Take-Aways from the New Hampshire HB522 Commission on 5G Final Report

for discussions with interested parties in Pittsfield, MA

July 5, 2021

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Conflict-of-Interest Statement

- My position at the time I joined the New Hampshire State Commission was Professor & Chair of the Dept. of ECE at UNH
  - My bias was and is generally in favor of technological developments
  - I also served on the InterOperability Laboratory Advisory Board, which is an international evaluator of wireless technologies
  - Was active in Project 54, addressing the communications needs of police and first responders
  - I am serving as Vice-Chair for the Virtual Learning Academy Charter School BoT •

I served on the Commission without any compensation, including travel expenses

- Because of my service on the Commission, I am asked to present to various groups, including your group, none of which involve compensation
- I present to you today as a fellow citizen, with no realized or expected financial rewards

Commonly-Asked Questions

- Why are we concerned about the placement of cell towers?
  - There is a large and growing body of evidence demonstrating that exposure to cell-phone type radiation is harmful to humans and the environment
    - Other types of radiation, such as radiation from radio and TV stations have also been shown to be harmful, but the impulsiveness of cell-phone radiation coupled with the number of transmitters makes them particularly harmful
- What is meant by "cell-phone type" radiation?
  - High-frequency devices that transmit high data-rate digital signals fall into this category. These devices include: cellphones, cell towers, Bluetooth, baby monitors, smart meters, cordless phones, WiFi (wireless routers) and IoT devices

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Commonly-Asked Questions (2)

- What are the differences between signals from different wireless devices?
  - They are all transmitted in high frequency bands (600 MHz to 5 GHz) but frequency varies from device to device
    - 5G will extend the upper frequency to around 40 GHz
  - Different device types use different protocols to transmit digital information
    - Generally, devices of the same type (such as cellphone and cell tower) use the same protocol when communicating. Because of this, cellphones and cell towers radiate the same types of signals, although at different powers and different periods of time.
  - Different device types transmit at different power levels
    - Bluetooth & WiFi (up to 100 mWatts)
    - Smart Meter (≤ 1 Watt)

- Cellphone (600 mWatts – 3 Watts)
- Cell Tower (typically 10 Watts, but can go as high as 50 Watts)

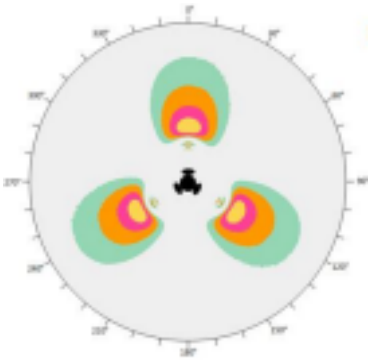
Radiation from all these devices are of concern

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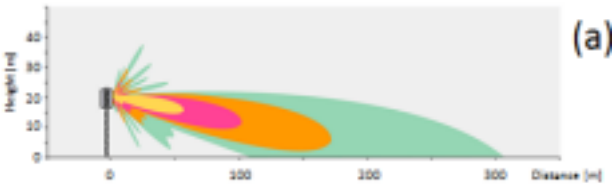
Commonly-Asked Questions (3)

- What does an antenna do to a cellphone signal? An antenna can focus signal energy in a particular direction, just like a flashlight can focus light in a particular direction; it enables the signal to be concentrated in the direction of the user An antenna does not change the frequency or information

Example: top-view of 3 directional antennas (horizontal, or azimuthal, pattern)



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(vertical, or elevation, pattern)

contained in a signal

Example: side-view of directional antenna

How Antenna Patterns Relate to the Proposed

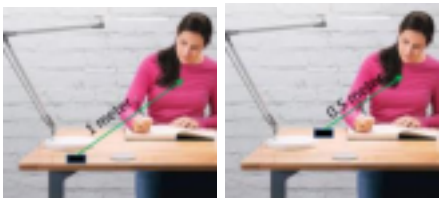
ANTENNA #2: (AT&T MOBILITY FUTURE PLANNED) CCI HPA65R-BU8A



Site

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Commonly-Asked Questions (4) • How does power density from an antenna vary with distance? Power density varies as inverse square (Power Density = P_0/R^2)



As reference, assume power density at 1 meter is 1 mW/m^2

If phone is moved to a distance of 0.5 m, P = 4 mW/m^2





In this case, distance is equal to fabric thickness (0.2 mm), so P = > kW/m^2 Definitely not a good idea!

Questions Posed by People Living Near Cell Towers

- Overall question: What distance is safe, based on concerns elaborated in the below questions and references listed above, for cell antennas and their associated RFR, to be from residences?
- Overall question: Should we feel completely confident that these antennas, installed outside of their bedroom windows and nearly in their yards, pose absolutely no health risk to them and their children?
- What distance is safe for these antennas (4G and 5G) to be from people's homes (are they safe at the distances in the current proposal)? The NH report recommendation is for cellular antennas, towers and other wireless technology including 5G to be at least 500 meters from residences.
- What long term safety studies have been done to establish safety of cellular wireless antennas on people living near them, at distances as close as 50ft as is the distance in this neighborhood in relation to water tower, including non-thermal effects of the radiation?

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The article reports on research that analyzed the spatial correlation between how close people lived to a cell tower and cases of deaths by neoplasia. Data obtained from Brazilian government databases.

Covered timeframe 1996-2006; conclusions based on study of 856 cell towers.

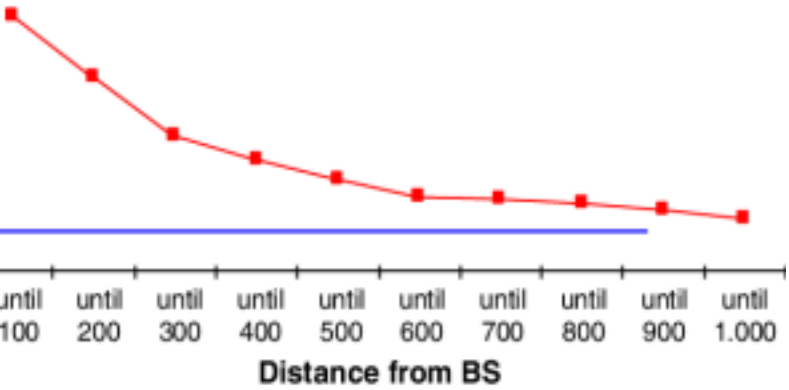
The largest power density measured during the study was 40.78 $\mu W/cm^2$ (407.8 mW/m^2)

Adilza C. Dode, Mônica M.D. Leão, Francisco de A.F. Tejo, Antônio C.R. Gomes, Daiana C. Dode, Michael C. Dode, Cristina W. Moreira, Vânia A. Condessa, Cláudia Albinatti, Waleska T. Caiaffa,

"Mortality by neoplasia and cellular telephone base stations in the Belo Horizonte municipality, Minas Gerais state, Brazil", Science of The Total Environment, Volume 409, Issue 19, 2011, Pages 3649-3665, ISSN 0048- 9697

https://doi.org/10.1016/j.scitotenv.2011.05.051

Take-Away from Article Referenced on Previous Slide



Rate of mortality by neoplasia according to distance from cell tower

Rate of mortality by neoplasia for general population

100 200 300 400 500 600 700 800 900 1000

Distance From Cell Tower (meters)

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Relating this to the Pittsfield Cell Tower



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Schools and Cell Tower Setback Examples

Many communities have policies, ordinances or zoning that ensures cellular antennas are restricted to a specific minimum distance from schools.

Palo Alto, California: 1,500 feet

https://mdsafetech.files.wordpress.com/2020/02/palo-alto-unified-school-district resolution-on-cell-tower-setbacks-2019.pdf

https://www.losaltosca.gov/sites/default/files/fileattachments/city_council/page/4842 1/resolution_no._2019-35.pdf

Walnut City, California: 1,500 feet

https://ehtrust.org/wp-content/uploads/Walnut-CA-Telcom-Setbacks-1.png **Bar**

Harbor, Maine: 1,500 feet

https://centerforsaferwireless.us/web/main/index.php/20-resources/article archive/85-cell-tower-setbacks-at-schools-and-daycare-facilities

Sallisaw, Oklahoma: 1,500 feet

https://www.oklahomacounty.org/Portals/0/CelltowerRegulations2_1.pdf

Stockbridge, Massachusetts: 1,500 feet

https://stockbridge-ma.gov/wp-content/uploads/2017/10/TOWN-OF-STOCKBRIDGE MASSACHUSETTS-Zoning-Bylaws-2017.pdf

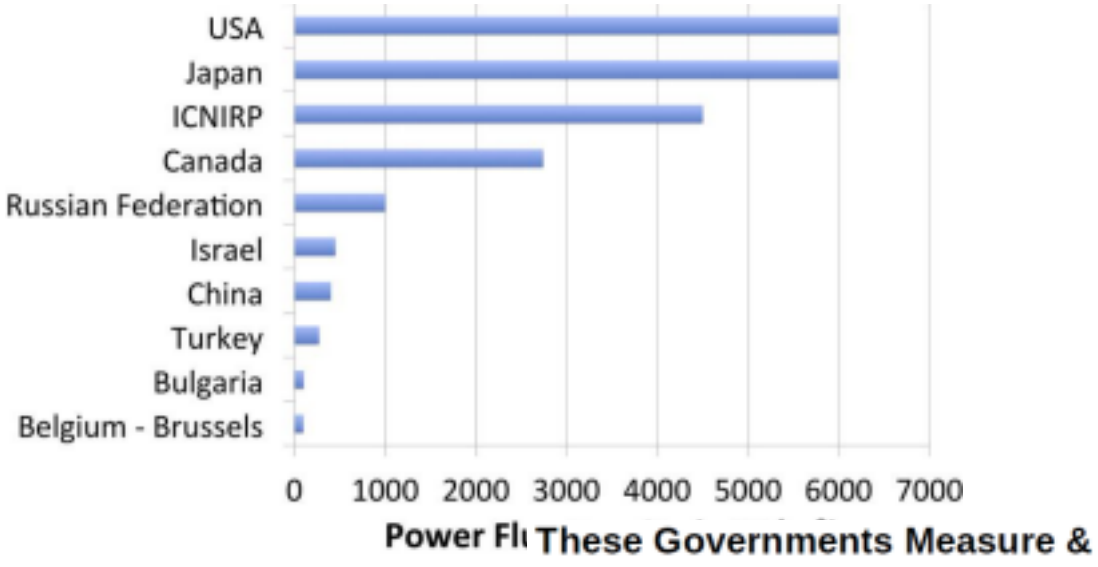
San Diego County California 1,000 feet (small cells)

https://www.sandiegocounty.gov/content/sdc/pds/advance/smallcellwirelessfacilities. html

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Los Altos , California: 500 feet (small cells)

How Do FCC Standards Compare Internationally?



Margaret Sears, Margaret Friesen, Theodora Scarato, Rob Me ience and radiofrequency radiation: What makes smart and health ISSN 0360-1323, https://doi.org/10.1016/j.buildenv.2019.106324.

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These Governments Measure & Publish RFR Levels Online

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- Many other countries have lower RFR thresholds
- FCC standards were set in the 1990s; a lot has changed electromagnetically since then
- The FCC did not answer questions posed to it by the NH Commission

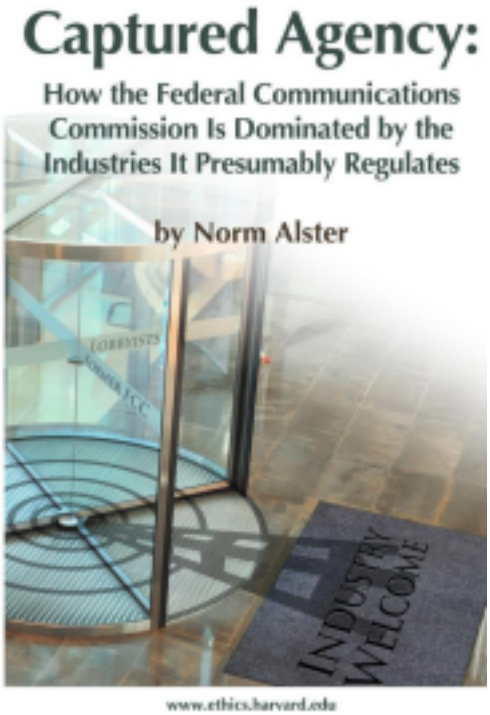
Why Aren't Our Regulatory Agencies Doing More to Protect the Public?

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What Role Do Regulatory Agencies Play?

"Industry controls the FCC through a soup-to nuts stranglehold that extends from its well placed campaign spending in Congress through its control of the FCC's Congressional oversight committees to its persistent agency lobbying."

https://ethics.harvard.edu/news/new-e books-edmond-j-safra-research-lab



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- There are thousands of refereed publications documenting the harm associated with Radio Frequency Radiation (RFR)

17 18

Feb 2021:

FCC sued for

dismissing evidence of serious health impacts from wireless tech

Peer-Reviewed Publications Used by NH Commission to Draw Conclusions for Majority Report

• **What the Lawsuit EHT et a., v the FCC is About**

- FCC ignored substantial record evidence when it decided that its 1996 RF exposure limits and regulations still provide adequate protection.
- FCC Violated the Administrative Procedure Act because its order is arbitrary and capricious, and not evidence-based as they did not fully address the scientific research findings showing harm in their response when they determined that FCC limits did not need to be changed.
- FCC Violated the National Environmental Policy Act because the FCC did not take a hard look on the environmental impacts of its decision.
- FCC Violated the 1996 Telecommunications Act because the FCC failed, as required by the TCA, to consider the impact of its decision on the public health and safety.
- FCC regs are preempting ADA/FHA accommodation obligations for those afflicted by Radiation Sickness.

During oral arguments one of the judges, Robert Wilkins, told the FCC, "I am inclined to rule against you."

A ruling on this case is expected within 3 months

• What I'll be showing next are examples of journal articles documenting negative health effects

• These are not from "fringe publications" nor are they people's opinions; they have been reviewed by experts in their fields

• Poor quality journals do exist, but they are readily identified by metrics such as impact factor, citation indices and the backgrounds of people serving on their

review boards
• I was an Assoc. Editor for IEEE TAP and am aware of how to assess the quality of a journal
• Articles address exposure to cellphone frequency radiation, and their findings extend to 5G and other forms of high speed-digital data transmission

19 20

Quote from article: “In conclusion, the present study suggests that low intensity microwave radiation induces oxidative stress, inflammatory response and DNA damage in the brain by exerting a frequency dependent effect.”

Megha K, Deshmukh P, Banerjee B, et al., NeuroToxicology (2015) 51 158-165, https://DOI: 10.1016/j.neuro.2015.10.009

Journal Impact Factor 3.379

Quote from article: “Results of the study showed that DNA damage indicators were higher in the RFR exposure groups than in the control subjects. In addition, DNA damage increased with the daily duration of exposure.”

Mehmet Akdag, Suleyman Dasdag, Fazile Canturk & Mehmet Zulkuf Akdag (2018), Electromagnetic Biology and Medicine, 37:2, 66-75, DOI: 10.1080/15368378.2018.1463246

21 22

Quote from article: “These findings show that these electromagnetic fields have significant biological effects on human skin fibroblasts.”

Stefania Pacini, Marco Ruggiero, Iacopo Sardi, Stefano Aterini, Franca Gulisano, and Massimo Gulisano, Oncology Research, 2002, Vol. 13, pp. 19–24

DOI: 10.3727/096504002108747926

https://pubmed.ncbi.nlm.nih.gov/12201670/

Journal Impact Factor 4.362

Quote from article: “Non-thermal microwave/lower frequency electromagnetic fields (EMFs) act via voltage-gated calcium channel (VGCC) activation. … Among the more commonly reported changes are sleep disturbance/insomnia, headache, depression/depressive symptoms, fatigue/tiredness, dysesthesia, concentration/attention dysfunction, memory changes, dizziness, irritability, loss of appetite/body weight, restlessness/anxiety, nausea, skin burning/tingling/dermographism and

EEG changes."

https://www.sciencedirect.com/science/article/pii/S0891061815000599 Journal Impact Factor 2.353

metabolism and the endocrine system, and produces genotoxicity, genomic instability and oxidative stress."

Kesari et al., Reproductive Biology and Endocrinology https://doi.org/10.1186/s12958-018-0431-1, (2018)

Journal Impact Factor 3.235

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Quote from article: "From currently available studies it is clear that radiofrequency electromagnetic fields (RF-EMF) have deleterious effects on sperm parameters (like sperm count, morphology, motility), affects the role of kinases in cellular

Quote from article: "In conclusion, the results of this study indicated that mobile phone exposure during pregnancy could have an important

Hava Bektas, Suleyman Dasdag & Mehmet Selcuk Bektas (2020), Biotechnology & Biotechnological Equipment, 34:1, 154-162, DOI: 10.1080/13102818.2020.1725639

https://www.tandfonline.com/doi/full/10.1080/13102818.2020.1 725639

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potential to cause oxidative stress and DNA damage in cord blood and placenta."

Journal Impact Factor 1.186

25 26

Quote from article: “Statistical analysis demonstrated that electromagnetic radiation from mobile phone masts is harmful for trees. These results are consistent with the fact that damage afflicted on trees by mobile phone towers usually start on one side, extending to the whole tree over time.”

Waldmann-Selsam C Balmori-de la Puente, A Breunig H et al., Science of the Total Environment (2016) 572 554-569, DOI: 10.1016/j.scitotenv.2016.08.045

https://www.sciencedirect.com/science/article/pii/S0048969716317375?casa_token=MQA3pRiHm0IAAAAA:Dvxz-gx8Lsdf2aWs9kbmQb7E8Hne11dbc_oUABdB8VgEsLGopSgtz7LubafACe_QQJAWv8RR7w

Journal Impact Factor 6.551

Quote from article: “The extent that anthropogenic electromagnetic radiation represents a significant threat to insect pollinators is unresolved and plausible.”

Alfonso Balmori, Science of The Total Environment, Volume 767, 2021, 144913, ISSN 0048-9697, https://doi.org/10.1016/j.scitotenv.2020.144913

Do all the published studies show harm with cellphone radiation?

Some show harm while others do not (somewhat dependent on who funds the research) (New York Times- Nov 13, 2010) University of Washington professor Henry Lai analyzed 326 cellphone radiation studies. He found that only 28 percent of industry-funded studies showed biological effects from cellphone radiation exposure — but that of the studies not funded by industry, 66 percent found biological effects.
https://www.nytimes.com/2010/11/14/business/14digi.html

In 2020, Dr. Lai updated his numbers based on around a thousand studies:

- Neurological RFR studies report effects in 73 % of studies on RF radiation
- Genetic effect studies report effects in 65 % of studies on RF radiation
- Free Radical (Oxidative Damage) effect studies report effects in 91 % of studies on RF radiation

https://bioinitiative.org/wp-content/uploads/2020/09/6-RFR-Neurological-Effects-Abstracts-2020.pdf

- Cellphone radiation, including 5G, poses a significant threat to human health and the environment
- The relative risk is not clear, and more research will be necessary to determine what it is
  - Without knowing what the relative risk is, a cost-benefit analysis cannot be performed
- This is not a scientific issue, it is a political issue
  - Until FCC radiation guidelines and policies (the 1996 Telecommunications Act) are changed, protections available to municipalities are limited

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General Recommendations in Majority Report

- Seek *independent* evaluation of FCC radiation guidelines
- Take action to alert public about the dangers of cellphone radiation
- Encourage the migration to wired networking
- Perform radiation-level measurements at cell towers
  - Enable public to perform their own measurements
- Work to protect trees, birds and pollinators

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References

- New Hampshire State Commission Final Report

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

- Video Overviews of Final Report

- Kent Chamberlin video: https://www.youtube.com/watch?v=qT9g5Mm3iSo
- Kent Chamberlin and Cece Doucette: https://www.youtube.com/watch?v=_WqKqpKPIE8

- Environmental Health Trust: https://ehtrust.org/
- Massachusetts for Safe Technology: https://www.ma4safetech.org/
- Bioinitiative Color Charts: https://bioinitiative.org/rf-color-charts/
- EMF Medical Conference Training (50% off thru July 26 for CME/CE credits and for the public videos): https://emfconference2021.com/online-cme-ce-courses/
- Safe Living Technologies EMF/RF Exposure Guidelines: https://safelivingtechnologies.com/emf exposure-rf-exposure-guidelines/
- Americans for Responsible Technology Activist/Municipal Tool Kit: https://www.americansforresponsibletech.org/tool-kit
- Frank Clegg (former Microsoft Canada Pres.): https://www.youtube.com/watch?v=h4TdY344Now

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