinguish correlation from causation. HHS could support rigorous, transparent research on whether any measurable interactions exist among wireless infrastructure, atmospheric processes, network energy use, and environmental conditions, using reproducible methods, independent review, and publicly available data. Whatever the results, communicating them clearly would address public questions with evidence rather than speculation.

Question 16: Priority Research Gaps

I recommend the following research questions:

1. How has the expansion of satellite networks altered the RF exposure environment at the Earth's surface?
2. What methods can measure and model the satellite contribution to individual and community RF exposure?
3. Do current exposure assessment frameworks account for combined terrestrial and space-based exposures?
4. What long-term surveillance systems should monitor health outcomes associated with evolving RF environments?

Question 17: Coordination

These questions cross disciplinary lines. I encourage HHS, including FDA, NIH, and CDC, to support interdisciplinary research involving public health, atmospheric science, physics, engineering, epidemiology, and exposure assessment, and to coordinate with agencies that hold satellite licensing and spectrum data so that source characterization is accurate.

Question 18: Additional Information

Sources relied on:

- Humphreys, T. E., Iannucci, P. A., Komodromos, Z. M., and Graff, A. M. (2023). "Signal Structure of the Starlink Ku-Band Downlink." *IEEE Transactions on Aerospace and Electronic Systems*, 59(5), 6016-6030.
<https://ieeexplore.ieee.org/document/10107477/> (preprint: <https://arxiv.org/abs/2210.11578>)
- Grigg, D., et al. (2025). "The growing impact of unintended Starlink broadband emission on radio astronomy in the SKA-Low frequency range." *Astronomy & Astrophysics*, 699, A307.
<https://www.aanda.org/articles/aa/abs/2025/07/aa54787-25/aa54787-25.html>
(data: <https://doi.org/10.5281/zenodo.15089852>)

The phased-array, frequency band, inter-satellite laser link, and orbital velocity descriptions are based on operator-published information and general electromagnetic principles.

Thank you for considering these comments.

Respectfully submitted,

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