



June 7, 2019

Honorable Joanne Comerford
Senate Chair, Massachusetts Joint Committee on Public Health
24 Beacon St., Room 70C
Boston, MA, 02133

Honorable John Mahoney
House Chair, Massachusetts Joint Committee on Public Health
24 Beacon St., Room 130
Boston, MA, 02133

Re: Opposition to S1272 and S1273, Related to 5G Wireless Facilities

Dear Chairs Comerford, Mahoney and Members of the Joint Committee,

On behalf of CTIA®, the trade association for the wireless communications industry, I am writing to respectfully oppose S1272 and S1273. S1272, related to the registration of small wireless facilities, is unnecessary in light of existing requirements and potentially costly to the Commonwealth. Further, we also respectfully oppose S1273, which requires the removal of wireless facilities and products “deemed to be especially dangerous,” including its unjustified requirement that small wireless facilities be banned at the outset. S1273 is also unnecessary and likely runs afoul of federal law.

Wireless infrastructure is comprehensively regulated at the federal level for health and safety purposes. Radiofrequency energy (RF) from antennas used by cell phones results in exposure levels on the ground that are typically thousands of times below safety limits set by the Federal Communications Commission (FCC). These safety standards include significant extra margins of safety for tower workers and the public. They are based on guidance from internationally recognized expert non-government organizations whose scientists and engineers study and develop mobile technology standards, and approved and overseen by federal agencies responsible for health and safety. As a result, the scientific consensus is that towers and base stations have not been shown to pose any health hazard to nearby residents. For example, the World Health Organization (WHO) advises that “[f]rom all evidence accumulated so far, no adverse short- or long-term health effects have been shown to occur from the RF signals produced by base stations.¹ The WHO continues that “[s]ince wireless networks produce generally lower RF signals than base stations, no adverse health

¹ See “Electromagnetic Fields and Public Health: Base stations and Wireless Technologies,” available at: <https://www.who.int/peh-emf/publications/facts/fs304/en/>, last accessed 6/5/2019.



effects are expected from exposure to them.”² The consensus among health experts is that the weight of scientific evidence shows no known adverse health effects to humans from exposure to wireless antennas or devices. For these reasons, S1272 is unnecessary.

Additionally, S1272 calls for the creation of a wireless infrastructure registry to be maintained by the Department of Public Health. With no discussion of how this registry will be maintained, the Commonwealth’s taxpayers may ultimately bear the burden for funding. Moreover, such a requirement may stall wireless deployment in Massachusetts as providers attempt to comply with such a provision.

S1273 appears to conflict with federal law and is unnecessary. A blanket ban on wireless facilities in the Commonwealth would flatly violate the Communications Act’s restrictions on local regulations that prohibit or have the effect of prohibiting service. The FCC has declared unlawful any state or local moratoria on deployment of facilities that would provide wireless services.³ It concluded that “moratoria limit the provision of service, harm competition, and impose significant costs that impede the deployment of telecommunications infrastructure and thereby exacerbate the digital divide.”

Furthermore, attempting to regulate wireless facilities due to health concerns is expressly prohibited under federal law. As outlined in Section 332(C)(7)(B)(iv), “No State or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the [FCC]’s regulations concerning such emissions.” Therefore, S1273 is unlawful.

The FCC’s oversight of these issues was confirmed in October 2018 by FCC Commissioner Carr who stated, “The FCC, as well as other agencies that are experts in health and safety issues, are always looking very closely at these issues, staying up to date on the latest science. They’ve looked at all of the studies and all of the information and they have reached the determination that these are safe...”⁴ In addition, per the attached, the consensus among health experts is that the weight of scientific evidence shows no known adverse health effects to humans from exposure to wireless antennas or devices.

² *Ibid.*

³ See: Third Report and Order and Declaratory Ruling, FCC 18-111, Aug. 3, 2018, <https://docs.fcc.gov/public/attachments/FCC-18-133A1.pdf>; last accessed 6/5/2019.

⁴ See: https://www.youtube.com/watch?v=Mo8_ORtBpFM&t=250s, October 12, 2018, last accessed 6/5/2019.



For the reasons outlined herein, we respectfully oppose S1272 and S1273 and urge your rejection.

Sincerely,

A handwritten signature in black ink that reads "Jamie Hastings". The signature is written in a cursive, flowing style.

Jamie Hastings
Senior Vice President, External and State Affairs
CTIA

Encl: Professor Eric Swanson, Testimony before the Wisconsin Assembly Jobs and the Economy
Committee, May 29, 2019



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May 29, 2019

Re: Health Effects of 5G Telecommunication Infrastructure

I have been asked by the CTIA to address any concerns over possible health effects related to 5G telecommunication infrastructure.

My name is Eric Swanson. I am a professor of theoretical physics at the University of Pittsburgh. I have published more than 100 papers on biophysics, nuclear physics, and condensed matter physics and given approximately 250 academic talks in 25 countries over a thirty year career. I am the founder of the American Physical Society Topical Group on Hadronic Physics and an elected Fellow of the American Physical Society. I am also the author of *Science and Society* (Springer), *Applied Computational Physics* (Oxford University Press), and many newspaper and magazine op-eds and articles.

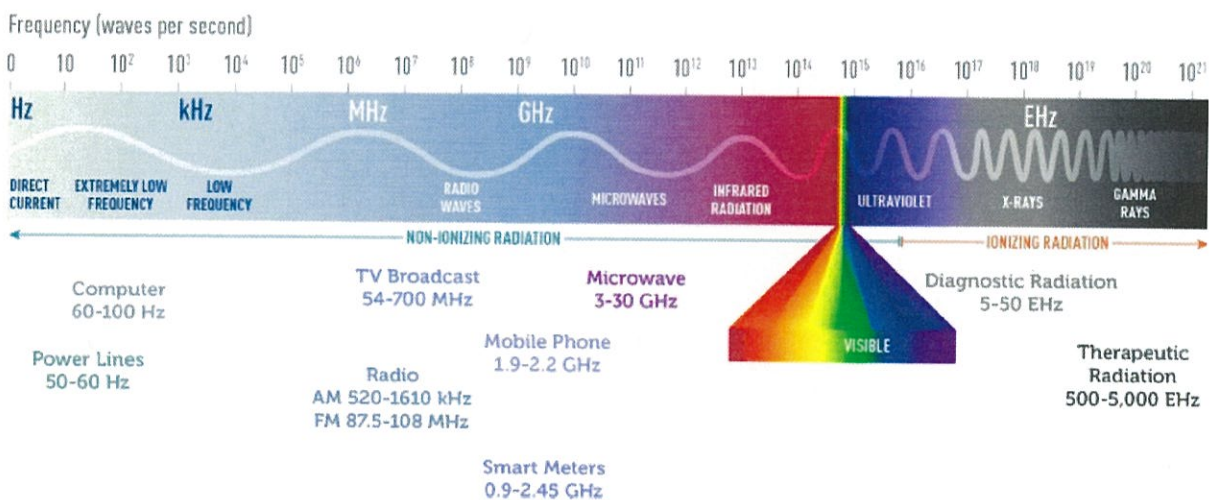
Because this report will be addressing issues concerning electromagnetic fields I would like say a few words about what this is. Electromagnetic fields are waves that are created by moving charges (usually electrons) that traverse space at the speed of light. These waves are the *simplest phenomena known in the universe* and the physics related to them is well established. Waves only have three basic characteristics: frequency (how many times the wave oscillates per second), amplitude (the “height” of the wave), and polarization (we are most familiar with this via polaroid sunglasses). The figure below shows the “electromagnetic spectrum”, which is just a representation of the names that we apply to different frequencies of radiation. Notice that visible light is part of the spectrum. Other familiar parts are UV radiation at slightly higher frequency than visible light, x-rays at even higher frequency, and microwaves and radio waves at lower frequency.

When it comes to human health concerns there is an important distinction between different parts of the spectrum. While I could explain this in terms of physical concepts, it is probably more useful to appeal to things we all know. UV radiation can be harmful because it can cause sunburns and skin cancer. X-rays and the higher frequency gamma rays can be even more harmful (at sufficient doses X-rays can cause cancer and gamma rays can kill people outright). Alternatively, we can happily spend days or months under indoor lighting with no chance of getting sunburn or skin cancer. The reason for this is that visible light is *below* the threshold frequency for causing damage to molecules in our cells. This threshold is referred to as the ionization threshold: electromagnetic waves that can break DNA bonds are called *ionizing* and

electromagnetic waves that cannot break bonds are called *nonionizing*. The electromagnetic fields emitted by a cell phone and wireless infrastructure are nonionizing radiofrequency (RF) fields.

The frequencies used by 4G cellphones are around 2 GHz (this means two billion oscillations per second). These frequencies are about one million times lower than UV frequencies, which places them well on the safe side of the ionization threshold. 5G cellphones and infrastructure operate at RF frequencies that are approximately 30000 times below the ionizing threshold.

ELECTROMAGNETIC SPECTRUM



In the USA, 5G wireless infrastructure and 5G-capable cellphones are regulated by the Federal Communications Commission. All new equipment is tested and must comply with safety limits that have been set by the FCC. The FCC adopted the RF emission regulations based on standards recommended by international standards setting bodies such as the National Council on Radiation Protection and the Institute of Electrical and Electronics Engineers. It did so after consulting with federal health and safety organizations such as the FDA, Environmental Protection Agency, Occupational Safety and Health Administration, and National Institute for Occupational Safety and Health to develop “consensus” regulations. Together, these bodies have assessed thousands of scientific studies concerning possible health effects of nonionizing radiation. Animal tests and other studies indicate that thermal effects start to be felt at an energy deposition rate of approximately 100W/kg (this is called the *specific absorption rate*, or SAR)¹. The FCC mandates that the general public be exposed to no SARs greater than 1.6 W/kg. In fact, according to the FCC, typical exposures near cellphone towers are hundreds or thousands of times lower than this figure. The FCC also mandates that *maximum permissible*

¹ For comparison, the heating pad I use to warm my arthritic knees is rated at 50W. I estimate it warms about 1 lb of my body, so this rather pleasant heating corresponds to a SAR of 100W/kg.

exposure (called MPE, this is a measurement of the energy deposition rate by area) be lower than approximately 1 mW/cm².²

The consensus of the world-wide health and government health and safety organizations is that non-ionizing fields at the levels allowed by the FCC regulations are safe. For example, federal agencies responsible for regulating the safety of cell phones and wireless infrastructure and leading cancer and health research institutions in the United States have not found any link between electromagnetic fields allowed by the FCC regulations and cancer or other adverse health effects:

The Federal Communications Commission (FCC): “As discussed above, radiofrequency emissions from antennas used for cellular and PCS transmissions result in exposure levels on the ground that are typically thousands of times below safety limits. These safety limits were adopted by the FCC based on the recommendations of expert organizations and endorsed by agencies of the Federal Government responsible for health and safety. Therefore, there is no reason to believe that such towers could constitute a potential health hazard to nearby residents or students.”³

The Food and Drug Administration (FDA): “Based on our ongoing evaluation of this issue, the totality of the available scientific evidence continues to not support adverse health effects in humans caused by exposures at or under the current radiofrequency energy exposure limits.”⁴

National Cancer Institute: “... although many studies have examined the potential health effects of non-ionizing radiation from radar, microwave ovens, cell phones, and other sources, there is currently no consistent evidence that non-ionizing radiation increases cancer risk in humans.”⁵

American Cancer Society: “At ground level near typical cellular base stations, the amount of RF energy is thousands of times less than the limits for safe exposure set by the US Federal Communication Commission (FCC) and other regulatory authorities ... Some people have expressed concern that living, working, or going to school near a cell phone tower might increase the risk of cancer or other health problems. At this time, there is very little evidence to support this idea.”⁶

Other worldwide health and safety organizations are in accord:

² FCC 13-39 (March 2013), Appendix A.

³ FCC RF Safety FAQ <https://www.fcc.gov/engineering-technology/electromagnetic-compatibility-division/radio-frequency-safety/faq/rf-safety#Q15> (last accessed March 11, 2019).

⁴ FDA Statement, Statement from Jeffrey Shuren, M.D., J.D., Director of the FDA's Center for Devices and Radiological Health on the National Toxicology Program's report on radiofrequency energy exposure, Nov. 1, 2018, <https://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm624809.htm>.

⁵ National Cancer Institute, “Cell Phones and Cancer Risk” Factsheet (2019), <https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/cell-phones-fact-sheet> (last accessed March 11, 2019).

⁶ American Cancer Society, “Cellular Phone Towers”, <https://www.cancer.org/cancer/cancer-causes/radiation-exposure/cellular-phone-towers.html> (2018) (last accessed March 11, 2019).

European Commission, Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) (2015): “Overall, the epidemiological studies on mobile phone RF EMF exposure do not show an increased risk of brain tumours. Furthermore, they do not indicate an increased risk for other cancers of the head and neck region.”⁷

World Health Organization (2006): “Recent surveys have indicated that RF exposures from base stations and wireless technologies in publicly accessible areas (including schools and hospitals) are normally thousands of times below international standards . . . From all evidence accumulated so far, no adverse short- or long-term health effects have been shown to occur from the RF signals produced by base stations.”⁸

Health Canada (2014): “The Panel has concluded that the balance of evidence at this time does not indicate negative health effects from exposure to RF energy below the limits recommended in the Safety Code.”⁹

United Kingdom Health Protection Agency Independent Advisory Group on Non-Ionizing Radiation (HPA) (2012): “In summary, although a substantial amount of research has been conducted in this area, there is no convincing evidence that RF field exposure below guideline levels causes health effects in adults or children.”¹⁰

Swedish Council for Working Life and Social Research (2012): “Extensive research for more than a decade has not detected anything new regarding interaction mechanisms between radiofrequency fields and the human body and has found no evidence for health risks below current exposure guidelines.”¹¹

Norwegian Institute for Public Health (2012): “The studies have been performed on cells and tissues, and in animals and humans. The effects that have been studied apply to changes in organ systems, functions and other effects. There are also a large number of population studies with an emphasis on studies of cancer risk. The large total number of studies provides no evidence that exposure to weak RF fields causes adverse health effects.”¹²

Similarly, the **Institute of Electrical and Electronics Engineers’ International Committee on Electromagnetic Safety (IEEE/ICES)**, which is one of the expert organizations that the FCC

⁷ European Commission, Scientific Committee on Emerging and Newly Identified Health Risks, Opinion, “Health Effects of Exposure to EMF,” (2015) (available at https://ec.europa.eu/health/scientific_committees/emerging/docs/scenihr_o_041.pdf).

⁸ World Health Organization, “Electromagnetic fields and public health: base stations”, (2006), <https://www.who.int/peh-emf/publications/facts/fs304/en/> (last accessed March 11, 2019).

⁹ Health Canada, “A Review of Safety Code 6 (2013): Health Canada’s Safety Limits for Exposure to Radiofrequency Fields,” (2014) (available at https://rsc-src.ca/sites/default/files/SC6_Report_Formatted_1.pdf).

¹⁰ Health Protection Agency, “Health Effects from Radiofrequency Electromagnetic Fields, Report of the Independent Advisory Group on Non-Ionising Radiation,” (2012) (available at <https://www.ncbi.nlm.nih.gov/nlmcatalog/101602435>).

¹¹ Ahlbom A., *et al.*, Swedish Council for Working Life and Social Research, “Radiofrequency Electromagnetic Fields and Risk of Disease and Ill Health: Research during the last ten years,” (2012) (available at <http://www.fas.se/pagefiles/5303/10-y-rf-report.pdf>).

¹² Norwegian Institute of Public Health, Report 2012:3, “Low-level radiofrequency electromagnetic fields, an assessment of health risks and evaluation of regulatory practice,” (2012) (available at <http://www.fhi.no/dokumenter/545eea7147.pdf>).

relies on in setting its RF emission standard, analyzed 52 years of studies and concluded that “the weight of scientific evidence supports the conclusion that there is no measurable risk associated with RF exposures”¹³ even at levels five times higher than that permitted by the FCC. In short, *the consensus of the scientific community is that the scientific evidence does not support any link between exposure to regulated RF and adverse health effects.*

5G telecommunication technology seeks to increase data rates by a factor of 100 over 4G networks (to 1Gbps or higher), decrease latency (time wasted in establishing communication) by a factor of 50 or more, and increase user density drastically (up to one mobile device per 10 square feet). These capabilities will enable smart city technology, the “internet of things”, mobile service on airplanes, remote medicine, and the machine-to-machine communication required for the robotic cars of the future. It will achieve these things by placing low power small cell wireless infrastructure close together and by employing more of the electromagnetic spectrum (specifically, the spectrum near 30 GHz). Because 30 GHz radiation is nonionizing and the emissions from cell phones and small cell wireless infrastructure are regulated by the FCC’s exposure standards that have withstood the test of time, there is no reason to believe there is a risk of adverse health effects. In addition, one can estimate MPE levels by using published data concerning the size of 5G small cell wireless infrastructure and their power ratings (these are also regulated by the FCC). The result is an MPE that is approximately 500 times below the FCC limit. Thus 5G technology presents no substantial risk to the general public, and certainly does not present risk that current regulations cannot manage.

Sincerely,



E.S. Swanson
Professor of Physics
University of Pittsburgh

¹³ Institute of Electrical and Electronics Engineers, International Committee on Electromagnetic Safety (SCC39), “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300 GHz,” (2006).