Your response

Question	Your response
Question 1: (Section 2) Do you have any comments on our assessment of potential use cases, demand and deployment strategies for new uses of mmWave spectrum?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'
Question 2: (Section 2) Do you have any comments on our proposed overall approach to mmWave spectrum (including our aim to make the 26 GHz and 40 GHz bands available for new uses on the same or similar timeframe)?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'
Question 3: (Section 3) Do you agree with our approach of specifying high and low density areas in the UK, and authorising new uses differently in those areas?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'
Question 4: (Section 3) Do you agree with our overall authorisation approach in high density areas for the 26 GHz band (i.e. to grant Shared Access licences on a first come, first served basis for the bottom 850 MHz of the 26 GHz band, (24.25-25.1 GHz), and to auction citywide licences for the rest of the 26 GHz band (25.1-27.5 GHz))?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'
Question 5: (Section 3) Do you agree with our overall authorisation approach in low density areas for the 26 GHz band (i.e. to grant Shared Access licences on a first come, first served basis)?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'
Question 6: (Section 3) Do you agree with adopting a similar approach to authorising the 40 GHz band as our proposals for the 26 GHz band, if we were to decide to re-allocate the 40 GHz band?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'

Question 7: (Section 4) Do you agree with our proposed methodology for identifying and defining high density areas?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'
Question 8: (Section 4) Do you agree with our proposed cut-off point of 40 high density areas?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'
Question 9: (Section 5) Do you agree with our proposal to clear the fixed links in and around high density areas from the 26 GHz band?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'
Question 10: (Section 5, Annex 8) Do you agree with our estimates of the cost of migrating fixed links into alternative spectrum bands?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'
Question 11: (Section 6) Do you agree with the proposed approaches we have outlined to manage coexistence between new 5G users and the different existing users in the 26 GHz band? In particular, do you have any views on our proposals to limit future satellite earth stations in this band to low density areas only, and to end access to this band for PMSE users with five years' notice?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'
Question 12:(Section 7) Do you agree with our initial assessment on which option for enabling the 40 GHz band for new uses would best achieve our objectives?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'
Question 13: (Section 7, Annex 8) Do you agree with our analysis of the impact on existing 40 GHz licensees, including our estimates of the cost of moving fixed links under the options involving revocation (options 2, 3 and 4)?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'

Question 14: (Section 8) Do you have any comments on our high-level Shared Access proposals (including technical and non-technical licence conditions and proposed approach to setting fees)?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'
Question 15: (Section 8) Do you agree with the overall approach we have set out to coordination and coexistence between new Shared Access users in the 26 GHz band and existing users?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'
Question 16: (Section 9) Do you have any comments on our initial thinking in relation to auction design?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'
Question 17: (Section 10) Do you have any comments on the licence duration options we have considered in this section for new licences for the 26 GHz and 40 GHz bands that we would auction?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'
Question 18: (Section 11) Do you agree with our assessment of potential competition concerns and that it may be appropriate to impose a competition measure such as a 'precautionary cap'?	*Is this response confidential? –No* Please see attached document – 'mmWave Response Dave Ashton'

Please complete this form in full and return to mmwave.allocation@ofcom.org.uk

'Enabling mmWave spectrum for new uses' Consultation

Question 2: (Section 2) Do you have any comments on our proposed overall approach to mmWave spectrum (including our aim to make the 26 GHz and 40 GHz bands available for new uses on the same or similar timeframe)?

Response from Dave Ashton:

In my submissions to two previous Ofcom consultations, 'Proposed measures to require compliance with international guidelines for limiting exposure to electromagnetic fields', and 'Implementation of measures to require compliance with international guidelines for limiting exposure to electromagnetic fields (EMF)', I criticised Ofcom's reliance on the limits set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) when seeking to protect the public from the harmful effects of non-ionising radiation. I said that:

> *Ofcom has a duty to protect public health, and in order to do this, it must base its decisions on solid principles, and it should resist unreasonable demands from the industry that it supposedly regulates. In my previous response, I suggested that the EMF exposure levels used in the UK for wireless technologies should:*
>
> *1) Be based upon objective and independent scientific and medical evidence, which does not put the interests of the technology and telecommunications industry ahead of public health.*
>
> *2) Protect the public both from chronic exposures, and from all adverse health effects, whether of thermal or non-thermal origin.*
>
> *3) Recognise the biological effects of artificial polarised EMFs, often from multiple sources concurrently, factoring in a probably infinite and unpredictable variety of frequencies, power density levels, modulations, and pulsation patterns.*
>
> *4) Be set so as to fully protect vulnerable individuals, including pregnant women and foetuses, infants and children, the sick, the elderly, and electrically-sensitised individuals.*
>
> *5) Be set so as to fully protect animals, plants, and the environment.*

I outlined some of the scientific and medical reasons for concern about the proliferation of wireless communications technologies, and the damage that they are said by many experts to cause, even when the electromagnetic radiation that they emit is well within ICNIRP's limits. [1]

Now, Ofcom is:

1) Enabling the rollout of technologies that will emit millimetre-wave (mmWave) radiation in the 26 GHz and 40 GHz bands to support 5G.

2) Facilitating the 'densification' of mmWave transmitters around our homes, in cities and towns, and also in less populated areas, meaning that avoiding this environmental electrosmog will become progressively more difficult.

I believe that this policy is misguided, and that, as a result, Ofcom will fail to protect people - and other species - from harm, as I describe below (all the emphasis shown is mine).

1. The radiofrequency portion of the electromagnetic spectrum, including mmWaves, is already classified as a Group 2B Possible Carcinogen

The International Agency for Research on Cancer (IARC), part of the World Health Organisation (WHO), classified Radiofrequency Radiation (RF radiation) as a Group 2B Possible Carcinogen in 2011. The frequency range that IARC covered in its evaluation was 30 kHz to 300 GHz, so it includes the mmWave bands of 26 GHz and 40 GHz.

In Monograph 102, 'Non-Ionizing Radiation, Part 2: Radiofrequency Electromagnetic Fields', IARC stated that:

> *There is rising concern as to whether exposure to RF radiation emitted by a mobile phone affects human health and, specifically, whether mobile-phone use increases the risk of cancer of the brain.* [2]

IARC's press release, 'IARC CLASSIFIES RADIOFREQUENCY ELECTROMAGNETIC FIELDS AS POSSIBLY CARCINOGENIC TO HUMANS' said:

> *Lyon, France, May 31, 2011 -- The WHO/International Agency for Research on Cancer (IARC) has classified radiofrequency electromagnetic fields as possibly carcinogenic to humans (Group 2B), based on an increased risk for glioma, a malignant type of brain cancer, associated with wireless phone use.* [3]

More recently, an IARC expert committee recommended that RF radiation should be re-evaluated with 'high priority' during the 2022-24 period, following recent scientific findings, and the pending release of further results from major scientific studies. [4]

Millimetre Waves form part of the radiofrequency spectrum, and so Ofcom is enabling the proliferation of an agent - RF radiation - which is already classified as possibly carcinogenic by a WHO agency, and which has been recommended for a high priority re-evaluation.

2. The science conducted so far does not show that mmWaves are safe

> **'It [5G] is not set up as a public health experiment but of course you can consider it as such...'**
>
> Eric van Rongen, former ICNIRP Chairman, Telegraph, March 2019 (via BRHP Blog) [5]

A recent study – 'Health impact of 5G' – was commissioned by the European Parliament's Scientific Foresight Unit (STOA), and a report was released in July 2021. In a detailed review of the science so far, the study found the following:

> *1) 5G lower frequencies (700 and 3 600 MHz): a) limited evidence of carcinogenicity in epidemiological studies;* ***b) sufficient evidence of carcinogenicity in experimental bioassays; c) sufficient evidence of reproductive/developmental adverse effects in humans; d) sufficient evidence of reproductive/ developmental adverse effects in experimental animals;***
>
> *2) 5G higher frequencies (24.25-27.5 GHz):* ***the systematic review found no adequate studies either in humans or in experimental animals****.*

Conclusions:

1) cancer:

FR1 (450 to 6 000 MHz): EMF are probably carcinogenic for humans, in particular related to gliomas and acoustic neuromas;

FR2 (24 to 100 GHz): no adequate studies were performed on the higher frequencies;

2) reproductive developmental effects:

FR1 (450 to 6 000 MHz): these frequencies clearly affect male fertility and possibly female fertility too. They may have possible adverse effects on the development of embryos, foetuses and newborns;

FR2 (24 to 100 GHz): no adequate studies were performed on non-thermal effects of the higher frequencies.

The overall evaluation was as follows:

FR1 (450 to 6000 MHz): As a synthesis of what we have managed to analyse in the available scientific literature, in both human and animal studies, ***we can say that RF-EMF at FR1 frequencies exposure probably cause cancer****, and in particular gliomas and acoustic neuromas in humans.*

FR2 (24 to 100 GHz): ***No adequate studies were performed on non thermal effects of the higher frequencies****.* [6]

Ofcom is facilitating the rollout of 5G infrastructure and technologies, despite the fact that microwave 5G frequencies have been found by this review to be a probable human carcinogen. At mmWave frequencies, we don't know what the biological effects will be, because the proper research hasn't been carried out yet.

A 2021 paper - 'Needed: More Reliable Bioeffects Studies at “High Band” 5G Frequencies' – which was written by two authors with a long history of EMF research, Kenneth R. Foster and Vijayalaxmi - says:

This Perspective considers 31 studies related to genetic damage produced by exposure to RFR at frequencies above 6 GHz, including at millimeter-wave (mmwave) frequencies. ***Collectively, the papers report many statistically significant effects related to genetic damage, many at exposure levels below current exposure limits****. However, application of five risk of bias (RoB) criteria and other considerations suggest that the studies in many cases are vulnerable to false discovery (nonreplicable results).* ***The authors call for improvements in study design, analysis and reporting in future bioeffects research to provide more reliable information for health agencies and regulatory decision makers****.* [7]

Another review from 2021 – '5G New Radio Requires the Best Possible Risk Assessment Studies: Perspective and Recommended Guidelines' - notes that:

Bioeffects studies in so-called high-band at 25–39 GHz are particularly sparse. Future assessments relevant for these frequencies will need to rely on still unperformed studies*. Due to few available studies at 5G NR “high band” frequencies, and questions raised by some existing studies, a recent review recommended a wide range of RF biostudies be done at 5G NR “high band” frequencies. It is of importance that such studies be done using the best possible science* [8]

Even a former member of the ICNIRP Commission, Dr James C. Lin, has sounded the warning over 5G, and the safety standards – including ICNIRP's - that underpin it. I've included some brief excerpts below from a 2021 article that he wrote for IEEE Spectrum:

> *...For health safety matters, it is not apparent whether the biological responses to high-band 5G radiations would be akin to earlier generations or low-band 5G radiations, given the distinctive characteristics of mm-wave and its interaction with the complex structure and composition of pertinent, superficial biological cells and tissues such as the cornea of the eye and nerve-rich human skin, the large, protective organ of the body...*
>
> *...The two most widely promulgated RF health safety guidelines or standards have recently published revisions of their respective 1998 and 2005 versions [1], [2]. The updated International Commission on Nonionizing Radiation Protection guidelines and IEEE standards appear to cater to industry wishes; they are strongly linked to thermal effects associated with measurable temperature elevations. Also, the updates seem to have been synchronized to accommodate the 5G rollout...*
>
> *...To date, there has not been a single reported epidemiological study that investigated mm-waves and their potential health effects...*
>
> *...the safety recommendation updates were based primarily on limiting the tissue-heating potentials of RF radiation to elevate body temperatures. There are significant anomalies in the recently updated safety recommendations. Moreover, aside from the aforementioned anomalies, the existing scientific data are too limited - especially at mm-wavelengths - to make a reliable assessment or conclusion with any certainty.* ***Some of the updated safety recommendations are marginal, questionable, and lack scientific justification from the perspective of safety protection****...* [9]

The reviews that I have quoted from above, with the exception of the STOA report, have been produced by EMF experts who might be considered to be sympathetic to the commercial and military exploitation of wireless technologies, among them a former ICNIRP Commission member. I could have cited hundreds of other EMF experts who are deeply, and openly, concerned about the health effects of radiofrequency radiation at non-thermal levels, such as the 255 scientists who have now signed the International EMF Scientist Appeal:

> *Numerous recent scientific publications have shown that EMF affects living organisms at levels well below most international and national guidelines. Effects include increased cancer risk, cellular stress, increase in harmful free radicals, genetic damages, structural and functional changes of the reproductive system, learning and memory deficits, neurological disorders, and negative impacts on general well-being in humans. Damage goes well beyond the human race, as there is growing evidence of harmful effects to both plant and animal life.* [10]

Or the 422 scientists and doctors who have signed the 5G Appeal:

> *The current ICNIRP/WHO guidelines for EMF are based on the obsolete hypothesis that "The critical effect of RF-EMF exposure relevant to human health and safety is heating of exposed tissue." However, scientists have proven that many different kinds of illnesses and harms are caused without heating ("non-thermal effect") at radiation levels well below ICNIRP guidelines.* [11]

It can be seen that a number of serious issues are now being raised concerning the 5G rollout:

1. Good quality science on 5G mmWave bioeffects is currently lacking.

2. At 5G microwave frequencies, there is 'sufficient evidence' that these are probably

carcinogenic, and that they are linked to adverse reproductive/developmental effects.

3. There are concerns about the health effects of mmWaves, particularly on the eyes and the skin.

4. The safety standards followed in the UK, namely the ICNIRP Guidelines, have significant anomalies, and 'lack scientific justification'.

5G is indeed a public health experiment, and yet it is one that is **not** being conducted with the informed consent of the British public.

3. There are known conflicts of interest at ICNIRP, WHO, and UKHSA

OFCOM aligns itself with ICNIRP, which is a supposedly independent private group, based in Germany. Three senior employees at the UK Health Security Agency (UKHSA) are ICNIRP members, ensuring that the ICNIRP Guidelines form an integral part of the UK Government's response to man-made 'electrosmog'. The involvement of UKHSA employees in ICNIRP represents a conflict of interest, as, by definition, ICNIRP membership precludes a serious and objective assessment of non-thermal health risks.

ICNIRP presents a cherry-picked view of the science, claiming that its Guidelines:

> *...provide protection against **all scientifically substantiated** adverse health effects due to EMF exposure in the 100 kHz to 300 GHz range.* [12]

ICNIRP has long stated that non-thermal health effects of radiofrequency radiation have not been 'substantiated', and so its limits are only set to protect against a rise in temperature (thermal effects). In its 2020 Guidelines, ICNIRP states that:

> *The only substantiated adverse health effects caused by exposure to radiofrequency EMFs are nerve stimulation, changes in the permeability of cell membranes, and effects due to temperature elevation. There is no evidence of adverse health effects at exposure levels below the restriction levels in the ICNIRP (1998) guidelines and no evidence of an interaction mechanism that would predict that adverse health effects could occur due to radiofrequency EMF exposure below those restriction levels.* [13]

ICNIRP has a close working relationship with the WHO's International EMF Project, which is in the process of producing ten Systematic Reviews (SRs) on various aspects of the health effects of RF radiation. ICNIRP is a 'non-state actor in official relation with WHO'. [14]

So far, the teams responsible for producing nine out of the ten SRs have published papers that detail the protocols to be used. Former and current ICNIRP members are involved in the production of **all nine** of these SRs, either as authors, or as lead authors. [15]

Given ICNIRP's denial of non-thermal effects, and its close involvement in the production of these WHO systematic reviews, it therefore seems highly unlikely that the teams involved will be allowed to arrive at opinions that differ from ICNIRP's.

This is a major problem, if critics accusing ICNIRP of a lack of scientific objectivity are correct. For example, two MEPs recently wrote about the conflicts of interest that are apparently endemic in ICNIRP. [16]

A paper published in 2022, 'Self-referencing authorships behind the ICNIRP 2020 radiation protection

guidelines', said this:

> *In March 2020, ICNIRP (the International Commission for Non-Ionizing Radiation Protection) published a set of guidelines for limiting exposure to electromagnetic fields (100 kHz to 300 GHz). ICNIRP claims this publication's view on EMF and health, a view usually termed "the thermal-only paradigm", is consistent with current scientific understanding. We investigated the literature referenced in ICNIRP 2020 to assess if the variation in authors and research groups behind it meets the fundamental requirement of constituting a broad scientific base and thus a view consistent with current scientific understanding, a requirement that such an important set of guidelines is expected to satisfy.*
>
> *To assess if this requirement has been met, we investigated the span of authors and research groups of the referenced literature of the ICNIRP 2020 Guidelines and annexes. Our analysis shows that ICNIRP 2020 itself, and in practice all its referenced supporting literature stem from a network of co-authors with just 17 researchers at its core, most of them affiliated with ICNIRP and/or the IEEE, and some of them being ICNIRP 2020 authors themselves. Moreover, literature reviews presented by ICNIRP 2020 as being from independent committees, are in fact products of this same informal network of collaborating authors, all committees having ICNIRP 2020 authors as members.*
>
> *This shows that the ICNIRP 2020 Guidelines fail to meet fundamental scientific quality requirements and are therefore not suited as the basis on which to set RF EMF exposure limits for the protection of human health. With its thermal-only view, ICNIRP contrasts with the majority of research findings, and would therefore need a particularly solid scientific foundation. Our analysis demonstrates the contrary to be the case. Hence, the ICNIRP 2020 Guidelines cannot offer a basis for good governance.* [17]

A European investigative team found that:

> *The conflicts in EMF research have long roots. Historically, science in this field has been associated with the telecom sector and the military. ICNIRP's safety limits primarily take into account the needs of the telecom industry, claims Dariusz Leszczynski, former long-time researcher at the Finnish radiation protection agency. In 2011, he sat on the committee of IARC, the cancer body of the World Health Organisation, when it decided that EMF is "possibly carcinogenic" to humans. Leszczynski is not represented in ICNIRP nor in other leading expert groups.*
>
> *"ICNIRP's goal is to set safety limits that do not kill people, while technology works – so something in between", says Leszczynski.* [18]

4. Effects of mmWaves on flora and fauna are ignored

Ofcom is basing the rollout of 5G telecoms in the UK on the limits provided in ICNIRP's Guidelines, which claim that no detrimental effects of non-thermal exposures to RF radiation have been 'substantiated'. Many experts worldwide disagree with this assessment, as I have detailed in my previous Ofcom consultation responses.

Even worse though, the effect of anthropogenic EMFs on fauna and flora is ignored by the current 'safety standards', which only apply to humans. Even ICNIRP accepts that this gap in the scientific knowledge exists. It has established the 'ICNIRP Project Group on Environmental EMF Protection', which has the following task:

> *Draft a statement on environmental effects of EMFs on the basis of qualitatively reliable scientific*

papers. And, if possible, to analyse whether the current human exposure guidelines are also sufficiently protective for plants and animals in their natural environment. [19]

In 'The ecology of electricity and electroreception', the two authors detail the ways in which living systems interact with electric fields:

Electric fields permeate both the terrestrial and aquatic environment, and therefore, as with any physical stimulus that has the potential to provide ecologically beneficial and/or behaviourally relevant cues, it is expected that organisms will have evolved systems to detect these electric fields. Electroreception is the ability of an organism to detect ecologically relevant electrical stimuli within its environment. Electroreception is thought to be an ancient sensory modality that may in fact be ancestral to all vertebrates... [20]

The question of how an environment saturated with man-made electrosmog will affect these organisms in all aspects of their lives remains unanswered. For example, how will the electroreception of organisms be affected, and what would the wider implications of this be?

Wildlife biologist Alfonso Balmori published a review, 'Electromagnetic radiation as an emerging driver factor for the decline of insects', in 2021. The abstract of his paper stated that:

The biodiversity of insects is threatened worldwide. Numerous studies have reported the serious decline in insects that has occurred in recent decades. The same is happening with the important group of pollinators, with an essential utility for pollination of crops. Loss of insect diversity and abundance is expected to provoke cascading effects on food webs and ecosystem services. Many authors point out that reductions in insect abundance must be attributed mainly to agricultural practices and pesticide use. On the other hand, evidence for the effects of non-thermal microwave radiation on insects has been known for at least 50 years.

The review carried out in this study shows that electromagnetic radiation should be considered seriously as a complementary driver for the dramatic decline in insects, acting in synergy with agricultural intensification, pesticides, invasive species and climate change*. The extent that anthropogenic electromagnetic radiation represents a significant threat to insect pollinators is unresolved and plausible. For these reasons, and taking into account the benefits they provide to nature and humankind, the precautionary principle should be applied before any new deployment (such 5G) is considered.* [21]

A recent report on the environmental impacts of 5G, from the European Parliament's Science and Technology Options Assessment Panel (STOA), outlined both the gaps in the scientific knowledge when it comes to the effects of 5G mmWaves on flora and fauna, and also the irrelevance of the current ICNIRP Guidelines:

The guidelines that form the basis for policy-making regarding RF-EMF exposure in most EU countries are those issued by ICNIRP (International Commission on Non-Ionizing Radiation Protection (ICNIRP) 2020). While the work done by ICNIRP is valuable for policy-making, it has to be noted that the scope of the ICNIRP guidelines is limited to humans. These guidelines only consider literature on substantiated biological effects that are harmful to human health. ***The ICNIRP guidelines do not focus on prevention of undesired biological effects of RF-EMF exposure of animals, fungi or plants****...* [22]

Ofcom, along with the UK Government, and the telecommunications industry, is facilitating the mass rollout of wireless infrastructure, and by doing so it is displaying a casual disregard for the long-term effects of mmWave radiation on flora and fauna. There are no meaningful, and scientifically-based, restrictions in

place. The addition of mmWave frequencies to support 5G, in addition to the existing microwave frequencies, may have profound consequences for smaller species in particular, and also for plants.

A major three-part review, 'Effects of non-ionizing electromagnetic fields on flora and fauna', recently noted that:

> *Ambient levels of electromagnetic fields (EMF) have risen sharply in the last 80 years, creating a novel energetic exposure that previously did not exist. Most recent decades have seen exponential increases in nearly all environments, including rural/remote areas and lower atmospheric regions. Because of unique physiologies, some species of flora and fauna are sensitive to exogenous EMF in ways that may surpass human reactivity...**Biological effects have been seen broadly across all taxa and frequencies at vanishingly low intensities comparable to today's ambient exposures**. Broad wildlife effects have been seen on orientation and migration, food finding, reproduction, mating, nest and den building, territorial maintenance and defense, and longevity and survivorship. **Cyto- and geno-toxic effects have been observed**.*

The review continues:

> ***The multiple biological effects from intense energy absorption at very small wavelengths, e.g., in human skin cells or any thin-skinned species, and especially in insects which lack efficient heat dissipation, may cause intense heating with concomitant cellular destruction and organism death.***

Also:

> *In a recent study, Thielens et al. modeled three insect populations and found that a shift of just 10% of the incident power density to frequencies above 6 GHz would lead to an increase in absorbed power between 3 and 370% in some bee species, possibly leading to behavior, physiology, and morphology changes over time, ultimately affecting their survival. Insects smaller than 1 cm showed peak absorption at frequencies above 6 GHz* [23]

Paragraph 2.55 of Ofcom's consultation document, 'Enabling mmWave spectrum for new uses', details the requirement for Ofcom to undertake an Impact Assessment, where the proposal is deemed as being 'important'. Ofcom states that the analysis provided in this consultation document represents an Impact Assessment, as defined in section 7 of the Communications Act 2003.

Part 1, provision 7.2.c of the Communications Act 2003 defines an 'important' proposal as follows:

> *(2) A proposal is important for the purposes of this section only if its implementation would be likely to do one or more of the following...*
>
> *(c) to have a significant impact on the general public in the United Kingdom or in a part of the United Kingdom.* [24]

The general public in the United Kingdom **would** be greatly impacted by any harm done to flora and fauna due to the 'densification' of wireless communications infrastructure, and particularly by the rollout of mmWave technologies, operating in the 26 GHz and 40 GHz bands.

So it is surprising that Ofcom makes no reference in it's de facto impact assessment to the risks that are posed to flora and fauna by the forthcoming proliferation of mmWaves, considering the gaps in the scientific knowledge, and also because of the extremely concerning scientific findings so far, which are generally based on lower EMF frequencies.

In 'Measures to require compliance with international guidelines for limiting exposure to electromagnetic fields (EMF)', Ofcom made the following response to concerns from the public and others over health effects and ICNIRP's Guidelines:

> *3.24 It is entirely appropriate for us to follow PHE's advice in making our proposals on EMF exposure. It is not appropriate for us to assume responsibilities beyond our own statutory duties, especially where doing so impinges on – and would undermine – the duties conferred by Government on another body.* [25]

ICNIRP's Guidelines have no relevance to non-human species, and the advice from the former PHE is irrelevant in this regard. Also, it is not clear that the Government's advisory committee on radiation-related matters, COMARE (Committee on Medical Aspects on Radiation in the Environment) is any better placed to offer advice, as 1) it's main focus is on ionising radiation, as its minutes make clear, and 2) it does not seem to have a wider ecological remit:

> *Terms of reference*
>
> *To assess and advise government and the devolved administrations on the health effects of natural and man-made radiation and to assess the adequacy of the available data and the need for further research.* [26]

Ofcom is ignoring the detrimental effects that RF radiation may have on flora and fauna, and it has taken advice from the former PHE **only** in terms of human harm that may arise, and then only based on thermal effects.

This raises a number of important questions:

- What advice has Ofcom received concerning possible harm that may be done to non-human species through the proliferation of mmWave radiation? Has it received any advice at all?
- Which Government Department, agency, or committee, is responsible for advising Ofcom on the likely effects of mmWaves on flora and fauna?
- If ICNIRP's Guidelines are irrelevant in terms of protecting flora and fauna, what limits do apply?
- What impact assessment of this issue has been carried out?

5. The impact on (and discrimination of) electrosensitive individuals, and other individuals with 'protected characteristics'

In its consultation document, Ofcom makes this statement:

> *2.56 We have also given careful consideration to whether our proposals will have a particular impact on persons sharing protected characteristics (broadly including race, age, disability, sex, sexual orientation, gender reassignment, pregnancy and maternity, marriage and civil partnership, and religion or belief in the UK, and in Northern Ireland also dependants and political opinion), and in particular whether they may discriminate against such persons or impact on equality of opportunity or good relations. This assessment helps us comply with our duties under the Equality Act 2010 and the Northern Ireland Act 1998.49 We do not consider that our proposals have equality implications under the 2010 Act or the 1998 Act.*

The Government defines Disability as follows:

> *You're disabled under the Equality Act 2010 if you have a physical or mental impairment that has a 'substantial' and 'long-term' negative effect on your ability to do normal daily activities.* [27]

A growing number of people living in the UK, and around the world, suffer from a condition called Electromagnetic Hypersensitivity (EHS). According to the World Health Organisation:

> *EHS is characterized by a variety of non-specific symptoms, which afflicted individuals attribute to exposure to EMF. The symptoms most commonly experienced include dermatological symptoms (redness, tingling, and burning sensations) as well as neurasthenic and vegetative symptoms (fatigue, tiredness, concentration difficulties, dizziness, nausea, heart palpitation, and digestive disturbances). The collection of symptoms is not part of any recognized syndrome...*
>
> *...EHS is characterized by a variety of non-specific symptoms that differ from individual to individual. The symptoms are certainly real and can vary widely in their severity. Whatever its cause, EHS can be a disabling problem for the affected individual. EHS has no clear diagnostic criteria and there is no scientific basis to link EHS symptoms to EMF exposure. Further, EHS is not a medical diagnosis, nor is it clear that it represents a single medical problem.* [28]

There is scientific controversy over the claimed link between electromagnetic fields and electromagnetic hypersensitivity, with some experts believing that EHS is a psychological issue (the so-called 'nocebo effect'). However, as the WHO recognises, the symptoms are 'certainly real', and the condition can be a disabling problem for sufferers – regardless of whether it is a psychological or a physiological issue (or a combination of the two). The estimated prevalence of EHS among the general population varies from around 0.7% to 13.3%. [29]

I suffer from EHS, and this has been the case since 2007, when my symptoms – intermittent at first – originally started. The Government's definition of 'Disability' applies to me. My condition is a physical impairment that continues to have a long-term negative effect on my ability to do normal daily activities.

I already know how I respond to microwave radiation exposures from WiFi, smart meters, mobile phones, mobile phone masts, tv and radio transmitters, radar, and so on. I do not respond well. However, if I am in an environment – increasingly hard to find now – where the electrosmog is at negligible levels, this is when my symptoms abate. As a result, I do my best, on a daily basis, to limit my exposure to man-made EMFs.

How will I respond to being exposed to mmWave radiation? I have no way of knowing, but it's a safe bet that my general health and well-being will not be improved. This will, I'm sure, apply equally to other EHS individuals.

I believe that I qualify as having 'protected characteristics', and yet I am not protected. As things stand, I suffer effective discrimination, as I am unable to do many of the things that other people take for granted, and I cannot tolerate being in places where there are high levels of microwave radiation (which is basically everywhere, now).

Ofcom's assurance, in its 'risk assessment', that the rollout of mmWave radiation will not impact on people with protected characteristics, and that it won't discriminate against such people, is bogus. The rollout of previous generations of mobile communications is harming electromagnetically hypersensitive individuals right now. The damage is already being done, but 5G mmWave radiation is likely to make things significantly worse.

Other people with protected characteristics may also be disproportionately harmed by the rollout of 5G, and other wireless technologies. In 2011, the Parliamentary Assembly of the Council of Europe passed Resolution 1815:

...the Assembly recommends that the member states of the Council of Europe:

8.1. in general terms:

8.1.1. take all reasonable measures to reduce exposure to electromagnetic fields, especially to radio frequencies from mobile phones, and ***particularly the exposure to children and young people who seem to be most at risk from head tumours****;*

8.1.2. reconsider the scientific basis for the present standards on exposure to electromagnetic fields set by the International Commission on Non-Ionising Radiation Protection, which have serious limitations, and apply ALARA principles, covering both thermal effects and the athermic or biological effects of electromagnetic emissions or radiation;

8.1.3. put in place information and awareness-raising campaigns on the risks of potentially harmful long-term biological effects on the environment and on human health, ***especially targeting children, teenagers and young people of reproductive age****;*

8.1.4. ***pay particular attention to "electrosensitive" people who suffer from a syndrome of intolerance to electromagnetic fields and introduce special measures to protect them, including the creation of wave-free areas not covered by the wireless network...*** [30]

By adhering to ICNIRP's thermally-based limits, and by enabling the proliferation of infrastructure that emits mmWave radiation into the environment, and into people's homes, Ofcom is failing to protect people, and especially people with protected characteristics, such as children and teenagers.

It is also discriminating against people who do not wish to be exposed to this radiation, such as electromagnetically hypersensitive individuals, who are given no say in the matter. Every possible measure is taken by Ofcom, the Government, the (supposed) health and protection agencies, and industry, to ensure that the soup of microwave and millimetre-wave electrosmog is everywhere, and that any attempts to slow down, or halt, this process in favour of precaution are firmly thwarted.

6. Conclusion

- Ofcom is making mmWave spectrum available, in the 26 GHz and 40 GHz bands, to support the rollout of the latest generation of mobile communications, and therefore the development of the 'internet of things', and 'smart', connected, technologies.

- It applies RF radiation limits that are provided by a private group – ICNIRP – which has known conflicts of interest, and which sets its limits based on cherry-picked science, and a group-think that dismisses all evidence of harmful effects that occur underneath these limits.

- The science to date on mmWaves is inadequate, and yet the rollout will occur before the scientists have been able to carry out their research. It will be a public health experiment.

- The science to date shows that RF radiation at microwave frequencies is probably carcinogenic, and RF radiation is currently classified as possibly carcinogenic. At the very least, Ofcom is enabling the proliferation of an agent in the environment that may cause cancer.

- MmWave radiation will be especially damaging to superficial areas of the body, including the eyes,

and skin.

- Flora and fauna are completely unprotected; the ICNIRP limits are irrelevant, as they only apply to humans.

- Electromagnetically hypersensitive individuals, and others with protected characteristics, will be adversely affected by the rollout of mmWave technologies, and discriminated against as a result.

The risks that are inherent in the rollout of 5G, and other wireless technologies, have been raised by concerned experts, groups, and individual,s on many occasions, and over many years. Ofcom ploughs on, slicing and dicing the spectrum, regardless.

Ofcom therefore bears full responsibility, along with all other organisations that are tasked with protecting the public, for what will inevitably follow as a result of 5G mmWave densification.

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