

5G: FACTS and FALLACIES

Introduction

5G (fifth-generation) telecommunications networks are being **pushed** as game-changing: the next big thing; the “inevitable best” move in mobile computerised technology evolution that will solve our ever-growing technology needs and allow for faster more powerful connectivity. With its catch phrase “the internet of Things,” it is claimed to be the best way to automate items such as smart homes and self-drive vehicles. [1] [2]

There are, however, **big problems** with 5G technology:

- The technology that 5G is based on operates on a “line-of-sight path” which means a **huge new infrastructure** is required to make it operational.
- There is a vast and growing body of research evidence that 5G technology **damages all biological life**.
- 5G is being rolled out quickly with **no safety assessments** having been completed with total disregard to the **life damaging effects** of this technology.

Importantly, there are other solutions to our growing mobile data transmission demands:

- There is an existing infrastructure of fibre optic cable in place that can be fully utilised to serve and provide us with ‘cleaner’ mobile computerised technology needs.

In this briefing paper, **these** arguments will be expanded and alternative solutions will be put forward, focusing on the following aspects:

1. The context and limitations of 5G
2. Proposed solutions to overcome the limitations of 5G
3. The effects of radiation from 2G, 3G and 4G
4. The effects of radiation from 5G
5. The need to ban 5G
6. What can you do?

1. The context and limitations of 5G

Mobile communications radiation falls within the Electro Magnetic Field (EMF) spectrum of the Radio Frequency band width and is therefore known as Radio Frequency radiation or RF. Our first form of wireless communication was the radio (late 1800s), then TV (introduced in the late 1920s), followed by 1G (1979 and early to mid-1980s) which bought us the very first mobile phones, 2G (1991) which allowed us to text for the first time, 3G (1998) which bought us online and then 4G (2008) which delivered the signal speeds we enjoy today.

5G (to be rolled out in 2020) falls within the terahertz frequency range which is outside of the radio frequency range and operates between microwaves and infer-red waves (at 30-300GHz), (see Fig. 1). This means that 5G operates using **millimetre waves (MMWs)** rather than the longer **microwaves**, used by previous generations. By their nature MMWs give off more heat. Furthermore, MMWs are closer in size to living organisms (insects and bacteria), thus will inevitably interact/interfere negatively with those organisms.¹

Chart Of The Electromagnetic Spectrum

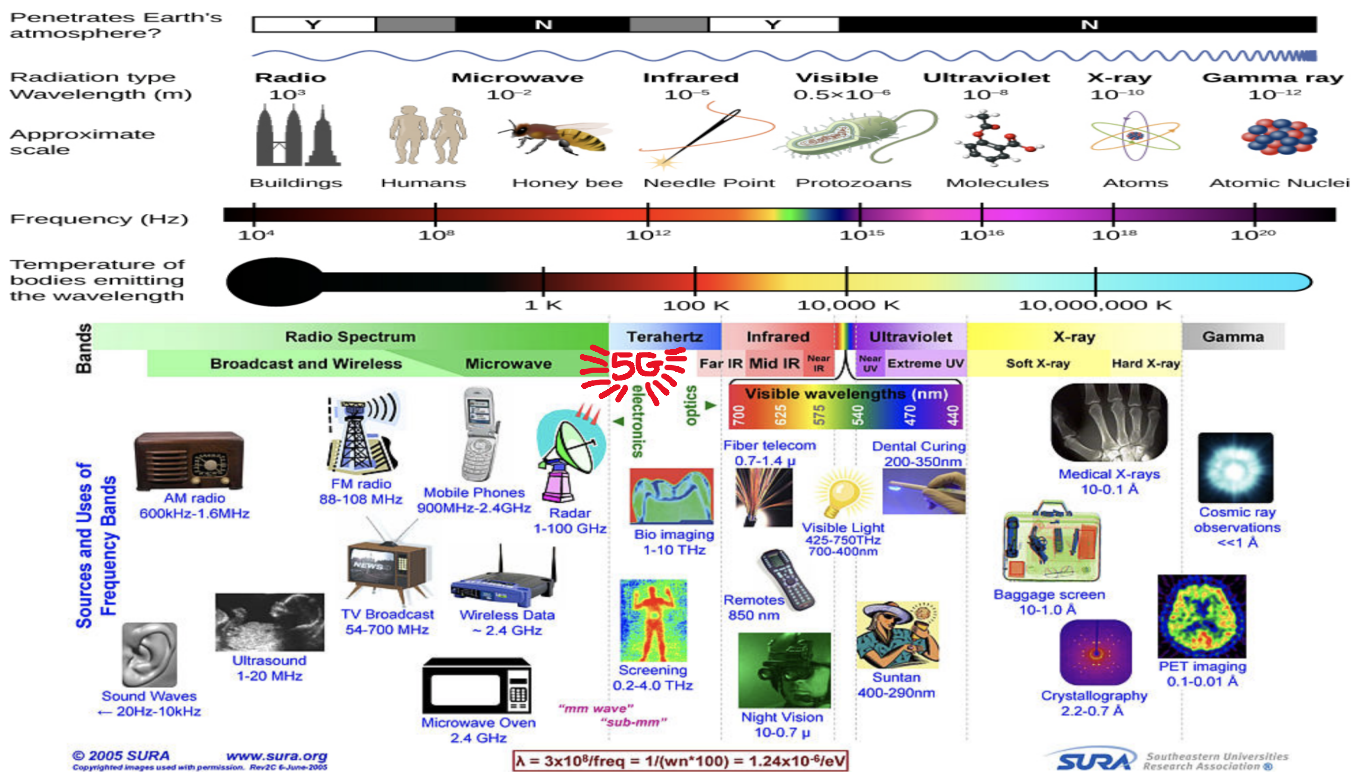


Figure 1: Where 5G falls in the Electromagnetic Spectrum [3]

Although the 5G MMWs do carry more information, these higher frequencies were previously not thought viable for mobile technology because of **the physical property limitations of the MMW signal**. Limitations include:

- Travelling in narrow (pencil thickness) line-of-sight straight paths of up to 914 meters (or 3000 feet);
- Unlike lower frequency radio waves that can travel along the Earth as ground waves, the MMW signal cannot do so nor can it be reflected by the ionosphere;

¹ MMW signals being the same size as most insects create an electrical charge between the MMW and the insect thus will produce tiny shockwaves that will damage eyes, wings, antennae, and other delicate body parts. 5G communications have to be powerful enough to penetrate buildings so with nowhere to hide and under relentless bombardment, **insects will simply cook** (<https://www.youtube.com/watch?v=zwo2E9b9CiU>).

- At typical power densities, MMWs are **blocked** by **human bodies**, **buildings** and **foliage**. Even water molecules on a damp day can hinder their transmission since MMWs are absorbed by **water**.

Governments and industries involved in the 5G rollout, lured by its technology and the promise of exceptional profitability, appear to be blinded to the immediate threat to public safety. The hype is in danger of obliterating the reality of the potential dangers of 5G to our health and to worldwide ecology.

An examples of typical marketing for 5G include: “The 5G revolution is here”; “Unlocking a \$12 Trillion 5G Cash Rush”; promises of “**22 million new jobs** ...increasing GDP by **\$3.5 trillion** – boosting the US more than the entire UK, French, Canadian, or Indian economies...”; “A tiny sliver of this potential 5G \$12 trillion windfall could change your family's financial status for generations to come...”. [4] [5]

2. Proposed solutions to overcome the limitations of 5G

As the saying goes, *all solutions create new problems* and this could not be truer for the catalogue of problems created by the so-called 5G ‘answer’ to our technology ‘needs’. To overcome the limitations of 5G MMWs a **massive infrastructure is required** (thus more tech hardware, more fitting more jobs, **equating to huge financial incentive**), with various brand-new forms of technology. None of these ‘new technologies’ has been tested for safety and no adequate evaluation of their health/ecology/life damaging effects has been presented.

Ubiquitous small cell base stations placed 250 meters apart throughout cities are required just to allow 5G to work. Current mobile transmitters are placed 43.5miles apart (70km). **The most damaging effects to living organisms occur at the point of RF transmission**, where RF is strongest. [6]

Thousands of these base stations will be erected, on every lamp post, in the roads, on traffic lights, on buses, on cars, on and **inside buildings** (see Fig. 2).²



Figure 2: Small cell base stations attached to lampposts and buildings in North America

² It has been asserted that for 5G to work **1 million** of these sensor base stations **per square meter** would need to be installed. (<https://www.youtube.com/watch?v=bub2iCRkyLE>)

These so called **smart cities** will form dense networks that act like a relay team, receiving signals from base station to base station and sending data. These are likely to adversely affect every home, hospital, school, workplace and every living thing within the vicinity/environment and it is even more alarming that there has been no extensive examination of the potentially devastating impact. [7] [8] [9]

In both Europe and the U.S., individuals living and working in proximity to newly installed 5G towers and antennas have already started experiencing health problems such as insomnia, miscarriage, memory problems and neurological issues, and there are widespread reports of annihilation among insect and bird populations. [10]

Massive MIMO (Multiple-Input, Multiple-Output) describes wireless systems that use dozens of antennas on a single array. Installing so many more antennas to handle cellular traffic also causes significant interference if and when those signals cross. For this reason, 5G stations must incorporate **beamforming to prevent them from stymying themselves**. This is an example of how the 5G solution might create a new problem (see Fig. 3).

Beamforming takes the Massive MIMO signal and fires this concentrated beam **in the direction of the user**.³ If the user has their back to the beam, they will not receive the signal so what beamforming does is bounce the beam off of buildings, triangulating the information so that it can achieve its target. This creates a **saturated environment of 'electromagnetic smog' from 5G**

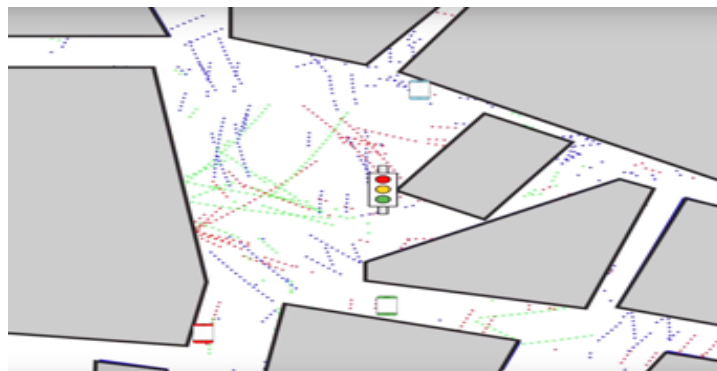


Figure 3: Beamforming: bounces MMWs off buildings, using triangulation to locate the user.

Beamforming technology uses a cluster of **pulsed microwave** antenna beams whose shape and direction can be controlled to an individual beam that can be fired directly at a device, similar to **missile control** (where 5G technology originated). [46] [47] The heat generated by the clustering of antennae is a huge concern. [11]

Full duplex is meant to allow the simultaneous transmission and reception of a signal and in so doing dramatically reduce latency. But this process creates an echo with the potential to generate further drawbacks requiring further technological fixes that are untested and unregulated. [12]

³ These technologies are still in the developmental stages but the entire infrastructure is forecast to have been fully deployed within 5 years

3. The effects of radiation from 2G, 3G and 4G

“The greatest polluting element in the Earth’s environment is the proliferation of Electromagnetic Fields” [13]

Negative health effects of our **current 2G, 3G and 4G** systems have been identified. [12] The World Health Organisation (WHO) data portal has an inventory of nearly 30,000 publications and over 6,000 summaries of individual scientific studies on the adverse effects of electromagnetic frequency (EMF) [50,51,52].

As well as the WHO repository, the potential negative health effects of mobile communications radiation have been addressed by several other **regulatory organizations** including:

- Occupational Safety and Health Administration (OSHA)
- Federal Communications Commission (FCC)
- International Agency for Research on Cancer (IARC)
- Centers for Disease Control and Prevention (CDC)

These regulatory bodies have (individually or collectively) identified potential thermal and non-thermal effects of EMF, including: [15]

Thermal effects:

- Blindness
- Sterility
- Heating of tissues – eyes and testes are particularly vulnerable
- Burns
- Electrical shocks

Non-thermal effects:

- Alteration of body’s circadian rhythms (sleep disturbances)
- Immune system and cell membrane disruptions
- *Possible* carcinogenic to humans⁴
- Interference with medical devices such as pacemakers

Commonly reported **wireless symptoms** include:

- Headaches
- Tinnitus/Ear ringing
- Fatigue
- Cognitive disturbance
- Irritability, increased cortisol/stress

Current policy means that **ALL mobile phones must display a warning** (which can be found under *legal* guidance), advising users to '**hold the phone away from your head when in use and ensure that it is kept at least 5mm away from the body at all times**'.⁴

The current **worldwide safety guidelines** regulating electromagnetic radiation are **20 years old** and are based on the 50-year-old concept that damaging effects of EMF's **are only due to thermal (heating) effects – meaning if it doesn't heat you it is harmless, but there is evidence that biological damage occurs below the heating threshold** ([Radiation Control for Health and Safety Act of 1968](#)). [48] Regulatory policies also do not consider low continuous non-thermal biological and physiological electromagnetic radiofrequency effects on living organisms, despite abundant literature that all EMF radiation is harmful. [16]

➤ **Older populations**

Crucially, radiofrequency radiation-related symptoms occur at levels well below the regulatory body guidelines. The incidence of brain tumours in England has been shown to have increased dramatically between 1995 and 2015 [17] and in all countries which replicated the study [18] Moreover, there is *latency* between electromagnetic RF radiation exposure and the manifestation of brain cancer but **symptoms tend to occur after age 60** [19]

Research that focuses on this older cohort is therefore urgently needed, especially in view of our ageing population.

➤ **Children**

The negative health effects of electromagnetic radiation are amplified in children whose skulls and entire systems are immature and vulnerable to EMF radiation. Indeed, **childhood cancer increases due to RF** radiation exposure have been **verified** by many studies. [20] The need to urgently investigate the **long-term health impacts** of MMWs over time is therefore imperative. [21]

⁴ Safety recommendations noted here are taken directly from the iPhone 8. The distance recommended for safety will vary slightly depending on the device.

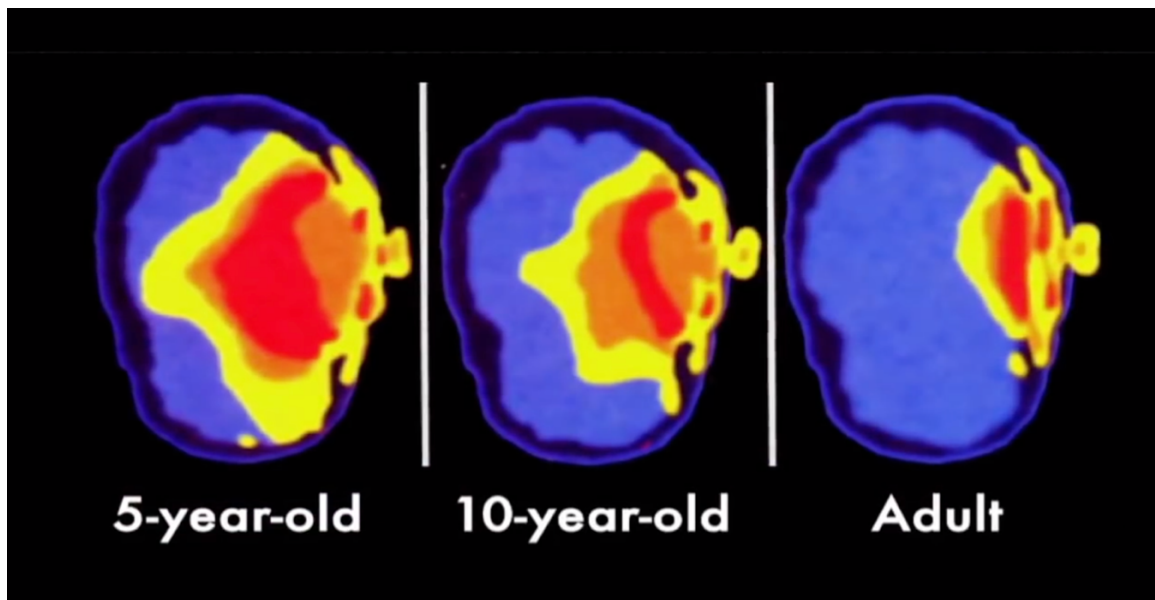


Figure 4: The difference between adults and children of electromagnetic radiation absorption

➤ Wildlife

The effects on wildlife environment and the fact that there has been massive and quite sudden decline in wildlife biodiversity has been ignored, despite there being mounting evidence the EMF radiation could well be a significant contributing factor in this alarming decline in biodiversity **and this is all before 5G is added to the EMF smog now clearly stressing world ecologically.** [22] [23] [24] [25]

4. The effects of radiation from 5G

'The deployment of 5G, or fifth generation cellular technology, constitutes a massive experiment on the health of all species' [26]

The **5G grid is a follow-on system and not a replacement** for the wireless network that we currently use. The integration of 5G with current 2G, 3G and 4G systems will add to the existing spectrum of microwave frequencies and this will cause significant increases in negative health and environmental effects. Despite the imminent roll out of 5G, few studies have examined prolonged exposure to low-intensity MMWs, and **no research has focused on exposure to MMWs combined with other radiofrequency radiation.**

Findings from an early study formerly classified by the CIA show a **myriad of adverse effects of millimetre wavelengths** on both humans and animals [27]. Researchers concluded that millimetre waves act on nerve receptors in the skin to cause such diverse biological and metabolic effects as:

- Reduction in haemoglobin (main constituent of red blood cells) and erythrocytes (white blood cells)
- Higher blood cortisol levels
- Adrenal stimulation
- Mitochondrial (constituent power station of every cell) dysfunction
- Suppression of the central nervous system with notable changes in liver, kidneys, heart and brain

More recent studies have confirmed these findings and have further elucidated the mechanisms of the negative health effects for **all living organisms**. Pall points out 4 reasons for why 5G is significantly more dangerous than earlier generations of wireless technology: [28]

1. The extraordinarily high numbers of antennae that are planned.
2. The very high energy outputs which will be used to ensure penetration.
3. The extraordinarily high pulsation levels.
4. The apparent high-level interactions of 5G frequency on living organism cellular electrical impulse communication-disrupting fundamental biological processes.

Major health concerns with exposure to 5G are to skin, eyes and adverse systemic metabolic signalling through skin sensors, as well as heat effects. [29] [30] [31]

The effect of 5G MMW's absorption in the skin results in symptoms of weakness, elevation of cortisol resulting in stress and anxiety, as well as suppression of the immune system among other symptoms. [28]

New research on heat effects of 5G [32] demonstrates that permanent tissue damage may occur even after short exposures to 5G MMW pulse trains, where repetitive pulses can cause rapid, localized heating. **The scientists highlight an urgent need for new thermal safety exposure standards to update current guidelines which do not adequately prevent excessive heating from 'pulsed millimetre wave' exposure.** In addition, there is convincing scientific evidence emerging giving rise to serious concern for environmental effects, harm to mammals, insects and bacteria.⁵ This is prompting scientists around the world to call for a **moratorium** on 5G. [44]

Summary of 5G Potential Health and Ecological Effects: [28] [33]

- Damage to the eyes – cataracts, retina
- Immune system disruption
- Neurological/neuropsychiatric effects (depression, poor concentration, memory loss)

⁵ In the Netherlands (November 2018), at The Hague, an **experiment carried out to assess the range of a 5G signal** and whether the signal would damage other equipment, **resulted in hundreds of birds spontaneously falling from the sky dead** in a park <https://www.snopes.com/fact-check/5g-cellular-test-birds>.

- Metabolic disruption
- Cellular DNA damage
- Oxidative stress and free radical damage (accelerated aging and fatigue)
- Carcinogenic (cancerous)
- Endocrine (hormonal) disruption (loss of libido, infertility)
- Damage to sperm (loss of libido, infertility)
- Skin damage
- Collapse of insect populations, the base of food for birds and bats
- Rise in bacterial resistance and bacterial shifts
- Damage to plants and trees

Interactions and the biological effects from everyone carrying mobile devices emitting 5G radiation have not even been assessed. Despite this scientific evidence, there has been a push for **accelerating the deployment [45]** of wireless antenna infrastructure by limiting local governments' ability to refuse these towers, limiting charging fees and shortening the time for approval. In effect, the power of local authorities is being systematically over-ridden.

Finally, it is alarming that the same frequencies used by the Department of Defence in crowd control weapons actually form the foundation of the 5G network. [34] **This means that MMW's are already known to be biologically active and damaging effects.**

5. The need to ban 5G

"5G rollout is absolutely insane." [35]

Cities in Germany, Switzerland and Italy are calling for bans on 5G due to health concerns and the need to raise their protective safety limits. A 5G Pilot project in Brussels was halted due to environmental and health concerns. The Environmental Minister Celine Fremault stated, "I cannot welcome such technology if the radiation standards, which must protect the citizen, are not respected, 5G or not...**The people of Brussels are not guinea pigs whose health I can sell at a profit. We cannot leave anything to doubt.**" [36]

Multiple European countries have restrictions on Wi-Fi. France passed a law in 2015 banning Wi-Fi from all nursery schools. [37] The law states that Wi-Fi must be turned off in all elementary schools when it's not in use and wired connection should not be used if possible.

Other countries including Belgium, Spain, Israel, Australia, Italy, Switzerland, Germany, Austria, India, Finland, and Cyprus have restrictions or have completely banned mobile especially in schools, communications to limit EMF RF radiation exposure. [38] [39]

The International Society of Doctors for the Environment, its subsidiaries in 27 countries and more than **200 doctors and scientists are all calling for a stop to be put to the roll out of 5G “due to concern that 5G radio frequency radiation will have adverse health effects”** [40]

There has been **no premarket testing** of new technology and the resulting mix of frequencies that we will be exposed to. There are **no protective regulations** to assure monitoring of radiation levels for each antenna or a registry to document reported health effects. Health and public **regulatory bodies are not informed** about any potential health or environmental effects and have **not given any guidance** with regards to non-ionizing wireless radiation safety except to tell people to reduce their current exposure [41]. Furthermore, effects on our most **vulnerable populations** i.e. children, pregnant women, the elderly and those with chronic diseases, have not been taken into account.

Trower, a British Military Expert, states *“there is no safety level for microwave radiation for children.”* As shown earlier, this is due to the fact that children’s brains absorb at least twice as much radiation as adults [42]

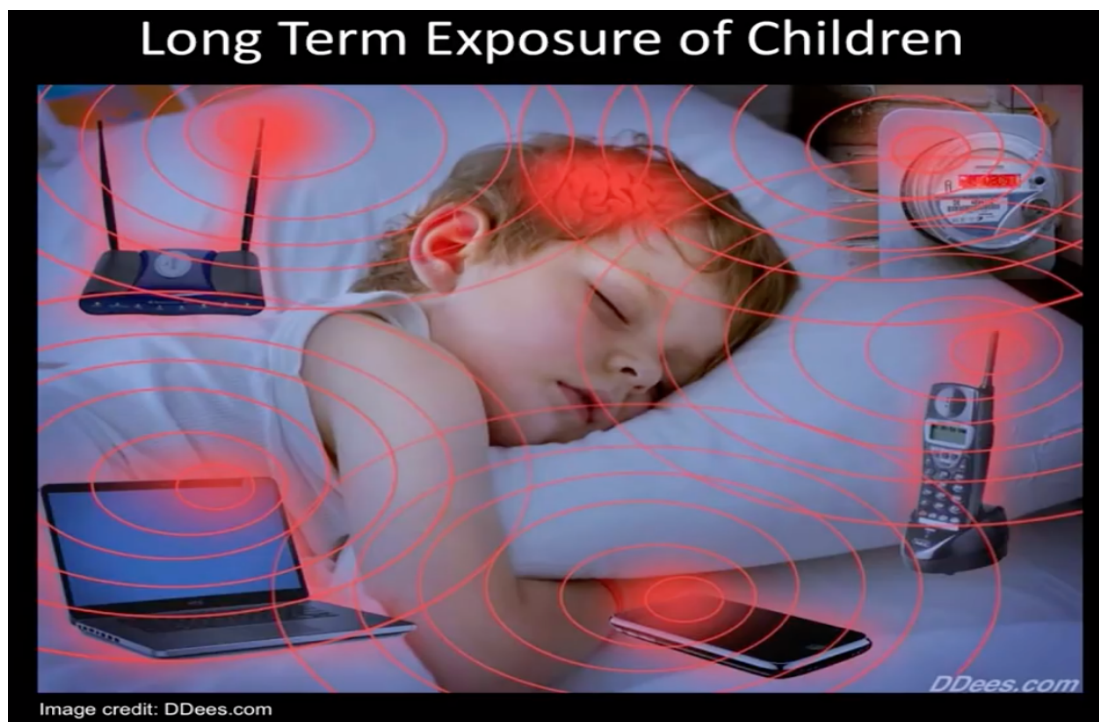


Figure 5: EMF smog that surrounds children

6. What can you do?

➤ Education

What you can do to keep yourself and loved ones as safe as possible in the *current* EMF smog environment:

- Always use your speaker phone when talking on your phone (the further your phone is away from you the less likely it is to cause harm, with RF radiation falling by 90% when the phone is 2 to 3 feet away); [43]
- Turn your internet Wi-Fi router off at night;
- Turn your phone *completely* off at night;
- Put your phone on airplane mode when you are in transit and ask others to do the same if possible.
- If children are to use iPhones or iPads then ensure that the device is in flight mode with blue tooth and Wi-Fi switched off. Once you have ensured that the device is in this recommended will able to use downloaded apps/films/games etc in this mode.
- Try holding the phone in a bag or on a strap away from the body when carrying it, rather than in your pocket close to your body, since this can potentially be damaging to your health (especially reproductive organs).
- Related to 5G; there is not much that we can do to keep ourselves and/or our loved ones safe. We can however stop the rollout of 5G insisting on the necessary safety assessments to be carried out.
- **Campaigns to halt 5G**

***Please contact the author for more information and/or how to get involved with making a stand against the impending rollout of 5G; Ms Amané Alturk (B.Sc., Dip.Nat.,Dip.Nut.,Dip.Herbs). Naturopathic Nutritional Therapist & Herbalist:**

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Local contacts to petition 5G...

<https://present.brighton-hove.gov.uk/mgUserInfo.aspx?UID=159>

<https://www.brightonpsc.org/campaigns-2/lobbying>

National contacts to petition 5G...

<https://www.parliament.uk/get-involved/contact-an-mp-or-lord/lobbying-parliament/>

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