

# Electro-Hypersensitivity Does Not Exist

## Document 5 — Technologies and Infrastructure: Exposures That Add Up, a Network Mesh That Leaves No Place Out of Reach

Comment submitted in response to the U.S. Department of Health and Human Services (HHS) *Request for Information on Electromagnetic Fields (EMFs), Radiofrequency (RF) Radiation, and Wireless Radiation Exposure*, FR Doc. 2026-19252, Docket HHS-OASH-2026-0397.

**Questions addressed:** 13 (a to k); 15 (d, e). Items 15a to 15c are addressed in Document 1.

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*The subjects addressed in this document are part of an open publication, intended to receive further testimonies and contributions.*

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### Abstract

This document examines the eleven technologies listed in Question 13 and two aspects of Question 15, small cells and livestock. Three findings emerge. First, each technology is assessed in isolation, against limits based on heating, whereas their emissions add up in the same places and on the same bodies; for several of them, the health literature is virtually nonexistent, as the French agency itself acknowledges for smart meters, and, to our knowledge, no health study has been devoted to satellite constellations. Second, deployment now aims at coverage without gaps: small cells exempted from individual permits and designed to go unnoticed, road coverage obligations, a 6G framework built on ubiquitous connectivity, and satellites linked directly to phones, announced as a means of covering the areas that nature protection or terrain had kept out of reach. The last white zones, which the electro-hypersensitive need in order to live and which also protect the rest of the living world, are thus disappearing by design, not by accident. Third, livestock farming provides observations that do not depend on symptoms reported by the subjects themselves — mortality, milk production, calf cataracts; to our knowledge, no French collective expert assessment is devoted to radiofrequency in livestock farming, and the experiment ordered by a French judge — switching off a base station antenna in order to observe a herd — never took place. The document sets out six recommendations.

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### 1. Purpose

Question 13 of the Request for Information asks how, according to scientific evidence, several technologies affect cumulative exposure patterns: 5G (a), 6G (b), Wi-Fi (c), satellite-based communications (d), the Internet of Things (e), wearable technologies (f), smart homes and

appliances (g), smart cities (h), autonomous vehicles (i), wireless medical devices (j), and smart meters (k). Question 15 asks what types of evidence should be considered when evaluating exposure associated with wireless infrastructure; here we address small-cell deployment (15d) and livestock (15e). Proximity to homes, cumulative neighborhood exposure, and antenna density (15a to 15c) are addressed in Document 1; environmental effects (Question 14), in Document 6.

## 2. Methods and Sources

The sources fall into four categories: European regulatory texts and decisions of the French telecommunications regulator (Arcep), consulted in their original text; the opinion of Anses (French Agency for Food, Environmental and Occupational Health & Safety) on smart meters, read in full; peer-reviewed publications, read in full or from their abstracts, as indicated; and industry press releases and press articles, whose standpoint is indicated. For the European regulation on small cells, we read the recitals. The Swiss study on calf cataracts ([Hässig et al., 2009](#)) was read in its abstract and methods; the study on connected household devices ([Joyner et al., 2024](#)) and the study on interference in intensive care ([van der Togt et al., 2008](#)), from their abstracts; the EUROPAEM guideline ([Belyaev et al., 2016](#)), in full, in its French translation; the IEEE 802.11bb standard, from its overview page; the study by [Bellieni et al. \(2008\)](#) on incubators, from its abstract; the recommendations of the Electrosensitive Society and of POEM 26, associations of the electro-hypersensitive and for prevention, from our files. The court decisions in the Haute-Loire case were consulted in their original text; the Calvados case is known from the press. We do not name the farmers. The link in each reference leads to the online source where one exists. Quotations in English are reproduced as written. Quotations from French and German sources are our translations; the original wording appears in the French version of this document.

## 3. Technologies and Cumulative Exposure (Question 13)

### 3.1 An Addition That No Assessment Takes into Account

The shift from a small number of powerful, distant transmitters to a multitude of weaker sources, installed as close as possible to the body, is described in Document 1 (Section 3.4). The sections that follow show that each technology adds its own layer. Yet assessment remains organized technology by technology: Anses issued separate opinions on 5G and on smart meters, and the French protocol for measuring base station antennas recommends switching off, during the measurement, equipment with non-permanent emissions, including phones (Document 3, Section 4.1). Long-term comparisons, such as the one conducted in New York, point to a substantial increase in urban exposure (Document 3, Section 3.4). No public mechanism assesses what a single individual receives over the course of a day when exposed at the same time to base station antennas, Wi-Fi, a cordless phone, connected devices, the meter, and their own mobile phone.

### 3.2 5G (13a)

In France, the licenses for the 3.4–3.8 GHz band require operators to cover highway-type roads in 2025 (16,642 km, about 10,340 miles) and main roads in 2027 (54,913 km, about 34,120 miles); the throughput of at least 240 Mbit/s, required at 75% of sites from 2022, is to be gradually extended to all sites by 2030, and one quarter of the sites in the last milestones must be located in an area combining sparsely populated municipalities and industrial territories, outside the main urban areas (Arcep, 2019). Beamforming antennas concentrate their signal on the user; a recent simulation shows that at 3,500 MHz, a field set at the ICNIRP reference level leads to the local basic restriction being exceeded for all four anatomical models studied, adults and children (Wydaeghe et al., 2026; see Document 3, Section 4.3). 5G therefore changes exposure in two ways: it extends coverage to areas that were previously poorly served, and it makes local exposure variable and concentrated, which a spot measurement captures poorly.

### 3.3 6G (13b)

No commercial 6G network exists in 2026; the International Telecommunication Union (ITU) envisages it “for 2030 and beyond.” The framework defined by the ITU (ITU-R, Recommendation M.2160) sets out six usage scenarios, including “Ubiquitous Connectivity,” which provides for interworking between terrestrial and non-terrestrial networks — satellites, high-altitude platform stations, unmanned aircraft — and “Integrated Sensing and Communication,” through which the network also serves as a sensor of presence and movement (ITU-R, 2023). The frequency bands have not been decided; a mid-band range of around 7 to 24 GHz is under study. In the simulation already cited, at 7 GHz and under simplified beamforming, the absorbed power density reaches 103% of the basic restriction for the six-year-old boy model (Wydaeghe et al., 2026). The 6G framework is thus being set before any health assessment of the bands it will use has been conducted.

### 3.4 Wi-Fi (13c) and DECT Cordless Phones

Wi-Fi is an indoor, permanent, and nearby source, present in homes, schools, shops, and transportation; on-board Wi-Fi helps make public transportation inaccessible to the electro-hypersensitive (Document 1, Section 6.1). Council of Europe Resolution 1815 nevertheless nevertheless recommends, for children, “particularly in schools and classrooms, give preference to wired Internet connections” (Council of Europe, 2011, § 8.3.2). Wi-Fi is the technology for which the alternative is simplest: cable provides the same service without radiation.

The household cordless phone, which Question 13 does not mention, follows the same logic. The base of an ordinary DECT cordless phone transmits even when idle, with no call in progress, and stops transmitting only in ECO mode (Document 7, Section 5.1). In our experience, many homes are still equipped with old DECT phones, often lacking this mode, whose users do not know that the base transmits continuously, day and night. Here too an alternative exists: a corded phone, recommended by EUROPAEM (Belyaev et al., 2016), plugs into the telephone port of the home internet router.

### 3.5 Satellite Communications (13d)

Low Earth orbit constellations, including Starlink, communicate with ground terminals in the Ku band, between approximately 10.7 and 14.5 GHz. The available estimates of the power received on the ground come from engineering calculations, not from health assessments; we found no health study, no independent measurement, and no data on the uplink emission of the terminal, even though it is the source closest to the user. The absence of data is not proof of harmlessness.

The decisive development is the direct link between the satellite and the ordinary phone, without a dedicated terminal, in bands close to those of mobile telephony. On March 2, 2026, Deutsche Telekom announced, under the title “Telekom closes the last whitespots in Europe with Starlink satellite-to-mobile,” a service planned from 2028 in several European countries, intended for “areas where network expansion is particularly challenging, for example due to nature conservation requirements,” or because of difficult terrain ([Deutsche Telekom, 2026](#)). On February 27, 2026, Satellite Connect Europe, a joint venture of Vodafone and AST SpaceMobile, announced a service intended to “extend mobile coverage beyond the limits of terrestrial networks,” compatible with existing 4G and 5G smartphones ([Vodafone, 2026](#)); Orange joined the venture in March 2026 ([Ur Rehman, 2026](#), based on Reuters). The areas that nature protection or terrain had kept clear of the terrestrial network are thus expressly targeted.

Constellations also pollute the sky. Observations with the European radio telescope LOFAR show that second-generation Starlink satellites emit, outside their communication bands, unintended radio radiation up to 32 times more intense than that of the previous generation ([Bassa et al., 2024](#)); the Netherlands Institute for Radio Astronomy, which operates LOFAR, sees in it “a growing threat to the integrity of astronomical observations” ([ASTRON, 2024](#)). This radiation falls on every place, including the radio quiet zones that regulations protect on the ground, such as the one at Green Bank (Document 1, Section 7.1). No terrestrial regulation can shield a territory from a constellation that passes over it.

### 3.6 The Internet of Things, Wearable Technologies, and Smart Homes (13e, f, g)

A study of smart-connected homes measured, over three years, 43 devices in 16 categories in occupied homes, and 12 more in the laboratory. According to the predictive software derived from it, one device from each of the 23 categories, operating near its maximum power, would produce in total, at 1 meter (about 3 feet), 0.17% of the ICNIRP limit; in two test apartments equipped with more than 50 and more than 100 devices driven to the maximum, the six-minute average exposure reached 0.0077% and 0.44% of that limit ([Joyner et al., 2024](#)). These results are expressed relative to a limit based on heating and say nothing about non-thermal effects. Radio modules are also finding their way into appliances that had no need for them: we had to return to the seller a camping refrigerator equipped with Bluetooth. Private antennas used to control devices — service robots in restaurants, for example — do not appear, to our knowledge, in any public inventory. Our files contain no measurement of the cumulative exposure due to wearable technologies; these place a transmitter in contact with the skin, continuously, sometimes during sleep.

### 3.7 Smart Cities and Autonomous Vehicles (13h, i)

The smart city relies on a mesh of sensors and of small cells installed on street furniture (Section 4.1). The connected, then autonomous, vehicle requires continuous road coverage, which Arcep's obligations organize (Section 3.2). The vehicle itself becomes a transmitter: since March 31, 2018, every new type of passenger car and light commercial vehicle type-approved in the Union must be fitted with the eCall in-vehicle emergency call system, which includes a mobile communication module ([Regulation \(EU\) 2015/758](#)). For the electro-hypersensitive, whose only means of travel often remains the private car, neither electric nor hybrid, on secondary roads (Document 1, Section 6.1), these two developments combine: vehicle and road are coming under coverage together.

### 3.8 Wireless Medical Devices (13j)

Wireless medical devices are both sources, worn or implanted in contact with the body, and devices vulnerable to the emissions of other sources. Of 41 intensive care devices tested without a patient connected, under controlled conditions, two radiofrequency identification systems caused 34 interference incidents in 123 tests, 22 of which were classified as hazardous ([van der Togt et al., 2008](#)). The hospital thus concentrates transmitters at the moment when the body is most fragile; for the electro-hypersensitive, it has often become inaccessible (Document 1, Section 6.2).

The bed itself is a source. An electric medical bed, in the hospital as at home, carries motors, a power supply, a control unit, and their cables beneath the mattress. As long as it remains plugged in, its wiring exposes the body lying on it to the 50 Hz electric field; its motors and power supply, when energized, add a magnetic field, and switched-mode power supplies, like those of most electronic devices, produce the high-frequency transients known as “dirty electricity.” We found no study that measures the exposure of a patient lying in such a bed. The closest equipment that has been studied is the incubator: in 43 newborns, switching off the incubator motor changed their heart rate variability, whereas changes in background noise had no effect, and the authors see in this an influence of its electromagnetic fields on the autonomic nervous system ([Bellieni et al., 2008](#)). Associations recommend that facilities unplug electric beds and electric examination tables when they are not in use, and prefer gravity infusions to electric pumps ([Electrosensitive Society, 2026](#); [POEM 26, 2017a](#); [POEM 26, 2017b](#)). We know of no official recommendation on these sources, even though patients spend most of their stay in this bed, nights included.

### 3.9 Smart Meters (13k)

In France, the Linky electricity meter communicates by power line communication (PLC), between approximately 35 and 91 kHz, over the home's wiring; the Gazpar gas meter transmits at 169 MHz, and smart water meters, depending on the utility, at 169 MHz or in the 868 to 870 MHz band. The revised 2023 Anses opinion concludes that it is “very unlikely” that these exposures cause health effects ([Anses, 2023](#), p. 24), but it notes that “there is practically no scientific literature addressing the specific health effects of exposure to smart meters” ([Anses, 2023](#), p. 19). The same opinion observes that “in a home not equipped with a Linky meter, but located near other homes already fitted with one, exposure to PLC signals exists, albeit at lower exposure levels” (p. 13); it recommends “continuing to study the possible health effects of exposure to electromagnetic fields

in the frequency range between 1 kHz and 30 MHz” (p. 22), while noting that the additional tax on the IFER (France’s flat-rate tax on network companies), which funded the annual “radiofrequency and health” research program, was abolished in 2019 (p. 23). The reassuring conclusion therefore rests on the low exposure levels measured and on the general literature on radiofrequency, not on health studies specific to the meters. The measurement of these signals is addressed in Document 3 (Section 4.5).

## **4. Infrastructure (Question 15d, e)**

### **4.1 Small-Cell Deployment (15d)**

[Implementing Regulation \(EU\) 2020/1070](#) specifies the characteristics of “small-area wireless access points,” the deployment of which should be “facilitated through a permit-exempt deployment regime” (recital 1). This equipment – up to 10 watts of equivalent isotropically radiated power for the most powerful class, with a lowest radiating part that may be only 2.2 meters (about 7 feet) above the sidewalk, a height chosen to ensure a distance of at least 20 centimeters (about 8 inches) between the main lobe of the antenna and the body of a 2-meter-tall (about 6.5-foot-tall) individual (recital 8) – must be “either invisible to the general public or mounted in a visually non-obtrusive way” (recital 3); its installation is notified “no later than two weeks after the installation” (recital 11). Access points equipped with an active antenna system, that is, with beamforming, are for the time being excluded from this regime (Article 1 and recital 13). The European regime thus organizes a deployment without individual permits, without prior notice to local residents, and designed to go unnoticed.

At the end of pilot deployments carried out with the operators, the French National Frequency Agency (ANFR) concluded that “the average exposure level is not changed by the commissioning of the small antennas,” while noting that near one of them “the exposure level is of the same order of magnitude as that which a macro network can create” ([ANFR, 2018](#)). A small cell therefore recreates, a few meters from passersby and windows, the exposure of a macro antenna, and an area-wide average erases this finding. The data to be considered are therefore the levels as close as possible to small cells, in the homes facing them, combined with those of macro antennas and under beamforming, and not an area-wide average. Resolution 1815 calls for the siting of any new antenna to be determined “not solely according to the operators’ interests but in consultation with local and regional government authorities, local residents” ([Council of Europe, 2011](#), § 8.4.4): the exemption regime does the opposite.

### **4.2 Livestock (15e)**

In France, livestock disorders attributed to electricity have been examined since 1999 by the Permanent Group for Electrical Safety in Agriculture (GPSE), under the aegis of the Ministry of Agriculture, whose mandate covers electricity problems in livestock farming – internal installations, high-voltage lines – and, to our knowledge, not the radiation from base station antennas. For wind turbines, Anses delivered in December 2021, at the request of the ministries responsible for the environment and for agriculture, an expert assessment of the disorders

observed on two farms in the Loire-Atlantique department ([AFP, 2021](#)). We have identified no equivalent expert assessment on radiofrequency in livestock farming.

In the Haute-Loire department, a 3G and 4G base station antenna was brought into service 250 meters (about 820 feet) from a dairy farm, gradually by the four operators, between June 28 and July 26, 2021. The farm reports a fourfold increase in mortality and an average production that fell from 60,214 liters per month in 2019 and 66,934 in 2020 to 43,000 in 2021 and 42,500 in 2022. The expert appointed by the Le Puy-en-Velay Judicial Court asked for the antenna to be switched off in order to observe the herd; since the judicial court had declared that it lacked jurisdiction to order this, the interim relief judge of the Clermont-Ferrand Administrative Court ordered, on May 23, 2022, that the antenna be switched off for two months, a measure deemed “necessary to enable the court-appointed expert to carry out his mission”; at the hearing, the expert had described a herd “in a state of real suffering” ([Clermont-Ferrand Administrative Court, 2022](#)). The Conseil d’État (France’s highest administrative court) annulled this order on August 17, 2022: the measure obstructed the execution of administrative decisions, and no serious danger had been shown — “although the GAEC reports a high mortality rate in its herd, it does not establish it” ([Conseil d’État, 2022](#)). The antenna was not switched off, the observation requested by the expert did not take place, and, to our knowledge, no court has ruled on the link between the antenna and the condition of the herd.

In the Calvados department, a farming family reports, after the installation of an antenna in 2023 a few meters from its site, “in eighteen months, we lost 90 cattle,” followed by a return to normal mortality after the herd was moved 20 kilometers (about 12 miles) away in 2025. The authorities dispute this explanation — “Not all the animals are exposed to the 4G antenna [...] When they were moved, they were in the same condition” — and the herd was removed in July 2026 on suspicion of mistreatment; an investigation is under way ([France 3 Normandie, 2026](#), as recorded in our files). We report both versions without deciding between them.

In Switzerland, a cohort study examined 253 calves from 229 farms, reconstructing the places where each calf and its dam had stayed since insemination. It found nuclear cataract in 32% of the calves, severe in 3.6%, and, for exposure in the first trimester of gestation, an odds ratio for severe cataract of 2.50 (95% confidence interval: 1.21 to 5.20) per unit of the logarithm of the field strength of the nearest base station within a 2 km (about 1.2-mile) radius, and of 3.10 (1.36 to 7.08) for all stations within a 10 km (about 6-mile) radius, compared with calves free of cataract ([Hässig et al., 2009](#)). The authors also report oxidative stress associated with the distance to the nearest station, while specifying: “It has not been shown that the antennas actually affected stress”; according to them, nuclear cataract can have many other causes, and the influence of fields during embryogenesis calls for further studies.

The data to be taken into account for livestock are therefore farm records — mortality, production, fertility, veterinary examinations — their chronology relative to the commissioning or modification of an antenna, the exposure measured in the buildings, and situations of shutdown, suspension, or relocation that allow a before-and-after comparison. These observations have particular value: the

animal does not report its symptoms, and the objection of self-attribution or of a nocebo effect raised against the electro-hypersensitive cannot be raised against it.

## 5. Discussion

Question 13 asks how these technologies affect cumulative exposure patterns. They add up: each adds a layer of sources, ever closer and ever more numerous, inside and outside homes. Assessment, for its part, remains fragmented, technology by technology, against thermal limits; for several technologies, the health literature is virtually nonexistent, and deployment precedes assessment instead of following it. The Haute-Loire case sums up the situation: the judge had ordered the simplest experiment, switching off the antenna and observing the herd, and it did not take place. The burden of proof rests on those who undergo the exposure, not on those who create it.

The common feature of the technologies examined is the goal of coverage without gaps: road obligations, exempted and invisible small cells, the ubiquitous connectivity of 6G, satellites announced as a means of covering areas protected for nature and difficult terrain. White zones are disappearing not by accident but by design. Yet they are the condition of life for the electro-hypersensitive, for whom a mere reduction in exposure is not enough, and a refuge for the rest of the living world (Document 6). The satellite is not a solution: its health effects have not been studied, its pollution of the sky is documented, and it eliminates precisely these last refuges.

For fixed uses, an alternative exists: a wired connection, by cable or optical fiber, provides the same service without radiation. As early as 2011, Resolution 1815 called on member states to “encourage research to develop telecommunication based on other technologies which are just as efficient but whose effects are less negative on the environment and health” ([Council of Europe, 2011](#), § 8.1.5). These other technologies exist. Inside buildings, light itself can carry data: LiFi transmits by modulated light—in the standard, the near infrared, from 800 to 1,000 nanometers—without radiofrequency, and does not pass through walls; IEEE, the body that established the Wi-Fi standard, incorporated it into that standard in 2023 ([IEEE, 2023](#)). Optical fiber now reaches homes, but inside them Wi-Fi most often takes over. The choice was made to move fast, by covering the planet with transmitters of high-frequency waves, rather than to develop safer technologies.

## 6. Limitations

For several technologies — 6G, wearable technologies, autonomous vehicles — our files describe deployment frameworks, not measured exposures. The Deutsche Telekom and Satellite Connect Europe announcements are corporate press releases; their timelines may change. In the Haute-Loire case, the mortality and production figures are those of the farm, and the Conseil d’État considered the mortality not established; in the Calvados case, known from the press, the authorities dispute the explanation put forward by the farmers; the Swiss study is observational, based on theoretical field strengths, without on-site measurement, and its authors themselves stress the multiplicity of possible causes. Section 3.8 describes the sources in an electric medical

bed without any measurement of the exposure it produces. Several studies are cited from their abstracts, as indicated in Section 2.

## 7. Recommendations (Questions 13 and 15)

1. Assess the cumulative exposure from all the sources present in the same place — base station antennas, satellites, Wi-Fi, connected devices, meters, personal devices — instead of separate assessments by technology against thermal limits, and reduce it at the source throughout the territory.
2. Make the deployment of any new generation or band — 6G, millimeter waves, integrated sensing, direct satellite coverage of phones — conditional on a prior, independent assessment of its effects on health, on the living world, and on the sky, funded independently of industry.
3. Connect all fixed uses — homes, schools (§ 8.3.2 of Resolution 1815), care facilities — by cable or fiber, guarantee, at no extra cost, non-communicating meters and household appliances whose radio function can be removed, and abandon the objective of full mobile coverage of the territory, which leads to antennas being installed everywhere.
4. Subject small cells to individual authorization and to prior notice to local residents, in the spirit of § 8.4.4 of Resolution 1815, which calls for the siting of antennas to be determined in consultation with local residents, instead of an exemption regime combined with notification after installation.
5. Preserve the white zones that remain, including with respect to direct satellite coverage of phones, and recreate new ones, for the electro-hypersensitive and for the rest of the living world; exclude areas protected for nature from such coverage.
6. Entrust an independent body with a collective expert assessment of radiofrequency in livestock farming, keep a register of reports from farmers, and, as a precautionary measure, suspend the emissions of an antenna when a documented coincidence appears between its commissioning and livestock disorders.

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## Glossary

| Term                                                   | Meaning                                                                                                                                                                    |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4G, 5G, 6G                                             | Fourth, fifth, and sixth generations of mobile telephone networks. 6G has not yet been deployed.                                                                           |
| Administrative court ( <i>tribunal administratif</i> ) | French first-instance administrative court.                                                                                                                                |
| ANFR                                                   | Agence nationale des fréquences (French National Frequency Agency): French public body responsible for managing radio frequencies and monitoring public exposure to waves. |

| Term                                                | Meaning                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Anses</b>                                        | Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail (French Agency for Food, Environmental and Occupational Health & Safety): French public body, under the supervision of five ministries, responsible for health risk assessment.                                                          |
| <b>Arcep</b>                                        | Autorité de régulation des communications électroniques, des postes et de la distribution de la presse (French Regulatory Authority for Electronic Communications, Postal Affairs and Print Media Distribution): independent French administrative authority which, among other things, sets the coverage obligations of operators. |
| <b>ASTRON</b>                                       | Netherlands Institute for Radio Astronomy, which operates the LOFAR radio telescope.                                                                                                                                                                                                                                                |
| <b>Beamforming</b>                                  | Technique by which an antenna concentrates its signal in the direction of the user instead of emitting it uniformly.                                                                                                                                                                                                                |
| <b>Bluetooth</b>                                    | Short-range radio link between devices, around 2.4 GHz.                                                                                                                                                                                                                                                                             |
| <b>Conseil d'État</b>                               | France's highest administrative court; among other things, it rules in last resort on appeals against the interim relief orders of administrative courts.                                                                                                                                                                           |
| <b>Council of Europe</b>                            | Intergovernmental organization of 46 European states, distinct from the European Union; its Parliamentary Assembly adopted Resolution 1815.                                                                                                                                                                                         |
| <b>DECT</b>                                         | Standard for household cordless phones, around 1.9 GHz; the base transmits even when idle, except in ECO mode.                                                                                                                                                                                                                      |
| <b>Department (département)</b>                     | French administrative division; Haute-Loire and Calvados are two of them.                                                                                                                                                                                                                                                           |
| <b>Direct satellite-to-phone link</b>               | Connection of an ordinary mobile phone to a satellite, without a terrestrial antenna or dedicated terminal (also called <i>direct-to-device</i> or <i>direct to cell</i> ).                                                                                                                                                         |
| <b>Dirty electricity</b>                            | High-frequency transients superimposed on the 50 Hz mains current, produced in particular by switched-mode power supplies, dimmers, and electronic lighting.                                                                                                                                                                        |
| <b>eCall</b>                                        | Automatic in-vehicle emergency call system, mandatory since March 31, 2018, in new types of passenger cars and light commercial vehicles type-approved in the European Union.                                                                                                                                                       |
| <b>ECO mode</b>                                     | Mode of DECT cordless phones in which the base stops transmitting, or transmits only very weakly, when no call is in progress.                                                                                                                                                                                                      |
| <b>Electric medical bed</b>                         | Bed with adjustable height and inclination, usually motorized, used in hospitals, care facilities, and at home.                                                                                                                                                                                                                     |
| <b>Electro-hypersensitivity, electrosensitivity</b> | Electrosensitivity refers to a sensitivity to electromagnetic fields shared, to varying degrees, by all human beings; electro-hypersensitivity, to its highest degrees. We regard it as a syndrome, not as a disease (see Document 4, Section 3.1).                                                                                 |
| <b>Equivalent isotropically radiated power</b>      | Power that would have to be supplied to an antenna radiating equally in all directions to obtain the same field in the main direction of the antenna under consideration.                                                                                                                                                           |
| <b>EU</b>                                           | European Union.                                                                                                                                                                                                                                                                                                                     |

| <b>Term</b>                      | <b>Meaning</b>                                                                                                                                                                                                                                                |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EUROPAEM</b>                  | European Academy for Environmental Medicine, which in 2016 published a guideline on the prevention, diagnosis, and treatment of disorders related to electromagnetic fields.                                                                                  |
| <b>GAEC</b>                      | Groupement agricole d'exploitation en commun: a form of French farming partnership.                                                                                                                                                                           |
| <b>GPSE</b>                      | Groupe permanent pour la sécurité électrique en milieu agricole (Permanent Group for Electrical Safety in Agriculture): French body created in 1999 under the aegis of the Ministry of Agriculture, responsible for livestock disorders of electrical origin. |
| <b>Heart rate variability</b>    | Variation in the interval between two heartbeats; it reflects the activity of the autonomic nervous system.                                                                                                                                                   |
| <b>Hertz (Hz, kHz, MHz, GHz)</b> | Unit of frequency: one kilohertz equals one thousand hertz, one megahertz one million, one gigahertz one billion.                                                                                                                                             |
| <b>HHS</b>                       | Department of Health and Human Services: U.S. federal health department, to which this contribution is addressed.                                                                                                                                             |
| <b>IEEE</b>                      | Institute of Electrical and Electronics Engineers: international professional association of engineers, which establishes, among other things, the Wi-Fi standards.                                                                                           |
| <b>ICNIRP</b>                    | International Commission on Non-Ionizing Radiation Protection: a private-law association registered in Germany, whose guidelines underpin European exposure limits.                                                                                           |
| <b>Internet of Things</b>        | Set of devices and sensors connected to one another and to the network, most often by radio link.                                                                                                                                                             |
| <b>ITU-R</b>                     | Radiocommunication Sector of the International Telecommunication Union, a specialized agency of the United Nations.                                                                                                                                           |
| <b>Ku band</b>                   | Frequency band used for satellite communications; here, approximately 10.7 to 14.5 GHz.                                                                                                                                                                       |
| <b>LiFi</b>                      | Data transmission by modulated light, visible or infrared, without radiofrequency; it does not pass through walls.                                                                                                                                            |
| <b>Linky, Gazpar</b>             | French smart meters, for electricity (grid operator Enedis) and for gas (GRDF), respectively.                                                                                                                                                                 |
| <b>LOFAR</b>                     | Low Frequency Array: European network of radio telescopes observing at low frequencies.                                                                                                                                                                       |
| <b>Low Earth orbit</b>           | Orbit at an altitude below 2,000 km, used by constellations of telecommunications satellites.                                                                                                                                                                 |
| <b>Macro antenna</b>             | Conventional high-power mobile base station antenna, installed on a tower or a rooftop and covering a wide area.                                                                                                                                              |
| <b>Nocebo effect</b>             | Onset of symptoms attributed to the expectation of a harmful effect, and not to the agent itself.                                                                                                                                                             |
| <b>Nuclear cataract</b>          | Clouding of the central part (nucleus) of the lens of the eye.                                                                                                                                                                                                |

| Term                                      | Meaning                                                                                                                                                                                                                 |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Odds ratio, confidence interval</b>    | Statistical measure of the association between an exposure and an effect; a value greater than 1 indicates an association, and the 95% confidence interval gives the range of values compatible with the data.          |
| <b>Oxidative stress</b>                   | Imbalance between the production of oxidizing compounds and the body's defenses.                                                                                                                                        |
| <b>Power line communication (PLC)</b>     | Data transmission by superimposing a signal of a few tens of kilohertz on the electric current of existing wiring.                                                                                                      |
| <b>Radio quiet zone</b>                   | Area where radio emissions are restricted by law to protect radio astronomy observations, as around Green Bank (United States).                                                                                         |
| <b>Recital</b>                            | In a European Union text, a statement of reasons set out in the preamble, before the articles.                                                                                                                          |
| <b>Référé (interim relief)</b>            | Emergency procedure by which a judge orders provisional measures.                                                                                                                                                       |
| <b>Reference level, basic restriction</b> | The basic restriction limits the energy absorbed in the body; the reference level limits the field measurable outside the body and is supposed to guarantee compliance with the former.                                 |
| <b>Resolution 1815</b>                    | Resolution adopted on May 27, 2011, by the Parliamentary Assembly of the Council of Europe on the potential dangers of electromagnetic fields and their effect on the environment.                                      |
| <b>Small cell</b>                         | Low-power, short-range antenna installed close to the ground, on street furniture or building facades; "small-area wireless access point" in European Union law.                                                        |
| <b>Starlink</b>                           | Low Earth orbit satellite constellation of the U.S. company SpaceX.                                                                                                                                                     |
| <b>Switched-mode power supply</b>         | Electronic power supply that converts mains current by rapid switching; present in most electronic devices, it produces high-frequency transients.                                                                      |
| <b>White zone</b>                         | In territorial planning, an area without mobile coverage, which public policy aims to eliminate; for the electro-hypersensitive, a place almost free of artificial radiation, which must be preserved (see Document 1). |
| <b>Wi-Fi</b>                              | Wireless local area network, around 2.4, 5, and 6 GHz.                                                                                                                                                                  |

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