Consolidated Case Nos. 19-70123, 19-70124, 19-70125, 19-70136, 19-70144, 19-70145, 19-70146, 19-70147, 19-70326, 19-70339, 19-70341, and 19-70344

IN THE UNITED STATES COURT OF APPEALS FOR THE NINTH CIRCUIT

Sprint Corporation,
Petitioner,
v.
City of Bowie, Maryland, et al.,
Intervenors,
v.
Federal Communications Commission
and United States of America
Respondents.

On Petition for Review of Order of the
Federal Communications Commission

AMICUS BRIEF OF THE BERKSHIRE-LITCHFIELD ENVIRONMENTAL COUNCIL (BLEC) AS *AMICUS CURIAE* IN SUPPORT OF PETITIONER MONTGOMERY COUNTY, MARYLAND

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CORPORATE DISCLOSURE STATEMENT

Amicus curiae The Berkshire-Litchfield Environmental Council (BLEC) has no parent corporation. It has no stock, and therefore, no publicly held company owns ten percent (10%) or more of its stock.

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INTEREST OF THE *AMICUS CURIAE*[1]

The Berkshire-Litchfield Environmental Council (BLEC) is a 501(c)(3) non-profit organization that focuses on environmental issues affecting the Northwest Corner of Connecticut and the Berkshires region of Massachusetts. BLEC addresses diverse environmental subjects, particularly infrastructure, including the environmental effects of low-level radiofrequency radiation (RFR) to humans and myriad other species associated with the siting of telecommunications infrastructure. Founded in 1970, BLEC holds educational forums on emerging environmental issues with speakers from federal agencies and researchers from around the world.

BLEC President, Starling W. Childs, is a lecturer at the Yale School of Forestry and President of EECOS Inc. Environmental Consultants. Mr. Childs has been a consultant on numerous infrastructure projects throughout the country. He has lectured on the environmental effects of electromagnetic fields to flora and fauna.

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[1] All parties consent and/or do not oppose the filing of this brief. No counsel of any party to this proceeding authored any part of this brief. No party or party's counsel, or person other than amicus and its members, contributed money to the preparation or submission of this brief.

BLEC Communications Director, Ms. B. Blake Levitt, is a longtime medical/science journalist, author, and former New York Times contributor. She is also co-author, with Dr. Henry C. Lai, of *Biological effects from exposure to electromagnetic radiation emitted by cell tower base stations and other antenna arrays*.[2]

The signatories of supporters of this *Amicus Curiae* Brief are listed in Exhibit S attached to the Appendix being filed concurrently herewith.

INTRODUCTION AND SUMMARY OF ARGUMENT

Amicus addresses the court in support of MONTGOMERY COUNTY, MARYLAND v. FEDERAL COMMUNICATIONS COMMISSION and UNITED STATES OF AMERICA, PETITION FOR REVIEW, regarding the inadequacy of FCC's radiofrequency radiation (RFR) standards to protect public health in light of FCC rulings promoting 5G development as written *In the Matter of Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure*

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[2] B. Levitt, et al., *Biological effects from exposure to electromagnetic radiation emitted by cell tower base stations and other antenna arrays*, ENVIRON. REV. (2010), http://www.nrcresearchpress.com/doi/pdf/10.1139/A10-018 (**Exhibit A**).

Investment, Declaratory Ruling and Third Report and Order (WT Docket No. 17-79; WC Docket No. 17-84; FCC 18-133), and released on September 27, 2018.

The FCC's Order substantially reduces the ability of Petitioner Montgomery County, Maryland ("Petitioner"), and local/state governmental entities across the country, to manage telecommunication carriers' rights to access, occupy, and use government property and rights-of-way. The FCC adopted this Order without adequately addressing comments submitted by Petitioner and other interested parties. Notably, the FCC inadequately addressed Petitioner's comments regarding the FCC's existing, and outdated, radiofrequency emission standards and their ability to sufficiently protect the health and safety of citizens residing in Montgomery County, Maryland.

Amicus respectfully submits this brief to demonstrate the necessity of updating the FCC's outdated public safety limits to account for biologically based standards which reflect the health impacts of chronic exposure to low-intensity, non-thermal, wireless radiofrequency microwave radiation, especially in light of the anticipated implementation of 5G wireless technologies.

Given the negative biological and environmental effects of chronic exposure to low-intensity, non-thermal radiofrequency radiation related to 5G wireless technologies, as demonstrated by multiple studies, it is vital that this Court set aside the FCC's Order until the FCC updates its standards to adequately protect the health and environmental concerns of Montgomery County, Maryland and local/state governmental entities alike.

ARGUMENT

I. The FCC Has A Historic Pattern of Disregarding Safety Issues Related to Radiofrequency Radiation.

The FCC voted to expedite the buildout of the 5G communications network in 2016. This was endorsed by then Chairman Thomas Wheeler on public record at the National Press Club when he stated the FCC wanted the U.S. to be "… first out the gate …" adding that "… Turning innovators loose is far preferable to expecting committees and regulators to define the future."[3] Chairman Wheeler indicated disregard for regulatory processes, especially those within FCC's

[3] *Prepared Remarks of FCC Chairman Tom Wheeler, 'The Future of Wireless: A Vision for U.S. Leadership in a 5G World'* (June 20, 2016), https://transition.fcc.gov/Daily_Releases/Daily_Business/2016/db0620/DOC-339920A1.pdf (**Exhibit B**).

purview for protecting the public's health, safety and welfare.

The problems in Chairman Wheeler's logic were obvious, most notably that the FCC is a licensing and engineering entity that *relies* on other agencies for guidance outside of FCC's range of expertise. It has no fundamental right to move ahead without it. FCC is the first to point out that it is not a health or environmental agency, yet it is lauding innovators over those very regulators who know far more about the subject of safety. FCC's clearly stated intention was to circumvent its statutory deference to those other agencies which are capable of slowing down 5G's buildout.

Thus FCC, rather than follow traditional legal mandates for careful, thorough review, committed instead to the buildout of a whole new wireless network, using novel frequency ranges and unusual wave propagation characteristics in a new/untested technology, with unknown global consequences far into the future. FCC's approach is guaranteed to create another ubiquitous layer of radiofrequency radiation (RFR) – a biologically active exposure – in frequencies not now in widespread use. At a time when other industrialized countries

are calling for caution regarding wireless exposures[4], the U.S. is going in the opposite direction as evidenced by Chairman Wheeler's enthusiasm for 5G, which intentionally avoided any in-depth review. This enthusiasm for 5G with no oversight has only intensified at FCC under current Chairman Ajit Pai.

Knowledgeable professionals have been addressing FCC over RFR safety and infrastructure siting issues for decades, only to be met with the same institutional disregard. Recent examples include filings at FCC by amicus, as well as the BioInitiative Working Group and many others. The BioInitiative Working Group is a collaborative of international scientists based in the U.S. that has provided, through Cindy Sage, MA, co-editor along with David O. Carpenter, MD., and principal author of the BioInitiative Reports (2007 and 2012) and a founder of the international BioInitiative Working Group, expert testimony and scientific briefings to: The European Environmental

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[4] Don Maisch, *Are community concerns over the 5G network rollout based on unfounded anxiety or valid evidence?* (May 2, 2019), https://betweenrockandhardplace.wordpress.com/2019/04/25/guest-blog-from-dr-don-maisch-australia-are-community-concerns-over-the-5g-network-rollout-based-on-unfounded-anxiety-or-valid-evidence/ (**Exhibit C**).

Agency (Denmark), European Commission (Brussels), UK Health Protection Agency, UK Children with Leukemia registered charity, various international health agencies, U.S. Department of Justice, FCC, FDA, public utilities commissions, LEED, state legislative committees, and numerous state and municipal agencies and commissions.

There were over 900 responses to FCC's request for comments in 2013 regarding their review of RFR exposures, a majority urging FCC to upgrade to a more protective model. Comment examples include:

- In 2013, amicus B. Blake Levitt filed comments with Henry C. Lai, Ph.D., calling for stricter radiofrequency radiation exposure standards in: The Matter of Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies and Proposed Changes in the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields.[5]
- In 2016, amicus filed comments at FCC re: Proceedings 14-177, 15-256, 10-112, and 97-95[6] regarding then FCC Chairman

[5] Comments for ET Docket Nos. 013-84, 03-137 (filed Aug. 24, 2013), https://ecfsapi.fcc.gov/file/7520939733.pdf (**Exhibit D**).

[6] Comments for ET Docket Nos. 14-177, 15-256, 10-112, 97-95 (filed

Thomas Wheeler's call for comments on 5G.

- In 2013, Cindy Sage, MA filed comments with Lennart Hardell, MD, Ph.D., and Martha Herbert, MD, Ph.D., on behalf of the BioInitiative Working Group opposing the proposed relaxation of public safety standards based on evidence for brain tumors, damage to sperm and reproduction, and fetal and neonatal harm in: The Matter of Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies (ET Docket No. 13-84), and Proposed Changes in the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields (ET Docket No. 03-137).[7]
- In 2013, Cindy Sage, MA filed comments with David Carpenter, MD on behalf of the BioInitiative Working Group calling for biologically-based public exposure standards addressing

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Jul. 12, 2018), http://nebula.wsimg.com/d47146dc1eb6dede8e10446de2df0507?AccessKeyId=045114F8E0676B9465FB&disposition=0&alloworigin=1 (**Exhibit E**).

[7] Comments for ET Docket Nos. 013-84, 03-137, https://ecfsapi.fcc.gov/file/7520940711.pdf (**Exhibit F**).

nonthermal (low-intensity) chronic exposure to radiofrequency microwave exposure in: The Matter of Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies (ET Docket No. 13-84), and Proposed Changes in the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields (ET Docket No. 03-137).[8]

- In 2014, Cindy Sage, MA filed Reply Comments with David Carpenter, MD on behalf of the BioInitiative Working Group documenting that there is no reasonable basis for time-averaging nor spatially averaged measured values of radiofrequency radiation, and that the biologically-relevant time period during which pulsed RF causes disruption of key biological systems should be the basis for determining acceptable safety limits in: The Matter of Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies (ET Docket No. 13-84), and

[8] Comments for ET Docket Nos. 013-84, 03-137, https://ecfsapi.fcc.gov/file/7520939956.pdf **(Exhibit G).**

Proposed Changes in the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields (ET Docket No. 03-137).[9]

- In 2017, Cindy Sage, MA filed comments with Lennart Hardell and David Carpenter on behalf of the BioInitiative Working Group opposing the FCC's proposal to streamline siting of new wireless facilities without the FCC first completing its ongoing investigations into health impacts of human exposure to radiofrequency electromagnetic fields in: FCC Docket 16-421 *Streamlining Deployment of Small Cell Infrastructure by Improving Wireless Siting Policies.*[10]

Most of the concerns today are in the health and environmental categories when it comes to the effects of wireless technologies, not on how to make the technology work. Radiofrequency radiation is highly biologically active across a range of frequencies and intensities. The 5G system is designed at present to function in the Super High Frequency

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[9] Comments for ET Docket Nos. 013-84, 03-137, https://ecfsapi.fcc.gov/file/7520957942.pdf (**Exhibit H**).

[10] FCC Docket 16-421 https://bioinitiative.org/small-cell-antenna-rollout/ (**Exhibit I**).

(SHF) and the Extremely High Frequency (EHF) gigahertz (GHz) ranges using millimeter waves between 3 GHz and 300 GHz, at or below intensities allowed by current FCC exposure limits, but that should instill no confidence. The current FCC standards were designed to prevent heating (thermal effects), shock and electrocution; FCC standards are for acute high-intensity, short-term exposures capable of heating tissue in adults. There are no FCC exposure limits (yet) for nonthermal, low-intensity chronic exposures. While most exposures today are long-term, chronic, and low-intensity, a systematically growing body of evidence[11] finds those to be as biologically active, if not more so, than the thermal effects regulated today. The 5G system, which will require literally millions of new antennas mounted everywhere, is exactly the kind of exposure that most alarms

[11] Joel Moskowitz, *Scientific and policy developments regarding the health effects of electromagnetic radiation exposure from cell phones, cell towers, Wi-Fi, Smart Meters, and other wireless technology* (last updated June 10, 2019), https://www.saferemr.com.

scientists,[12] legislators,[13,14,15,16] and citizens alike.[17]

In light of the $28-million multi-year study released in 2018 by

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[12] Martin Pall, *5G: Great risk for EU, U.S. and International Health! Compelling Evidence for Eight Distinct Types of Great Harm Caused by Electromagnetic Field (EMF) Exposures and the Mechanism that Causes Them* (2018), https://einarflydal.files.wordpress.com/2018/04/pall-to-eu-on-5g-harm-march-2018.pdf.

[13] Sen. Blumenthal Press Conference (Dec. 3, 2018), http://www.ctn.state.ct.us/ctnplayer.asp?odID=15794&fbclid=IwAR2MoOv8RN8BmqbmFwjbzDPVO2PddCnwg-h0BiuudyStgvfO2sh_seBmp_E.

[14] *At Senate Commerce Hearing, Blumenthal Raises Concerns on 5G Wireless Technology's Potential Health Risks* (Feb. 7, 2019), https://www.blumenthal.senate.gov/newsroom/press/release/at-senate-commerce-hearing-blumenthal-raises-concerns-on-5g-wireless-technologys-potential-health-risks.

[15] *Eshoo Introduces Legislation to Restore Local Control in Deployment of 5G* (Jan. 15, 2019), https://eshoo.house.gov/news-stories/press-releases/eshoo-introduces-legislation-to-restore-local-control-in-deployment-of-5g/.

[16] Letters from Congress to FCC (**Exhibit K**): **(1)** Sens. Feinstein and Blumenthal to FCC Chairman Ajit Pai (Jan. 30, 2019), https://www.feinstein.senate.gov/public/_cache/files/2/6/26b80f01-7ca7-46ce-b26e-c9863a6ecbea/80446A9A6B1AEE016FE9E8C064E68C25.1.30.19-df-blumenthal-letter-to-pai-re-5g.pdf (frivolous lawsuits); **(2)** Rep. Peter DeFazio to FCC Chairman Ajit Pai (Apr. 15, 2019), https://www.eugene-or.gov/DocumentCenter/View/46057/Rep-Peter-DeFazio---Letter-to-FCC-on-5G (5G health effects and RF proceeding); and **(3)** Rep. Thomas R. Suozzi to FCC Chairman Ajit Pai (Apr. 16, 2019), https://docs.fcc.gov/public/attachments/DOC-357620A5.pdf (5G, NTP, and RF standards).

[17] Lloyd Burrell, *Citizens Up In Arms Against 5G Wireless Tech Roll Out: Are Their Concerns Justified?*, GREENMEDINFO (Mar. 27, 2018), http://www.greenmedinfo.com/blog/citizens-arms-against-5g-wireless-technology-roll-out-are-their-concerns-justified.

The National Toxicology Program (NTP) at the National Institutes of Health (NIH), which found a causal relationship between RFR in cell phone frequencies and malignant brain cancers (glioma), as well as malignant nerve tumors (schwannomas) of the heart in male rats,[18] amicus and supporters strongly recommend that the courts demand FCC apply the brakes and not move forward until all of the current biological information is taken into consideration, *biologically based standards are enacted that are more stringent than today's,* and the appropriate agencies consulted. To do otherwise is a severe overreach of FCC's traditional role in responsibly managing the nation's airwaves. Current FCC rulings throw all sane caution to the wind regarding small cell siting and violate longstanding federal laws requiring extensive review in advance of such FCC actions.

II. 5G Is Unlike Any Communications Technology Previously Implemented.

5G stands for "Fifth Generation" – a massively complex network of machine-to-machine communications made up of cloud-based wireless

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[18] *Cell Phone Radio Frequency Radiation,* NATIONAL TOXICOLOGY PROGRAM (Nov. 2018), http://ntp.niehs.nih.gov/results/areas/cellphones/index.html.

transceivers, ground-based fiber-optic wires and wireless antenna systems that will enable full buildout of the "Internet of Things," including driverless cars, interconnectivities between cell phones and 'smart' homes/businesses, and faster telecom services/entertainment to businesses and consumers among myriad applications yet-to-be-imagined. There are serious concerns at all levels of government, in business and many private sectors about such massive interconnectivity regarding cybersecurity, safety, health, privacy, and liability to investors – concerns that may be irreconcilable given how technology will function in the hyper-connected 5G world. One of the world's largest insurance companies has classified 5G mobile networks as "HIGH" level emerging risk to the global insurance and reinsurance industry[19] due in part to health issues.

Spectrum allocated for 5G is spread across a range of frequencies between the Super High Frequency (SHF) and the Extremely High Frequency (EHF) bands between 3 GHz and 300 GHz, also known as

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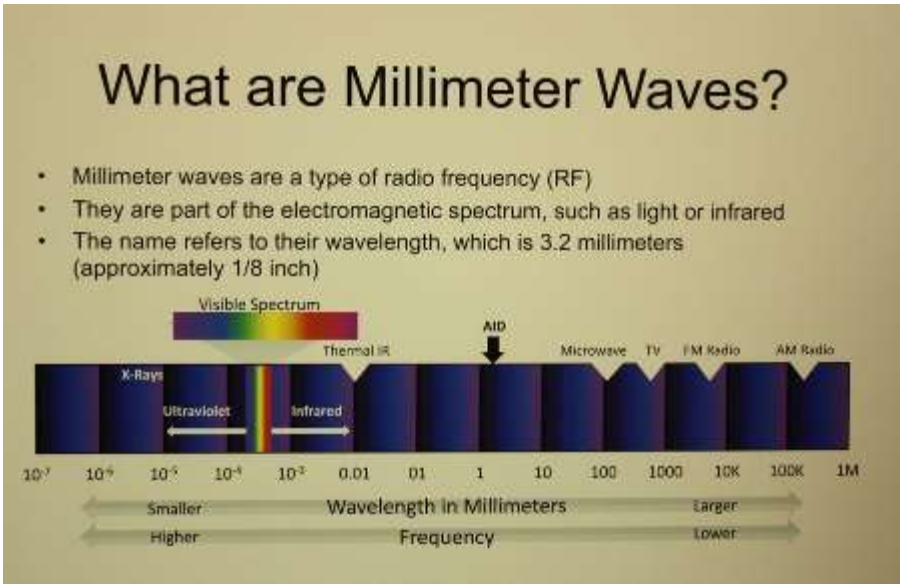
[19] *Swiss Re Institute's 2019 SONAR report examines new and "slow-burner" emerging risks like the public health implications of climate change* (May 22, 2019), https://www.swissre.com/media/news-releases/nr-20190522-sonar2019.html.

millimeter wave (MMW) bands. Current cell technology functions in the Ultra High Frequency (UHF) bands between 300 megahertz (MHz) and 3 GHz. 5G may end up functioning close to the lower regions of the laser frequencies visible to other species. These upper ranges are in fact the only area of the nonionizing bands of the electromagnetic spectrum that are relatively untouched. Most others are completely filled in with civilian, government, and military uses. The FCC has licensed frequencies at 24, 28, 37, 39 and 47 GHz, and plans to open spectrum up to 90 GHz for 5G.



The FCC also plans to open up multiple wide areas of other bands for 5G too. This is the first time since the advent of telecommunication in the 1990's that the FCC has opened this much spectrum – more than

the 1-through-4G systems combined. 5G makes use of digitized millimeter waves (MMW) that function best in narrow beams/bands that do not wrap well around obstacles like buildings, is easily deflected by trees, weather, and structures, and has poor penetration ability. But new antenna designs have overcome those limitations and can now aim and process the radiation into coherent signals that easily penetrate buildings, people, and all flora and fauna. According to Chairman Wheeler in 2016, 5G will require millions of new antennas, as well as hundreds of billions of microchips. He called 5G "infrastructure intensive."[20]

5G system(s), although markedly different in every conceivable way from former generations of communications technology, currently fall under the same restrictions of the Telecommunications Act of 1996 that prohibited states and communities from taking the "environmental effects" of radiofrequency radiation into consideration in infrastructure siting if the emissions are within FCC limits.[21] This is an egregious mistake because 5G is unlike anything we have ever seen before.

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[20] *See* n.3.

[21] *FCC Fact Sheet: New National Wireless Tower Siting Policies* (Apr. 23, 1996), http://wireless.fcc.gov/fact1.pdf.

Not only are the frequencies allocated for 5G in much higher electromagnetic spectrum ranges than anything used for civilian telecommunications before, but because signal propagation is so difficult in the MMW bands, 5G uses untested beam-steering technology that follows the device, not the user, and signaling characteristics like phased array with time-varying overlapping wave banks that hit living cells constantly from multiple angles, and at speeds so fast that there is no possible biological recovery time between exposures. Phased array signaling is known to cause unusual biological effects, capable of delivering RF energy deep within body tissue[22], not just the superficial skin-deep effects FCC assumes. 5G is quite simply the most labyrinthine wireless network ever created. There is already discussion of 6G with telecoms using even higher laser frequencies that other species can actually see – all without environmental review under NEPA. The higher the frequency, the more inherent power it packs, capable of physiological effects. Yet no specific allowance is being made at FCC for any of these differences regarding 5G exposures or rewriting the standards accordingly. When the standards were enacted in 1996,

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[22] *See* n.4.

such exposures to the general population at such close proximity as small cells bring, were unimaginable.

Even pre-5G small cells are problematic. Small cells, mostly using 4G technology, are being installed on utility poles in neighborhoods within mere feet of people's homes.[23] While 4G bears little resemblance to 5G, incorporated into 4G's newest antenna designs are hundreds of tiny 5G antennas that can be remotely activated at will. Thus, 4G small cells today are Trojan horses for 5G.

Toward the 5G initiative, the FCC also enacted rules being challenged in this court[24] that gave distributed antenna systems (DAS) and small cell technology – precursors of how 5G will operate in combination with fiber-optic cable – expedited review at the local level for both environmental effects (NEPA) and national historic significance

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[23] *FAQ about Wireless Facilities on Wooden Utility and Wooden Streetlight Pole* (Dec. 2015), http://default.sfplanning.org/currentplanning/wireless/FAQ_Wireless_Facilities_on_Poles.pdf (**Exhibit L**).

[24] *Acceleration of Broadband Deployment by Improving Wireless Facilities Siting Policies Acceleration of Broadband Deployment: Expanding the Reach and Reducing the Cost of Broadband Deployment by Improving Policies Regarding Public Rights of Way and Wireless Facilities Siting 2012 Biennial Review of Telecommunications Regulations*, WT Docket Nos. 13-238, 11-59, 13-32 (adopted Oct. 17, 2014, released Oct. 21, 2014).

(NHPA). These are historically sacrosanct tools that local governments use to determine suitability for any proposal, not just telecomm infrastructure.

That this buildout will bring increasing levels of RFR to the living environment is a given at a time when there are serious concerns in many countries about just such exposures. Yet former FCC Chairman Wheeler showed marked disregard toward other countries that have elected to study 5G's effects before buildout. Chairman Wheeler expressly said that technology should drive policy, not the other way around. The U.S., therefore, will be the first nation to give total license to the companies that stand to profit most, with virtually no scrutiny for safety.

Both former FCC chairman Wheeler and current chairman Ajit Pai see FCC's role as making spectrum available but thereafter letting the technology sector take the lead. As such, 5G will basically be unregulated for health effects. And since FCC appears averse to micromanaging technological development, that means we are missing a critical opportunity to make recommendations or requirements for safer devices and infrastructure.

A deep "sleeper" issue afoot at FCC concerns the increase in *unlicensed* RFR uses and exposure allowances that play a critical role in 5G. FCC intends to increase the RFR exposure allowances to a less stringent level for unlicensed devices at 100 Watts effective radiating power (ERP) which could include most small cell antennas very close to the population and many devices, thereby increasing RFR with even less overall regulation. No cumulative effects are taken into consideration with unlicensed spectrum.

These are enormous missed opportunities, given what is known – and continuing to emerge – about health and environmental RFR exposures. There's compelling science, at vanishingly low intensities, leading to:

- The 2011 International Agency for Research on Cancer (IARC) at the World Health Organization (WHO) classified RFR as a 2B (possible) human carcinogen.[25] Newer research calls for RFR reclassification as 2A (probable) carcinogen, or to Group 1 (known) carcinogen.

[25] *IARC Classifies Radiofrequency Electromagnetic Fields as Possibly Carcinogenic to Humans* (May 31, 2011), http://www.iarc.fr/en/media-centre/pr/2011/pdfs/pr208_E.pdf.

- The BioInitiative Report[26] concluded in 2007 that the evidence for health risks from electromagnetic fields (EMF/RFR) generated by wireless technologies was sufficient to take public health action, and in 2012 that the evidence had substantially increased since 2007. Based on a review of over 1800 new scientific studies since 2007, current FCC guidelines are inadequate to protect the public from chronic exposure to very low-intensity (non-thermal) electromagnetic fields and EMF/RFR. The 2012 BioInitiative Report was prepared by 29 authors from ten countries. Peer-reviewed author credentials include: 10 MD's, 21 Ph.D.'s, and three MsC, MA or MPH's. Among the authors are three former presidents and five full members of the BioElectromagnetics Society (BEMS). One distinguished author is the chairman of the Russian National Committee on Non-Ionizing Radiation. Another is a senior advisor to the European Environmental Agency.[27] Research Summaries in the BioInitiative Report are further updated in

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[26] *BioInitiative Report,* 2012, http://www.bioinitiative.org.

[27] Full titles and affiliations of authors are in Section 25 of the BioInitiative Report, www.bioinitiative.org.

2014, 2017 and 2019 and include several hundred more peer-reviewed scientific studies.[28]

- The 2015 International Scientists Appeal[29] to the UN/WHO by 247 scientists from 42 nations addressed grave concerns over rising ambient EMF/RFR. Their warnings include all RFR-emitting devices: cell phones, infrastructure, wifi, 'smart' meter/grid technology, devices like baby monitors, and commercial broadcast. The warning extends to 4 and 5G small cells, which may warrant specific exposure standards all of their own.
- The 2017 petition by Swedish scientist Lennart Hardell,[30] signed by over 235 scientists and medical doctors from 36 countries, calling for a EU moratorium on 5G roll-out until human and environmental hazards are investigated by non-industry scientists. Signatories noted 5G will substantially increase cumulative RFR effects on top of existing 2G, 3G, 4G,

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28 https://bioinitiative.org/research-summaries/

29 *The International EMF Scientist Appeal* (May, 11 2015), https://www.emfscientist.org/.

30 *5G Appeal* (updated May, 16, 2019), https://www.5gappeal.eu/about/.

wi-fi, and other exposures. They urged EU to halt 4 and 5G until non-industry scientists show total radiation levels from all sources are safe, especially to children, pregnant women, and the environment.

- The 2017 U.S. National Toxicology Program's (NTP)[31] release of a 16-year, $28-million study that found causal relationships between cell-phone RFR and DNA damage, malignant brain cancers (glioma), and malignant nerve tumors (schwannomas) of the heart in male rats. NTP, the largest long-term low-level RFR study ever conducted, used 2G-type radiation at non-thermal RFR where effects were considered impossible. Newer generation signaling characteristics are even more complex.
- The 2018 Ramazzini Institute study[32] in Italy verified NTP's findings at even lower non-thermal RFR intensities. They also

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[31] *See* n.18.

[32] L. Falcioni, et al., *Report of final results regarding brain and heart tumors in Sprague-Dawley rats exposed from prenatal life until natural death to mobile phone radiofrequency field representative of a 1.8 GHz GSM base station environmental emission,* ENVIRONMENTAL RESEARCH, Vol. 165, pp. 496-503 (Aug. 2018), https://www.sciencedirect.com/science/article/pii/S0013935118300367?via%3Dihub.

found increased brain tumors and schwannomas in both male and female rats though not statistically significant. Consistent with NTP, Ramazzini showed effects are reproducible. Yet FCC, FDA, and industry dismiss the data.

The question is: Why does FCC continue to adhere to an obsolete standard that takes none of the above concerns into consideration – a clear contraindication to public welfare – then misapply an erroneous presumption of safety to an entirely new technology never used before in civilian telecommunications?

III. The FCC Has Been Aware of the Adverse Health and Environmental Effects Caused By Radiofrequency Radiation.

The potential adverse health and environmental effects from nonionizing radiation have been known since the advent of radar used in WW2 aboard U.S. ships when cataracts, numerous cancers and infertility were observed in U.S. Navy midshipmen and radar technicians.[33] Since that time, and especially within the last 25 years, the use of wireless technologies has exploded – all without a clear

[33] B. Levitt, *Electromagnetic Fields, A Consumer's Guide to the Issues and How to Protect Ourselves*, pp.20-21 (Harcourt Brace/Harvest Books 1995).

understanding of the biological implications and without adequate regulatory controls. Ambient nonionizing radiation – a form of energetic air pollution – is the fastest growing environmental pollutant today.

Regulatory agencies – particularly the U.S. Environmental Protection Agency (EPA) which had statutory authority to set standards for ambient nonionizing radiation exposures from EMF/RFR infrastructure – began issuing reports/white papers/studies in the 1970's concerning civilian exposures. For a comprehensive timeline regarding what was known, when, and by whom, as well as actions recommended but never implemented, and how authority was taken away from EPA for the nonionizing bands of the electromagnetic spectrum at the very nexus of the civilian telecom buildout in 1996, see the Environmental Health Trust's website.[34] EPA retains control over

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[34] Environmental Health Trust, *US Government Reports On Cell Phones, Radiofrequency And Electromagnetic Fields*, https://ehtrust.org/policy/us-government-reports-on-cell-phones-radiofrequency-electromagnetic-fields/; *Recent US Government Reports, Congressional Hearings On Wireless And Electromagnetic Radiation*, https://ehtrust.org/recent-us-government-reports-congressional-hearings-on-wireless-and-electromagnetic-radiation/; and *EPA Recommendations And Reports On Cell Phones, Radiofrequency And Electromagnetic Fields*, https://ehtrust.org/epa-recommendations-and-

environmental ionizing radiation for soil and water contamination.

IV. The FCC's Current Standards Cannot Adequately Measure the Effects of 5G Communications Technology.

All living cells function with complex electrical micro-current. The rise in ambient EMF/RFR levels is the single biggest environmental alteration within the last 25 years, speaking the same fundamental energetic language as living cells, leading many scientists today to think artificial EMF/RFR degrades the body's functional electrophysiology balance. 5G's infrastructure-intensive small-cell densification will increase that by orders of magnitude. FCC RFR exposure standards, over 20 years old, do not adequately cover these new exposures, leading even some industry scientists to call for new standards just for 5G.[35]

It is the long-term, low-level, chronic exposures that are rapidly increasing today from all types of wireless devices – cell phones, tablets, 'smart' homes, baby monitors, security cameras, wireless-enabled anti-collision vehicles, 'smart' grid/meters and others. Add to this ambient

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reports-on-cell-phones-radiofrequency-and-electromagnetic-fields/.

[35] Neufeld E., Kuster N., *Systematic Derivation of Safety Limits For Time-Varying 5G - Radiofrequency Exposure Based on Analytical Models and Thermal Dose*, HEALTH PHYSICS, Vol. 115, No. 6 (Dec. 2018).

exposures from all of the infrastructure – cell towers, small cells, and myriad antenna arrays to support 2G, 3G, 4G, 4G LTE (Long Term Evolution) and soon the 5G network creating ubiquitous machine-to-machine connectivity and it is easy to understand why many governments and health agencies outside the U.S. are calling for a precautionary approach before further buildout.

What's more, man-made radiation creates very different kinds of exposures with unusual signaling characteristics like digital pulsing, phased array, and saw-tooth waveforms, and at much higher power intensities than anything found in nature. A myriad of species are known to be exquisitely sensitive to low-level energy[36] and may be affected by these increasing background levels. No federal or state agency has standards to protect wildlife from RFR.[37] 5G could approach

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[36] S. Cucurachi, et al., *A review of the ecological effects of radiofrequency electromagnetic fields (RF-EMF)*, ENVIRONMENT INTERNATIONAL, Vol. 51, pp. 116-140 (Jan. 23, 2013). https://www.sciencedirect.com/science/article/pii/S0160412012002334?via%3Dihub (**Exhibit M**).

[37] Albert M. Manville, II, *What We Know, Can Infer, and Don't Yet Know about Impacts from Thermal and Non-thermal Non-ionizing Radiation to Birds and Other Wildlife* (Jul. 14, 2016), https://ecfsapi.fcc.gov/file/12270470130362/Manville%207-14-%202016%20Radiation%20Briefing%20Memo-Public.pdf (**Exhibit N**).

frequency bands that are actually visible to avian species. Yet FCC has instituted expedited review for environmental effects against NEPA laws.[38]

FCC RFR exposure standards are for acute short-term thermal effects (like a microwave oven cooks food) but today's exposures are long-term, low-level, chronic, and far below that threshold. Although a safety margin is built into the standards, any biological effects below that thermal threshold are simply unregulated for ambient, far-field exposures in particular that result from infrastructure. Complex signaling characteristics like waveform, pulsing, and modulation are not taken into consideration although each has been found to have detrimental biological effects as separate metrics. Cumulative effects from many different devices working simultaneously are also not taken into consideration. (RFR power density and categorical exclusion are considered one product at a time.) Nor does FCC monitor for compliance unless a complaint has been filed. The 5G network will add a whole new layer of ambient RFR exposure that does not now exist – mostly involuntary exposures when it comes to small cell placement near

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[38] *See* n.24.

people's homes.

FCC categorically excludes from review any device or application that falls below a certain power density threshold, which most wireless devices and some infrastructure (like small cells) do. That means there is no true regulatory oversight of nearly all the wireless products in use today with the exception of cell phones which have to meet a threshold for a specific absorption rate (SAR) of energy deposited in tissue.

FCC uses two categories of exposure for how RFR is assessed/regulated: the SAR, which is the rate of energy that is theoretically absorbed by a unit of tissue, and power density which is the intensity of energy in space. Power density is used for far-field exposures like cell towers while SARs are typically used for near-field exposures from devices like cell phones. SARs are generally expressed in watts per kilogram (W/kg) of tissue, while power density is expressed generally in microwatts per centimeter squared (μW/cm2). The SAR measurements are averaged either over the whole body, or over a small volume of tissue, typically between 1 and 10 grams of tissue. The SAR is used to quantify energy absorption to fields typically between 100 kHz and 10 GHz and encompasses RFR from devices such as cell phones up

through diagnostic MRI (magnetic resonance imaging) under the purview of the FDA.

Both measurements have limitations, but power density is a preferable approach compared to SAR as it can be independently verified, measurement equipment is readily available, FCC Bulletin OET 65 has widely accepted calculation formulas, and the public can generally understand this information.

Although SARs may function as a biological model for electric shock, burns and electrocution, they are fundamentally meaningless for low-intensity RFR effects below those thresholds as they only measure heating effects. It is impossible to conduct SAR measurements in living organisms so all values are inferred from dead animal measurements or computer simulation.[39] (Living systems are far more complex than that, and certainly not all living tissue is alike.) SARs also fail to adequately address known effects from modulation, pulsing, and other signaling characteristics.

The scientific panel of the Seletun Report[40] in 2009 unanimously

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[39] *See* n.2.

[40] Fragopoulou, et al., *Scientific Panel on Electromagnetic Field Health Risks: Consensus Points, Recommendations, and Rationales*

agreed that SAR is a poor measurement approach and not suitable as the sole basis for testing/regulating public safety standards. SARs were exclusively used in many key studies reporting increased risk of DNA damage, brain cancer, acoustic neuroma, and reduced sperm quality parameters, among others. SAR measures only one aspect of exposure – heating – while excluding other critical characteristics inherent to biologically active exposures such as frequency and modulation, which provide essential information in understanding EMF biological responses over short and long-term exposures. These include, but are not limited to, effects on nervous system response and tissue/organ development, which are not predicated on tissue heating. Using exclusive SAR measurements may actually hinder the creation of biologically protective limits and therefore are not recommended for use in standards setting models.

The bottom line: The entire basis upon which FCC regulates is fundamentally an engineering model, not a true biological one.[41]

Scientific Meeting: Seletun, Norway, November 17-21, 2009 REVIEWS ON ENVIRONMENTAL HEALTH VOLUME 25 (Nov. 4, 2010).

[41] DEP'T OF HEALTH AND HUMAN SERVS., RF Guideline Issues Identified by Members of the Federal RF Interagency Work Group (Jun. 1999). http://www.emrpolicy.org/litigation/case_law/docs/exhibit_a.pdf

Power density may end up being a better determinant for 5G far-field infrastructure exposures since it can be measured at the generating source. At present, *FCC regulations do not use SAR values above 6 GHz and 5G licenses have already been granted far above 6 GHz with more to come. FCC plans to use power density as the measurement for 5G which is still inadequate in capturing true biological effects particular to 5G.* It is presumed that by controlling the field strength from the transmitting source that SARs will automatically be controlled too, but this may not be true, especially with exposures from small cells so close the population and 5G's unusual signaling characteristics.

Another primary criticism of FCC standards concerns the time-averaging of exposures rather than regulate for short-term peak exposures (typical when devices first transmit), which is the most important biological metric. During the duty cycle, transmitters put out a peak burst of RFR that has been found to exceed FCC limits by orders of magnitude. (Cell phone manufacturers tell consumers not to hold a functioning cell phone against the body or it too may exceed FCC limits.) Yet that peak is averaged away into the duty cycle's lower

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(Exhibits O1 and **O2**).

exposures and essentially disappears into what is deemed "safe."

The proposed 5G network will contain high peak exposures[42] of its own that will also be lost in the background averaging of how FCC regulates. There is no reasonable basis for time-averaging and/or spatially averaging measured values as the sole basis for protection against chronic exposures. Pulsed RFR health effects require development of protective limits that control chronic exposure for *peak* values, not watered-down time-averaged exposures.

Of critical importance is the fact that because of the high peak exposure, *5G may even exceed FCC's thermal limits*.[43] Permanent tissue damage from heating may occur even after short exposures to 5G millimeter wave pulse trains (where repetitive pulses can cause rapid, localized heating). Even industry researchers are warning that there is an urgent need for new *thermal* safety standards to address the kind of health risks possible with this new technology. If 5G transmissions fail to meet even current short-term acute thermal exposure limits, then 5G's rollout is even more problematic than 5G's low-intensity effects for

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42 *See* n.35.

43 *Id*.

which no operative public safety standards yet exist. This alone will hopefully inspire the Court to ask FCC to hit the pause button until the issue of exposure standards is settled.

The biologically-relevant time period during which pulsed RFR causes disruption of key biological processes should be the basis for determining acceptable safety limits. For example, if biological systems register pulsed RFR as a continuous insult, e.g., by expression of stress proteins (or heat shock proteins), or by disruption of normal electrophysiology or neural synchrony, or by oxidative damage or mitochondrial cell function disruption, then the biologically relevant time period in which cells/cell membranes and tissue respond as a continuous insult must define the safety limit, not just where overt permanent damage is possible as is the case in thermal models.

V. 5G Communications Technology Leads to Negative Biological and Environmental Effects.

The research on EMF biological effects is legion. Research at non-thermal levels conducted over the last 20 years since FCC instituted its standards shows effects to: DNA, cell membranes, gene expression, neuronal function, the blood brain barrier, melatonin production, sperm damage, learning impairment, and immune system function. Known

adverse effects to humans include infertility, neurogenerative changes, numerous cancers, and heart rate variability. For some this is not theoretical. Near towers and in classrooms with Wi-Fi, people have experienced headaches, increased noise sensitivity, rashes, nausea, exhaustion, muscle weakness, lower libido, premature bone aging, concentration and memory problems, and hyperactivity. Prenatal exposures have led to ADD and autism-like effects in test animals.

In 2012, in twenty-four technical chapters, the BioInitiative Working Group authors discussed the content and implications of about 1800 new studies since 2007.[44] Overall, these new studies report abnormal gene transcription (Section 5); genotoxicity and single and double strand DNA damage (Section 6); stress proteins because of the fractal RF-antenna like nature of DNA (Section 7); chromatin condensation and loss of DNA repair capacity in human stem cells (Sections 6 and 15); reduction in free-radical scavengers – particularly melatonin (Sections 5, 9, 13, 14, 15, 16,17); neurotoxicity in humans and animals (Section 9); carcinogenicity in humans (Sections 11, 12, 13, 14, 15, 16, 17); serious impacts on human and animal sperm

44 *See* n.26.

morphology/function (Section 18); effects on the fetus, neonate and offspring (Sections 18,19); effects on brain and cranial bone development in the offspring of animals that are exposed to cell phone radiation during pregnancy (Sections 5, 18); and findings in autism spectrum disorders consistent with EMF/RFR exposure effects. Global precautionary actions that have been taken in countries around the world and recommended by medical/research experts are documented in Section 22. Use of the Precautionary Principal and its relevance are presented in Section 23. Key scientific evidence and public health policy recommendations are in Section 24.

Numerous effects to wildlife are also seen. Birds suffer disorientation near cell towers. European studies found adverse effects in avian breeding, nesting, and roosting, and documented nest and site abandonment, plumage deterioration, locomotion problems, plus deaths in house sparrow, white stork, rock dove, magpie, collared dove, and other avian species from microwave RFR. Under laboratory conditions, U.S. researchers found non-thermal radiation from standard cell phone frequencies were lethal to domestic chicken embryos. Other affected species include bats, amphibians, insects, and domestic animals - even

plant/tree flora are susceptible. RFR created increased bacterial antibiotic resistance, and fruit flies showed morphological abnormalities and decreased survival.[45] The tiny millimeter waves used in 5G will be particularly devastating to insects and thin-skinned amphibians as they couple maximally with skin tissue. Exhibit P attached to the Appendix being filed concurrently herewith contains a chart compiled by Levitt and Lai[46] of biological effects at extremely low intensities comparable to 5G infrastructure. These exposures cannot be considered biologically inactive.

CONCLUSION

Given industry influence at all levels of government, only the courts can remedy this situation. We urge the Court to stop FCC from conducting business as a captured agency of the industry it is supposed to regulate.[47] There are safe ways to live with and encourage technology, but blind 5G technophoria at FCC is not it. The FCC is

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45 *See* n.37.

46 *See* n.2.

47 Norm Alster, *Captured Agency: How the FCC Is Dominated by the Industries It Presumably Regulates*, http://ethics.harvard.edu/files/center-for-ethics/files/capturedagency_alster.pdf.

supposed to manage the airwaves for the common good. They have also been given control over a critical public health issue that daily affects our lives, even as FCC has no health authority, and essential agencies with that expertise, like EPA, are no longer up to their advisory roles. FCC seeks FDA advice but historically FDA controls for devices, not ambient environmental exposures from infrastructure. FCC intentionally facilitating an unknown/untested technology that could essentially go unregulated other than via spectrum allocation, is not what the public wants from FCC, which has been given oversight for RFR *safety*. 5G's consequences must be much clearer before moving forward. In today's polarized political climate, this is not a public safety question that can be directed toward a legislative solution. Regulatory agencies like FCC are failing the public, or, like EPA, have been silenced. There is only a legal solution under these very specific circumstances.

In 2004, U.S. Senator Richard Blumenthal (D-CT), then the state's attorney for Connecticut, wrote an amicus brief that delineated many of the same questions now before this Court – questions all disregarded by

FCC then and now.[48] There is a longstanding FCC pattern of negligence regarding state/local rights and inadequate exposure standards that only the courts can remedy today. It is long past time to solve this problem, which is only getting worse as each new layer of technology appears.

In 2013, the FCC called for comments regarding their review of cell phone and RFR exposure limits to which they received over 900 responses. But there is intense pressure to make the current inadequate standards *even more lenient*.[49] Industry's goal is to "harmonize" U.S. standards with those from the International Council on Nonionizing Radiation Protection (ICNIRP) – a self-assigned group of industry engineers and physicists – with standards that are more lenient in key exposures than the current FCC standards. The ICNIRP

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[48] *Amicus Curiae* Brief Of the State Of Connecticut In Support Of Petitioner EMR Network's Petition for Writ Of Certiorari, Richard Blumenthal, Attorney General of Connecticut, IN THE SUPREME COURT OF THE UNITED STATES, OCTOBER TERM, 2004, EMR NETWORK (*Petitioner)* v. FEDERAL COMMUNICATIONS COMMISSION and UNITED STATES OF AMERICA, No. 04-1515, 2004. (**Exhibit R**).

[49] Personal communication of B. Blake Levitt and Robert F. Cleveland, Jr., Office of Engineering and Technology, Federal Communications Commission (2000).

standard is widely used throughout Europe and elsewhere. Conflicts of interest among members are currently being challenged in Europe.[50]

For these many reasons, *Amicus Curiae* requests that this Court:

- Direct FCC to develop standards based on true biological models, not on their current dosimetry models of how to make communications systems work with the least amount of transmitted power necessary.[51] Questions now are biological regarding consequences to living systems in the path of technology.
- Direct FCC to upgrade their standards to a biologically based model in power density measurements that specifically regulate for non-thermal, low-intensity effects, and chronic, cumulative exposures from myriad sources in child as well as adult models; *and under no circumstances allow standards to become more*

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[50] Sage C., et al., *Comment on SCENIHR: Opinion on Potential Health Effects of Exposure to Electromagnetic Fields*, Bioelectromagnetics 36:480-484, 2015: https://bioinitiative.org/rebuttal-emf-effects/ and https://bioinitiative.org/advisors-committee/.

[51] Sage, C., et al., *Public Health Implications of Wireless Technologies*, PATHOPHYSIOLOGY, Vol. 16, Issues 2–3, Pages 233-246 (Aug. 2009), https://doi.org/10.1016/j.pathophys.2009.01.011.

lenient.

- Direct FCC to include true signal propagation characteristics in their standards: modulation, pulsing, phasing, and especially non-averaged peak exposures, among others.
- Direct FCC to halt 5G buildout until exposure standards that truly apply to 5G are developed by unbiased sources and implemented.
- Direct FCC to abide by, and allow municipalities, to exercise their planning and zoning authorities in full, including National Environmental Policy Act (NEPA) and National Historic Preservation Act (NHPA) reviews for all small cells and 5G.
- Include a request for new research appropriations by unbiased, independent government agencies, as well as a recommendation to refund the agencies that FCC relies upon to help them make such determinations. EPA, NIH and the U.S. Fish & Wildlife Service should have funding for new research/labs permanently dedicated to EMF research that is arm's length from industry. A $1 per/year charge to cell phone

bills, overseen by FCC, would adequately fund those initiatives.

Dated: June 17, 2019

Respectfully submitted,

/s/ Sblend A. Sblendorio

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STATEMENT OF RELATED CASES

This case (19-70147) has been consolidated with the following actions seeking judicial review of the Small Cell Order:

Sprint Corp. v. FCC, No. 19-70123
Verizon Commc'ns, Inc. v. FCC, No. 19-70124
Puerto Rico Telephone Co. v. FCC, No. 19-70125
City of Seattle v. FCC, No. 19-70136
City of San Jose v. FCC, No. 19-70144
City and County of San Francisco v. FCC, No. 19-70145
City of Huntington Beach v. FCC, No. 19-70146
AT&T Services, Inc. v. FCC, No. 19-70326
Am. Public Power Ass'n v. FCC, No. 19-70339
City of Austin v. FCC, No. 19-70341
City of Eugene v. FCC, No. 19-70344
AEPSC v. FCC, No. 19-70490

In addition, *United Keetoowah Band of Cherokee Indians, et al. v. FCC,* No. 18-1129 (D.C. Cir.) is currently pending before the United States Court of Appeals for the District of Columbia. This case seeks judicial review of a different FCC order (*In the Matter of Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment; see* 2018 FCC LEXIS 1008 (March 22, 2018)). However, Petitioners Natural Resources Defense Council and Edward B. Myers also raise issues related to RF and the FCC's RF standards.

UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

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Signature */s/ Sblend A. Sblendorio* **Date** June 17, 2019
*(use "*s/[typed name]*" to sign electronically-filed documents)*

CERTIFICATE OF SERVICE

I hereby certify that on June 17, 2019, I caused the foregoing Amicus Brief of The Berkshire-Litchfield Environmental Council (BLEC) to be electronically filed with the Clerk of Court for the United States Court of Appeals for the Ninth Circuit using the CM/ECF system. I further certify that all participants in the case are registered CM/ECF users and will be served electronically via the CM/ECF system.

/s/ Sblend A. Sblendorio
Sblend A. Sblendorio