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Measures to require compliance with international guidelines for limiting exposure to electromagnetic fields (EMF)

Measures to require compliance with international guidelines for limiting exposure to electromagnetic fields (EMF) – Welsh overview

STATEMENT

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1. Overview

Radio spectrum is used by people and business for many everyday communications services, including mobile phones, business radio, Wi-Fi, TV and radio. All uses of spectrum generate electromagnetic fields (EMF) and there are international guidelines to help ensure services operate safely.

The guidelines are published by the International Commission for Non-Ionising Radiation Protection (ICNIRP) and include limits for the safe level of EMF. These guidelines are endorsed by Public Health England (PHE) in its advice to the UK Government. The limits in the guidelines are widely understood and applied by spectrum users, including Mobile Network Operators (MNOs). They also form the basis for Ofcom's own EMF tests, which show exposure levels from mobile base stations well within the limits.

Ofcom is responsible for managing spectrum in the UK. To ensure spectrum users continue to operate services which are safe for people, in our February 2020 consultation we proposed formally incorporating the limits in the ICNIRP Guidelines for the protection of the general public into spectrum licences and into authorisations of licence-exempt spectrum.[1] This document sets out our decisions in relation to these proposals.

What we have decided – in brief

We will include a specific condition in Wireless Telegraphy Act licences requiring licensees to comply with the ICNIRP general public limits on EMF exposure. This condition will apply to all licence classes which authorise equipment to transmit at powers higher than 10 Watts EIRP (including, for example, the licences of mobile phone companies, TV and radio broadcasters and most point-to-point microwave links).

We intend to apply a similar approach for equipment that is exempt from the requirement to have a licence and that is authorised to transmit at powers higher than 10 Watts EIRP, such as certain types of satellite terminals. We intend to amend relevant licence exemption regulations as considered appropriate on a case-by-case basis in line with our policy decision.

In addition, we will require spectrum licensees to keep records (including the results of any measurements, tests and calculations) that demonstrate how they have complied with the ICNIRP general public limits.

We have listened to the concerns of some licensees about the potential administrative burden of demonstrating compliance. To help ease this, we have developed a simple online EMF calculator, so they can assess their compliance more easily. We have also made changes to our proposed licence condition and to our 'Guidance on EMF Compliance and Enforcement'.

1.1 In the UK, Public Health England takes the lead on public health matters associated with radiofrequency electromagnetic fields, and has a statutory duty to provide advice to

[1] We refer to these limits as the 'ICNIRP general public limits'.

Government on any health effects that may be caused by exposure to EMF. PHE's main advice is that EMF exposure should comply with the ICNIRP Guidelines. Ofcom authorises and manages the use of radio spectrum in the UK through the issue of licences and/or by setting conditions for spectrum use on a licence-exempt basis. We take into account the advice of PHE in relation to EMF in our management of the radio spectrum. We also measure EMF levels near to mobile phone base stations and publish the results of these measurements.

1.2 Manufacturers, installers and users of the radio spectrum should already be aware of the ICNIRP Guidelines and be taking EMF exposure into account when conducting their business. Our own measurements of EMF to date around 5G mobile base stations show EMF levels well below the ICNIRP general public limits (no measurements have exceeded 1.5% of the limit).

1.3 However, in our February 2020 consultation we noted that some spectrum users may not be fully aware of the ICNIRP general public limits and/or may not be taking full account of EMF exposure when installing or modifying radio equipment.

1.4 As the organisation that authorises spectrum use, and that has expertise in measuring EMF levels, we recognised that we are well placed to help mitigate risks related to EMF and reassure the public. We also have legal powers to hold spectrum users to account if issues are identified.

1.5 We noted that current regulatory regimes on EMF exposure do not require spectrum users to comply with the ICNIRP general public limits and do not put Ofcom in a position where we could take appropriate enforcement action in the event the limits are breached. For example, there is already specific legislation – mainly enforced by the Health and Safety Executive (HSE) – which requires employers to protect workers from EMF but it does not cover the protection of the general public from EMF. Compliance with the ICNIRP general public limits is also already built into the mobile network operators' Code of Best Practice on Mobile Network Development but this is a voluntary commitment.

1.6 The proposals in our February 2020 consultation sought to complement – and not overlap – with the regulatory regimes that currently exist. They were intended to address the risks we have identified and help reassure the public.

1.7 We received around 400 responses to our February 2020 consultation. A majority of these were from one of two groups: a) organisations and individuals opposed to 5G on health grounds and b) amateur radio enthusiasts opposed to the inclusion of their hobby within the scope of our proposals. The remainder of the responses came mainly from current industry operators of mobile or other radio equipment. Some supported our proposals and said they provided the general public with appropriate reassurance on EMF safety. Others said our proposals were unnecessary because there was no evidence of harm and/or current regulations were sufficient. There was concern that our proposals could result in a disproportionate and unjustified administrative burden.

1.8 We have carefully considered the potential impact of our proposals and whether they are a proportionate response to the risks we have identified.

1.9 There is a gap in the current regulation which means breaches of relevant EMF safety limits can clearly be enforced with respect to the protection of workers, but not more generally to protect the general public. We continue to believe the general public should be protected from the specific risk of harm from EMF exposure. There is also evidence in consultation responses that some users of radio equipment are not fully aware of the need to ensure that EMF exposure levels are within the ICNIRP general public limits.

1.10 In order to address these risks, we believe it is appropriate for us to intervene and require spectrum users to comply with the ICNIRP general public limits. We have therefore decided to proceed with our proposals.

1.11 We have however listened to respondents' concerns and have introduced important changes to the wording of our proposed licence condition and 'Guidance on EMF Compliance and Enforcement'. These changes clarify the scope of our proposals and address concerns raised by respondents relating to their potential impact.

1.12 These changes include making available a simple online EMF calculator that licensees and other spectrum users can use to demonstrate their compliance in a straightforward way. The calculator will enable spectrum users to check easily whether the use of their radio equipment is likely to exceed the ICNIRP general public limits, based on some conservative assumptions. For many other low risk situations, demonstrating that equipment is being operated in line with manufacturers' instructions on EMF safety may be sufficient.

Next steps

1.13 To implement the decisions set out in this Statement, we will be varying all affected licences to include a new EMF licence condition. We will also be including an EMF licence condition in all new licences.

1.14 Alongside this Statement, we are publishing a short, focused further consultation to give stakeholders an opportunity to provide feedback on the implementation of the decisions we have made in this Statement. We are consulting further on:

a) the specific drafting changes we have made to the wording of the licence condition to implement our decisions on its scope; and

b) the changes we have made to our 'Guidance on EMF Compliance and Enforcement' as well as our new EMF calculator.

1.15 We will be consulting until 16 November 2020. We will then consider and address any comments we receive in response to this consultation and publish updated versions of our EMF licence condition, our 'Guidance on EMF Compliance and Enforcement' and our EMF online calculator (as appropriate).

1.16 We will subsequently start the formal process of varying licences in all licence classes which authorise radio equipment to transmit at powers higher than 10 Watts EIRP.

1.17 We will also consider our next steps for amending relevant licence exemption regulations as considered appropriate on a case-by-case basis to include an EMF-related condition.

The overview section in this document is a simplified high-level summary only. The decisions we have taken and the new proposals on which we are consulting are set out with our reasoning in the full document.

2. Introduction

2.1 This document sets out our decisions on ensuring compliance with international guidelines for limiting public exposure to electromagnetic fields (EMF) arising from the use of radio spectrum. It follows the publication of our February 2020 consultation.

2.2 Radio spectrum is used for a variety of communications purposes including by mobile operators, TV and radio broadcasters, the emergency services, radio amateurs, taxi companies and many other industries. It is also used by the general public for things like using their mobile phones, Wi-Fi at home and keyless entry to their cars.

2.3 Demand for radio spectrum is increasing, driven by the development of new technologies opening up new services and applications. Against this background, some people have raised concerns around the safety of exposure to EMF, particularly from new technologies such as 5G.

EMF and health

2.4 EMF is present everywhere in our environment and can come from natural or manmade sources. For example, the sun, the earth and the earth's atmosphere are all sources of EMF. Manmade EMF sources include mains electricity, radio transmitters, mobile phones, lighting, and X-rays.

2.5 EMF in the part of the electromagnetic spectrum used for radiocommunications (i.e. between 3 kHz and 3000 GHz) is sometimes referred to as radiofrequency EMF. At these frequencies, the radiation produced is classed as 'non-ionising radiation' (see Figure 2.1 below). This means that it has insufficient energy to break chemical bonds or remove electrons (as opposed to 'ionising radiation' which occurs at much higher frequencies and is generally considered to be more hazardous to humans).

2.6 Under normal conditions, most uses of radio spectrum for wireless communications present no health risks to humans, but exposure to very high levels of radiofrequency EMF can be harmful. According to the World Health Organization (WHO), the main effect of radiofrequency EMF is the heating of body tissue.

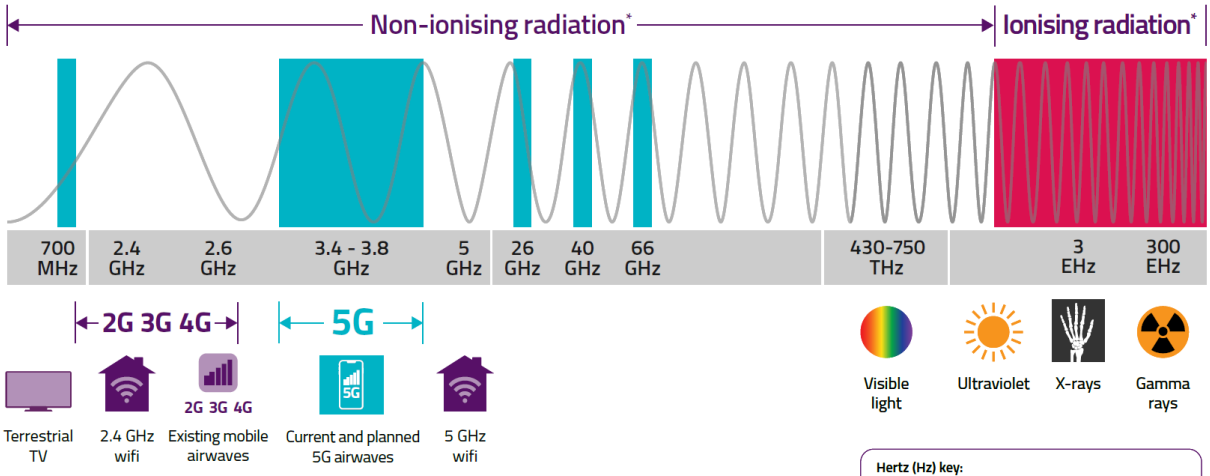
2.7 We are aware that some organisations and individuals have expressed concern that 5G mobile technology presents a greater risk to public health than previous generations of mobile technology (such as 2G, 3G and 4G).[2]

2.8 We note that current 5G deployments are re-using frequencies that have been in use for many years to deliver mobile and other services, such as TV broadcasting, satellite connections, and point-to-point microwave links. In the future, 5G will also use higher

[2] For information on 5G technology, please see Ofcom's Consumer Advice on 5G including a Guide to 5G.

frequencies than those currently used by wireless networks (e.g. mmWave frequencies above 24 GHz). However, the use of these frequencies is also not new.

Figure 2.1: The electromagnetic spectrum



**Radio frequencies needed for common household items to work, from televisions to microwave ovens (usually between 3KHz and 300GHz), produce radiation which is classed as 'non-ionising'. This means that it does not have sufficient energy to break chemical bonds or remove electrons, as opposed to 'ionising radiation', which occurs at much higher frequencies and is generally considered to be hazardous to humans. (Source: International Commission for Non-Ionizing Radiation Protection (ICNIRP))*

Framework for managing EMF exposure

2.9 Ofcom authorises and manages use of the radio spectrum in the UK. In performing that role, we take into account the advice on EMF exposure from the relevant public health authorities such as Public Health England (PHE). PHE's main advice about radio waves is that the guidelines of the International Commission on Non-Ionising Radiation Protection (ICNIRP) should be adopted for limiting exposure.

2.10 Our aim is to make sure that all radio equipment, including 5G equipment, complies with the basic restrictions in the ICNIRP Guidelines for the protection of the general public. Throughout this document we refer to these restrictions as the 'ICNIRP general public limits'.

ICNIRP Guidelines

2.11 ICNIRP is a non-profit independent scientific organisation set up specifically to investigate possible adverse health effects from non-ionising radiation. It is formally recognised by the World Health Organization and is consulted by the European Commission.

2.12 The ICNIRP Guidelines for limiting radiofrequency EMF exposure (up to 300 GHz) have been in place since 1998 and were updated in February 2020. The Guidelines establish restrictions (referred to as basic restrictions) that provide protection from exposure to EMF based on known health effects. They also provide reference levels to help determine

whether the basic restrictions are likely to be exceeded. Compliance with the reference levels should ensure compliance with the basic restrictions.[3]

2.13 Manufacturers, installers and users of radio equipment should be aware of the ICNIRP Guidelines and should already be taking EMF exposure into account when conducting their business.

2.14 For example, compliance with the ICNIRP Guidelines is already built into the mobile network operators' Code of Best Practice on Mobile Network Development, and the operators sign a declaration (sometimes referred to as an ICNIRP Certificate) confirming they have complied with the ICNIRP general public limits when applying for planning permission for a new site or a change to an existing site.[4]

2.15 The ICNIRP Guidelines set different limits for the protection of workers (occupational exposure) and for the protection of the general public. The limits for workers are higher than those for the general public.

2.16 We note that our February 2020 consultation included proposals only concerning the exposure of the general public to EMF. This is because the regulation of workplace safety is mainly the responsibility of the Health and Safety Executive and the exposure of workers to EMF is covered by various health and safety legislation including the Control of Electromagnetic Fields at Work Regulations 2016. We discuss the scope of our own proposals – including how we define the 'general public' – more fully in section 4.

Public Health England

2.17 In the UK, Public Health England has taken the lead on public health matters associated with EMF and has had a statutory duty to provide advice to Government on any health effects that may be caused by exposure to EMF.[5] [6]

2.18 As noted above, PHE's advice is that EMF exposure should comply with the ICNIRP Guidelines. PHE notes that: "*control of exposures occurs through product safety legislation …and planning policy. These regulatory areas all consider the international guidelines".*

[3] The ICNIRP Guidelines indicate that "*if measured values are higher than reference levels, it does not necessarily follow that the basic restrictions have been exceeded, but a more detailed analysis is necessary to assess compliance with the basic restrictions.*"

[4] Code of Practice, paragraph 7.5 and Appendix D and E. The Code of Practice requires MNOs to confirm they have complied with European Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (1999/519/EC). The restrictions in this Recommendation are based on the ICNIRP general public limits.

[5] The Scottish Government set out its position on 5G and public health in a statement published alongside its 5G strategy in August 2019. This noted that "*the advice provided by PHE is fully endorsed by the Chief Medical Officer for Scotland*". Public Health Wales notes on its website that "*specialist radiation protection information and advisory services are provided in Wales by Public Health England's Centre for Radiation, Chemical and Environmental Hazards (CRCE)*".

[6] In July 2020, the UK Government announced that PHE was to be replaced from the end of March 2021 by a new body, the National Institute for Health Protection. It is not yet clear if the remit of this new body will extend to all policy areas currently assigned to PHE.

The role of Ofcom

2.19 As noted, Ofcom is responsible for managing how radio spectrum is used in the UK. We do this by issuing licences for use of particular frequencies or by setting conditions for use of other frequencies on a licence-exempt basis, where exclusive use of the spectrum is not necessary (i.e. where many users can operate together without causing interference). Until now, we have not included requirements on EMF exposure for the protection of the general public in spectrum authorisations.[7]

2.20 Ofcom has expertise in measuring EMF levels, and we carry out measurements of EMF levels close to mobile phone base stations on request. This service was originally introduced around the time of the Stewart Report into mobile phones and health in 2000.

2.21 At the time, the Government asked Ofcom's predecessor, the Radiocommunications Agency, to implement a national measurement programme, to ensure that EMF exposure from mobile phone base stations did not exceed the levels in the ICNIRP Guidelines. All measurements taken over the course of the programme showed EMF levels were at small fractions of the ICNIRP general public limits.

2.22 In 2012, our measurement activity switched from a proactive to a reactive programme. From this date onwards, Ofcom has conducted site surveys on request. This is provided as a free service to qualifying schools and hospitals that do not have base stations installed on their site. In other cases, a fee is charged.

2.23 The results of these measurements - published on our website - have consistently shown that EMF levels are well within the ICNIRP general public limits. In April 2020, we published the updated results of EMF exposure measurements at publicly accessible locations near 5G-enabled mobile phone base stations. The highest level measured was approximately 1.5% of the ICNIRP general public limits.

2.24 In addition to measuring EMF levels on request, we feed our expertise in relation to measuring EMF into other appropriate channels (including PHE and the British Standards Institution). We take account of PHE's advice when carrying out our own functions, including those relating to managing the use of radio spectrum in the UK. We also have legal powers to hold spectrum users to account if issues are identified.[8]

Proposals in our February 2020 consultation

2.25 In our February 2020 consultation we proposed to introduce a specific condition in Wireless Telegraphy Act licences requiring licensees to comply with the ICNIRP general

[7] We use the term "spectrum authorisations" to refer to radio equipment that is authorised to operate, whether under a Wireless Telegraphy Act licence or under licence exemption regulations (in which case the equipment is exempt from the requirement to obtain a licence).
[8] Please see Annex 3 (Guidance on EMF Compliance and Enforcement) of this document for further information on the legal powers available to Ofcom to take enforcement action in the event of non-compliance with the ICNIRP general public limits.

public limits. We said this condition would apply to all radiocommunications equipment which is authorised to transmit at powers higher than 10 Watts EIRP.

2.26 We proposed to apply a similar approach for equipment that is exempt from the requirement to have a licence and that is authorised to transmit at powers higher than 10 Watts EIRP, such as certain types of satellite terminals.

2.27 We also proposed that spectrum users should keep records (including the results of any measurements, tests and calculations) to demonstrate how they have complied with the ICNIRP general public limits.

Consultation responses

2.28 We received nearly 400 responses to our consultation. Around 240 of these were from amateur radio enthusiasts, mostly expressing concern about new obligations being placed on them and the impact on a hobby many had practised for years without problems.

2.29 Another 107 responses were received from individuals and groups with concerns about potential health impacts from EMF. Many argued that the ICNIRP general public limits were insufficient to address health risks.

2.30 The rest of the responses were from current users of radio equipment, including mobile operators, TV and satellite companies, maritime users of radio equipment and volunteer emergency services. Many of these were broadly supportive of us ensuring that radio equipment complies with the ICNIRP general public limits but commented on the implementation of the proposed new EMF licence condition. Some opposed any changes to existing licences.

2.31 We have taken all the responses to our February 2020 consultation into account in making our decisions and have summarised what we believe to be the key points made in this Statement. The vast majority of respondents commented on our proposed new EMF licence condition rather than our proposal to include an EMF-related condition in licence exemption regulations. The discussion in this Statement therefore focuses on respondents' comments in relation to our proposed EMF licence condition. However, the decisions we make in this Statement relate to both our EMF licence condition and also to any EMF-related condition we include in licence exemption regulations in the future (collectively referred to as an EMF-related condition). Non-confidential responses are published on our website.

Structure of this document

2.32 The rest of this document is structured as follows:

- In **section 3** we address the issues raised by respondents to our February 2020 consultation who expressed particular concerns about health issues.
- In **section 4** we discuss and make decisions on the scope of our proposed new EMF-related condition, including identifying which spectrum users will be required to comply, and the physical areas in which they will need to ensure compliance.

- In **section 5** we discuss and make decisions on issues relating to compliance with the new EMF-related condition, including in relation to shared sites, and the approach we will take to enforcement.
- In **section 6** we set out how we will implement the new regulatory regime and the next steps in the process.

3. Health concerns over EMF exposure

3.1 A number of organisations and individuals have expressed concern that EMF exposure from mobile and other wireless technologies present a risk to public health. In particular, there have been suggestions that 5G presents a greater concern than previous generations of mobile technology.

3.2 As already noted, our own measurements near mobile phone base stations consistently show that EMF levels are well within the ICNIRP general public limits, including near 5G-enabled stations.

3.3 However, as explained in the February 2020 consultation, some spectrum users may not be fully aware of the ICNIRP general public limits and/or may not be taking full account of EMF exposure when installing or modifying radio equipment.

3.4 The proposals set out in the February 2020 consultation were intended to address these risks and ensure we are in a position to take appropriate enforcement action in the event of non-compliance with the ICNIRP general public limits.

Consultation responses

3.5 A majority of the nearly 400 respondents to our consultation supported our objective of ensuring all radio equipment complies with the ICNIRP general public limits. However, there was strong disagreement among respondents about whether the ICNIRP general public limits were the appropriate benchmark against which we should assess compliance.

3.6 A large number of individuals and organisations said the proposed EMF licence condition was inadequate to address issues arising from EMF exposure, particularly in respect to 5G deployments.

3.7 On the other hand, some respondents (notably many radio amateurs) said the condition went too far, and that the scope of our proposals should be limited to major commercial operations, such as Mobile Network Operators (MNOs), which they said presented a far greater risk of harm to the public.

3.8 Other respondents, including Sky, BAE Systems, Joint Radio Company, Mobile UK (the trade body for all the MNOs) and Telefonica (O2) said the proposed EMF licence condition was not necessary, since there was already general compliance with the ICNIRP general public limits among operators.

Consultation responses about EMF and health

3.9 We received 107 responses from individuals or groups directly expressing ongoing health concerns about EMF, particularly from the rollout of 5G mobile networks. 65 of those responses were submitted by respondents asking for their name and/or their whole response to remain confidential.

3.10 Many of the responses urged Ofcom to make its own assessment of health risks, without reference to PHE, and urged rejection of the ICNIRP Guidelines on the basis they are inadequate. Most respondents concerned about exposure to 5G emissions quoted from articles, available on the internet, which set out arguments against mobile and other wireless technologies. These texts were often copied in full or in part by respondents or adapted to make the same or similar arguments in the respondents' own words.

3.11 At least one website opposed to 5G urged visitors to respond to our consultation and to send a pre-prepared letter to their local councillors urging them to also respond.

3.12 Many respondents attached a document to their responses labelled *"Ofcom rebuttal – June 12"* and entitled *"Objections to the Ofcom proposal"*. This document goes through the consultation document in detail raising a number of points. The main issues raised are addressed in turn below. The document also includes a very large number of links to other websites and to research attributed to scientists and others identifying health risks from EMF.

3.13 Other respondents copied alternative prepared texts, which made the same or similar points to the 'Ofcom rebuttal' document, plus some further points. Some respondents with general concerns about 5G and other related technologies made points independently from the prepared texts. Many expressed some support for our proposals, but some suggested they did not go far enough.

3.14 A summary of responses related to health concerns – including the pre-prepared texts, the 'Ofcom rebuttal' document, and links to outside opinions – is published on our website.

Adequacy of ICNIRP Guidelines

3.15 The main common argument of those with ongoing concerns about health matters related to 5G and other mobile technologies was that the ICNIRP general public limits were inadequate for the protection of public health. Many suggested the expansion of mobile networks was progressing with little or no public scrutiny or consultation.

3.16 There were suggestions that the ICNIRP general public limits were set far too high and/or did not take account of the combined effects of EMF radiation from multiple sources. Many said it was wrong that the ICNIRP general public limits only took account of the heating of tissue and ignored other impacts of EMF.

3.17 Many respondents who questioned the relevance of the ICNIRP general public limits suggested ICNIRP was dominated by representatives of the telecommunications industry who therefore had conflicts of interest. They said advice should be taken from medical experts, not engineers.

3.18 One of the pre-prepared texts included in many respondents' submissions said: *"…. ICNIRP guidelines are being revealed as completely inadequate by many scientists, doctors and official bodies who know that there are non-thermal, harmful biological effects which*

happen at exposure levels much lower than ICNIRPs. Many countries have set guideline levels 100 times lower than here in the UK…."[9]

3.19 This text and the document labelled 'Ofcom rebuttal' pointed to particular issues with 5G, saying the scale of emissions planned for a fully rolled out 5G network had never been experienced before. It said rigorous safety testing procedures of this exponential increase in exposure was absolutely essential.

3.20 Some respondents urged Ofcom to make its own judgement on health matters relating to EMF and not rely on PHE and ICNIRP. For example, one respondent (Dave Ashton) said: *"Ofcom has the flexibility and mandate to follow precautionary and independent scientific and medical advice"*. Another said: *"Are you happy and confident to conclude that adherence to ICNIRP…… adequately protects human health for biological effects? Note, I am not asking are PHE happy, I am asking are you as Ofcom happy and confident in this?"*

3.21 Many respondents urged Ofcom to adopt a precautionary approach, whereby we should require proof there was no harm to citizens, rather than rely on a lack of evidence that harm existed. There was wide opinion from these respondents that the roll-out of 5G networks should be halted until there had been full independent scientific studies to demonstrate the technology was safe.

Ofcom response

3.22 We acknowledge the very strong feelings of some individuals and organisations about 5G and other mobile technologies.

3.23 However, Ofcom is not a public health body and does not have medical or health expertise to make the kind of judgements being urged by these respondents. PHE currently has the statutory responsibility for public health issues in England, and its guidance on EMF exposure is also taken into account for public health advice in Scotland, Wales and Northern Ireland.

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.

3.25 For these reasons, we did not consult on whether the ICNIRP general public limits are the appropriate benchmark by which we should assess EMF compliance or what the appropriate safety levels should be. We have decided it is appropriate for us to follow the main advice of PHE that exposure should comply with the internationally agreed safety levels set by ICNIRP. Moreover, we note that ICNIRP is the formally recognised non-governmental organisation in the field of non-ionising radiation protection for the World Health Organisation (WHO), the International Labour Organisation (ILO) and the European Union (EU).

[9] 5G and health response summary page 2.

3.26 As explained in our February 2020 consultation, some spectrum users may not be fully aware of the limits and/or may not be taking full account of EMF exposure when installing or modifying radio equipment. Our EMF-related condition is intended to address this and ensure we are in a position to take appropriate enforcement action in the event of non-compliance with the ICNIRP general public limits.

Self-certification by spectrum users

3.27 Although the main thrust of arguments submitted by respondents with concerns about EMF health issues related to the suitability of PHE and ICNIRP to determine safety levels, there was also some concern about how our proposed licence condition would be enforced.

3.28 In particular, there was concern that spectrum users would be required to self-certify that their installations were compliant. One of the texts copied by many respondents (included in our summary[10]) states: "*The proposal requires telecoms to self-certify their compliance, and only to keep records of that compliance. They are not requiring any audit or checking process at the time of turning on the equipment. This is not adequate to ensure public safety".* It continues: "*Who is checking interference patterns in the environment? The consultation does not reveal any commitment to a programme of testing.*[11]

3.29 Some respondents urged Ofcom to collate and keep details of all relevant sites and make this available to the public via an easily accessible website. The information should include details of new, upgraded and older masts. They said there should also be an opportunity for the public to submit complaints, with a prospect of masts being removed if they were a danger to the public.

Ofcom response

3.30 We discuss our approach to compliance monitoring, checks and measurements in section 5. In that section, we explain that we will continue to carry out random, routine compliance checks on licensees and that these will now include a check of EMF compliance records. We also explain that we have a wide range of enforcement powers available to us in the event of non-compliance, including the power to impose fines, instigate criminal proceedings and revoke spectrum licences, if considered appropriate. Additionally, we will continue to conduct site surveys on request to ensure EMF levels remain within the ICNIRP general public limits.

3.31 As already noted, all the measurements we have conducted over the years have shown EMF levels to be well with the safety limits. In the circumstances, it would in our view be a disproportionate intervention for us to require independent checks on all new sites prior to equipment being turned on. Further, the cost and resources involved for Ofcom to carry out such checks cannot be justified in relation to the level of risk.

[10] 5G and health response summary page 2.
[11] 5G and health response summary page 2.

3.32 However, we will in future require licensees and other users to keep records of their own compliance assessments so they are in a position to demonstrate how they have complied with the new requirements. We consider this is a proportionate and objectively justified approach to this issue.

Ofcom 'conflict of interest'

3.33 All of the main texts copied into consultation responses by respondents concerned about health aspects of EMF suggested that Ofcom was not fit to make judgements on these matters because of a perceived 'conflict of interest'.

3.34 For example, one body of text says: "*Ofcom receive money for sale of bandwidth and they are responsible for overseeing adherence to ICNIRP guidelines. This is a conflict of interest.*" Another said: "*We question whether Ofcom are well placed to regulate the licensees. The fact they authorise spectrum use for which they receive very large sums of money means they have a serious conflict of interest if they are regulating those same companies*".

3.35 The 'Ofcom rebuttal' document states: "*Ofcom receive huge income from telecoms from selling off the bandwidth for 5G. Is this a glaring conflict of interest? How is it correct that Ofcom are responsible for regulation of licensees' emission levels"*?

Ofcom response

3.36 The suggestion that Ofcom has a conflict of interest as a result of conducting spectrum auctions is incorrect.

3.37 Ofcom's duties are set out in the Communications Act 2003, one of which is to secure the optimal use of spectrum for wireless telegraphy.[12] Raising revenue is not one of our statutory duties and has never been one of our objectives.

3.38 Where demand for spectrum exceeds supply, we generally allow the market to determine the optimal use, often through an auction process. However, all proceeds raised through spectrum auctions are passed on by Ofcom to HM Treasury's Consolidated Fund. No monies raised from spectrum auctions are retained by Ofcom.

3.39 In order to recover our costs relating to spectrum management, which may include the cost of preparing and delivering auctions, we are allowed to retain part of the on-going licence fees paid by some holders of Wireless Telegraphy Act licences (provided any fees we retain are objectively justifiable and proportionate in relation to the costs we are likely to incur). Any excess raised through licence fees is transferred to the HM Treasury's Consolidated Fund.

Impact assessments on use of 5G

3.40 One of the pre-prepared texts used by many respondents urged Ofcom to conduct an impact assessment on the projected use of 5G in the UK before proceeding with our proposals. Some respondents pointed to the likelihood of higher radio frequencies being

[12] Section 3(2)(a).

used in future for mobile, and said these presented a potentially higher risk to the public than those currently in the scope of our proposals.

3.41 The 'Ofcom rebuttal' document, attached to many responses, also said Ofcom should conduct an equality impact assessment to assess the impact of 5G on vulnerable groups. It asked: *"Where is equality impact assessment of this proposal on children, chronically sick, people with electro-sensitivity, the elderly, people with metal implants?"*

3.42 Some individual respondents also noted the existence of a medical condition whereby some had heightened sensitivity to EMF. Some individuals described their own cases, and how such sensitivity affected them personally. One respondent said electro-sensitivity was a condition that qualified sufferers for personal independence payments and therefore had a 'disability dimension' under the Equality Act.

3.43 Some respondents were concerned about the potential impact of EMF on the environment, particularly on birds and insects. Some said there had not been sufficient research carried out and that roll-out of 5G should not proceed until or unless it was proved to be safe.

Ofcom response

3.44 As explained above, current 5G deployments are re-using frequencies that have been in use for many years. Whilst 5G will, in the future, start to use higher frequencies than those currently used by wireless networks (e.g. mmWave frequencies), the use of these frequencies is also not new. 5G is re-using spectrum that has previously been used to deliver services such as TV broadcasting, wireless broadband and satellite connections as well as for point-to-point microwave links and other types of transmitters that have been present in the environment for many years. The ICNIRP general public limits also apply to frequencies used for 5G services in the same way as they apply to frequencies used for other services.

3.45 We also note PHE's view that "*the overall exposure [from all mobile network EMFs, including 5G] is expected to remain low relative to [the ICNIRP] guidelines and, as such, there should be no consequences for public health*."

3.46 As explained above, we did not consult on whether the ICNIRP general public limits were the appropriate benchmark by which we should assess EMF compliance, or what the appropriate EMF safety levels should be. Ofcom is not a public health body and we are not qualified to make such public health judgements. We have decided it is appropriate for us to follow the main advice of PHE that exposure should comply with the ICNIRP general public limits.

3.47 As explained in our February 2020 consultation, some spectrum users may not be fully aware of the ICNIRP general public limits and/or may not be taking full account of EMF exposure when installing or modifying radio equipment. Our consultation was therefore limited to how we should ensure compliance with the ICNIRP general public limits to address these risks. The potential impact of our proposals should be viewed in this context.

3.48 As we have explained, all the EMF measurements we have taken to date have been well within the ICNIRP general public limits and many licensees are already taking the ICNIRP general public limits into account when installing and operating their radio equipment.

3.49 That said, as our licence condition is intended to address any gaps in current compliance and ensure we are in a position to take appropriate enforcement action in the event of non-compliance, it should foster a culture of even greater compliance going forward.

3.50 Annex 1 explains our legal obligations relating to assessing the impacts of our proposals under the Communications Act 2003 and equality legislation. We have carefully considered the potential impact of our proposals including on persons sharing protected characteristics under equality legislation.

3.51 For the reasons set out above, our proposals should have only a positive impact on individuals such as children, the chronically sick, people with electro-sensitivity, the elderly and people with metal implants compared to the status quo where there is no formal obligation on spectrum users to comply with the ICNIRP general public limits.

3.52 In relation to the concerns about the impact of EMF on the environment, Ofcom does not have the environmental expertise to reach the kind of judgements being urged by these respondents. The Department for Environment, Food & Rural Affairs is the UK government department responsible for safeguarding our natural environment.

3.53 We note that none of the environmental reports or assessments referenced in the answers to questions on this topic provided by Members of Parliament have identified EMF exposure "*as a significant threat to pollinating insects*". Instead they highlighted key threats such as habitat loss, inappropriate pesticide use and invasive species. [13]

3.54 For example, in 2018, an EU-funded 'EKLIPSE' study concluded that "*few ecological studies exist, but when they do, the reported [EMF] effects are negligible, contrasting, or cannot be separated from other environmental factors*".

Alternative approaches to assessing harm from EMF exposure

3.55 The 'Ofcom rebuttal' document, attached to many responses, notes PHE's commitment to consider adjusting its guidance in future if there are changes in the overall trend of research on EMF health effects. It says there is therefore a *"moving benchmark for safety on the PHE side, whilst Ofcom are proposing regulating licensees solely against ICNIRP guidelines".*

3.56 The submission says there should be procedures in place to apply and enforce changes to our regulations if new research is presented through a body other than ICNIRP. It adds that there is no defined procedure regarding the reissuing of certificates and audits should ICNIRP lower or change its guidelines.

[13] See: https://questions-statements.parliament.uk/written-questions/detail/2020-02-04/12213

Ofcom response

3.57 As explained above, PHE is the expert health body and its main advice on EMF is that exposure should not exceed the ICNIRP general public limits. Similarly, our EMF-related condition will require exposure to be below the ICNIRP general public limits.

3.58 We discuss how we will take account of future changes to the ICNIRP Guidelines in section 5 of this document.

3.59 PHE "*continues to monitor the health-related evidence applicable to radio waves, including in relation to base stations, and is committed to updating its advice as required*."[14] We will similarly continue to take into account PHE's advice and consider how to reflect any updates to its advice in any EMF-related condition and/or 'Guidance on EMF Compliance and Enforcement' at the appropriate time.

Other matters raised by respondents with concerns about EMF and health

3.60 In addressing their concerns about the potential health impact of EMF, many respondents touched on other aspects of the proposals discussed in our February 2020 consultation.

3.61 For example, the 'Ofcom rebuttal' document raised issues about how we will monitor, assess and enforce EMF limits – including limits on shared transmission sites.

3.62 In section 4 we discuss the scope of our proposals and in section 5 we discuss issues relating to compliance and enforcement of our EMF-related condition, including our decisions in relation to shared sites.

Conclusions on EMF and health

3.63 We acknowledge the concerns that some organisations and individuals have about EMF exposure, particularly from new 5G mobile transmissions.

3.64 However, Ofcom is not responsible for setting EMF safety levels. As an expert health body, PHE takes the lead on public health matters associated with EMF exposure, including in relation to 5G. The judgements about health matters that some respondents are urging Ofcom to make to do not fall within our remit and it would not be appropriate for us to adopt a different approach to that of PHE.

3.65 It remains the case that the advice from PHE is that EMF exposure should comply with ICNIRP Guidelines. We have therefore decided to adopt this principle in our EMF-related condition.

3.66 We recognise that there is a lot of public interest in this issue and we will continue to carry out EMF measurements and take into account PHE's advice in any EMF-related condition we impose.

[14] See: https://www.gov.uk/government/publications/mobile-phone-base-stations-radio-waves-and-health/mobile-phone-base-stations-radio-waves-and-health (Section 1)

4. Scope of the new EMF-related condition

4.1 All manufacturers, installers and users of radio equipment should already be aware of the ICNIRP general public limits and be taking EMF exposure into account when conducting their operations. However, having reviewed the current approach to regulation of EMF, we said in the February 2020 consultation that there was a risk that some spectrum users:

- may not be fully aware of the ICNIRP Guidelines; and/or
- may not be fully taking account of EMF exposure when installing or modifying radio equipment.

4.2 Our proposed EMF licence condition would require licensees to ensure that EMF exposure from radio equipment complies with the ICNIRP general public limits. We said in the February 2020 consultation that this condition would apply to all licences that authorise transmissions at powers higher than 10 Watts EIRP. [15] [16]

4.3 Licensees would also be required to keep records (including the results of any measurements, tests and calculations) that demonstrate how they have complied.

4.4 We also proposed to apply a similar approach for equipment that is currently exempt from the requirement to obtain a licence (or may be exempt in the future) and that is authorised to transmit at powers higher than 10 Watts EIRP. [17]

4.5 Whilst the following discussion focuses on respondents' comments in relation to our proposed EMF licence condition, the discussion and decisions we make in this section relate to both our EMF licence condition and also to any EMF-related condition we include in licence exemption regulations in the future.

Overview of consultation responses on the scope of our proposals

4.6 Some respondents to our February 2020 consultation questioned whether Ofcom needed to intervene at all and suggested the current regulatory framework is sufficient to protect the general public from EMF.

4.7 Other respondents queried the scope of our proposals and said we should ensure they do not overlap with any pre-existing legislation which requires employers to protect workers from EMF. They suggested we should clarify what we mean by "the protection of the

[15] For radio equipment transmitting at powers at 10 Watts or below, the compliance distances set out in the relevant standards are lower and we do not consider a licence condition is necessary. We discuss this in more detail in Section 4 of this document.
[16] EIRP stands for Equivalent Isotropically Radiated Power. It is a measure of the strongest power emitted in any direction from an antenna. In this document, when we refer to the power transmitted by a piece of radio equipment, we are referring to EIRP unless explicitly stated otherwise.
[17] Most equipment that is licence exempt operates at powers well below 10 Watts. However, there are a small number of cases where equipment that is exempt but which is authorised to operate at a relatively high power (such as certain types of satellite terminals and some fixed links).

general public" and should not require licensees to comply in areas which are not accessible to the general public.

4.8 Some stakeholders argued that our proposals went too far and affected too many spectrum users. Some argued that the 10 Watt EIRP threshold we had proposed was too low and should be set higher. Others suggested that specific spectrum users should be exempt from compliance.

4.9 For example, we received a large volume of responses from amateur radio enthusiasts, many of whom were concerned that the new requirements would have a detrimental impact on their hobby. They argued that amateur radio should be excluded from the scope of the proposals altogether. They were particularly concerned with the additional administrative burden they believed would be placed on them and queried whether this was proportionate to the issue being addressed.

4.10 Other respondents – notably some of those who used radio at sea, either for business or leisure – queried how the new limits would apply to them. Some argued it was impractical to require them to comply. Others said including leisure craft within the scope of the proposals meant boat owners may be deterred from using radio altogether, which was a maritime safety issue.

4.11 Rescue organisations, such as Scottish Mountain Rescue and the RNLI, were also concerned about the use of their radio equipment being required to comply with our proposed licence condition in certain situations.

4.12 Other respondents suggested the scope of our proposals was not wide enough and should be applied further.

Suitability of the current regulatory framework

4.13 There was disagreement amongst respondents to the February 2020 consultation over whether our proposal to include compliance with the ICNIRP general public limits in licences was necessary. Some said the existing regulatory framework was perfectly adequate to address any concerns over EMF exposure. Others said our proposals addressed a gap in the current regulatory framework.

Responses opposing our proposals

4.14 Telefónica noted Ofcom's general bias against intervention in the market and said the absence of evidence that the current regime was not working made it difficult to justify the proposals. Yaesu UK also said the proposals were neither justified nor proportionate.

4.15 Mobile UK said the current regime for management of compliance was already providing appropriate protection to the public at large. It encouraged Ofcom to avoid any change which led to additional overheads or complexity of administration.

4.16 The Joint Radio Company, a venture set up by the gas and electricity industries that manages its members' spectrum licences, said we had provided no justification for

imposing any additional regulatory burden on licensed operators in the February 2020 consultation.

4.17 Sky noted that EMF exposure is already managed under product safety legislation, health and safety legislation and planning policy. It also noted that Ofcom's measurements near newly deployed 5G-enabled base stations were well within the ICNIRP general public limits. Given this context, it was unclear why Ofcom was now proposing to introduce additional and unnecessary burdens on operators.

4.18 BAE Systems said it understood Ofcom's interest in these matters, but did not believe our proposals conferred any additional protection for employees or the general public beyond what was delivered by existing regulation. It was therefore *"at best nugatory and at worst counter-productive".*

4.19 It said existing health and safety standards and statutes were, for the most part, adequate and appropriate in this area. If there were limitations in these or opportunities for improvement, they should be addressed within existing structures, rather than in a new mandated licence condition. It said spectrum authorisation was a separate issue to safety, health and environmental concerns.

4.20 The Royal Yachting Association (RYA) said it was not necessary to involve a second body, Ofcom, to enforce a compliance regime with similar objectives to the existing legislation enforced by HSE, The Control of Electromagnetic Fields at Work Regulations 2016.

4.21 Another company said Ofcom should set out a clearer justification for any application of the proposal beyond mobile networks. It said justification was needed because there was existing legislation covering exposure to non-ionising radiation. It asked whether licence fees would remain the same, noting that the additional administrative burden could negatively affect small businesses.

Responses supportive of our proposals

4.22 The BBC noted that Ofcom had a legitimate interest in demonstrating to the general public that operators are working within international guidelines on EMF exposure. For locations where the general public have legitimate access, it said it accepted that licensees will need to show there is compliance with the basic restrictions.

4.23 The Federation of Communication Services, which represents operators of business radio, said it understood that current public concerns over the introduction of 5G infrastructure required a response from Ofcom. It said it recognised that, along with other radiocommunications providers, it already had an obligation to ensure its systems followed the ICNIRP general public limits. Therefore, adding that condition to licences will make little technical difference.

4.24 Arqiva expressed agreement with our proposals in principle, although raised concerns about potentially burdensome compliance requirements. It said the proposals could help the public perception of EMF and health issues. Cambium Networks said the current

absence of an EMF licence condition was a loophole, and that addressing this was fundamental to ensuring public confidence in radio systems, particularly 5G.

4.25 The Telecommunications Association of the UK Water Industry (TAUWI) said it agreed with the proposed steps to mitigate the risk of exceeding the ICNIRP general public limits. It said that by introducing this new condition, Ofcom will be aligning with local planning department conditions concerning the installation of telecommunications apparatus.

4.26 Vodafone said it was broadly supportive of our proposals and that it was logical for a condition to use radio safely to be added to spectrum licences (*"and to all of them, rather than just those relating to mobile access spectrum"*). Although compliance with the ICNIRP general public limits have to date been managed mainly via health and safety regulation, it acknowledged that it was an anomaly that Ofcom authorises the use of radio waves, yet stays silent on using those radio waves safely.

4.27 BT said it welcomed Ofcom's engagement with issues related to EMF and health. Although it did not see any need for substantive additional regulation, it recognised that our proposal might provide assurance to the general public, and to that extent welcomed the proposed EMF licence condition.

4.28 Whilst Inmarsat said it was not aware of any issues with the current voluntary approach, it accepted that it was important to provide a high level of assurance.

4.29 Various other respondents were broadly supportive of the aim of our proposals – though not necessarily all the detail of our proposals (including EchoStar/Hughes and Strutt and Parker).

The current regulatory framework

4.30 As set out in section 2 of our February 2020 consultation, there is pre-existing legislation, rules and guidance which seeks to mitigate the risk of EMF exposure. We first consider the scope of the following regulation and the responsibilities of the relevant regulatory organisations that play a role in the control of EMF exposure in the UK:

a) **Product safety legislation**: The Radio Equipment Regulations 2017 and the role of local trading standards.

b) **Planning policy**: Voluntary commitments by industry to comply with the ICNIRP general public limits and the role of local planning authorities.

c) **Health and safety at work legislation**: Legislation which requires employers to protect workers from EMF including The Control of Electromagnetic Fields at Work Regulations 2016 and The Merchant Shipping (Health and Safety at Work) Electromagnetic Fields Regulations 2016, and the role of the Health and Safety Executive and the Department for Transport.

4.31 We then explain why we consider the current regulatory framework does not provide sufficient protection from EMF exposure for the general public or ensure spectrum users comply with the ICNIRP general public limits. We also explain how our proposals are

intended to complement – and not overlap – with the regulatory regimes that currently exist.

Product safety legislation

4.32 The Radio Equipment Regulations 2017 (RER) govern the placing of radio equipment on the market. These regulations transpose into UK law The Radio Equipment Directive 2014/53/EU of the European Parliament and Council.

4.33 The RER sets out requirements for health and safety, electromagnetic compatibility, and the efficient use of the radio spectrum. Manufacturers, importers and distributors of radio equipment all have responsibilities under the RER.

4.34 Manufacturers must design and manufacture radio equipment so that it meets the essential requirements in the RER, and must carry out a 'conformity assessment procedure' to demonstrate that the radio equipment meets the essential requirements. One way of ensuring conformity with the essential requirements is by using the relevant harmonised standards. The list of harmonised standards for radio equipment includes standards explaining how to demonstrate that radio equipment complies with EMF exposure limits, which are based on the ICNIRP Guidelines.[18]

4.35 Manufacturers, importers and distributors are also required to ensure that radio equipment is accompanied by clear, understandable and intelligible instructions and safety information.[19] Where appropriate, manufacturers and importers must also sample test the equipment and monitor complaints to protect the health and safety of end-users, and keep distributors informed of any monitoring carried out.

4.36 Ofcom is the enforcing authority for radio equipment in the UK in respect to protection and management of the radio spectrum only. Other aspects of enforcing radio equipment standards are the responsibility of others: in Great Britain, enforcement responsibility lies with the local 'weights and measures authority' (trading standards). In Northern Ireland, the enforcing authorities for these aspects are the local district councils.

Planning policy

4.37 Although Ofcom authorises the use of radio spectrum, it is the responsibility of local planning authorities to approve or reject applications for the siting of infrastructure to actually deploy those frequencies. Planning procedures vary across the UK regions and are subject to various national and devolved administration laws.

4.38 Ofcom is not involved in the planning process, except in the issuing of 'Communications Code' rights to network providers. The code gives operators various general permissions, including the right to install electronic communications apparatus; gain access to land to maintain or operate apparatus; connect to a power supply; construct communications infrastructure etc.

[18] RER, Regulations 18 and 26.
[19] RER, Regulations 13, 24 and 31.

4.39 Beyond that, Ofcom has no role in the enforcement of planning law or the siting of telecommunications masts. Individual planning authorities administer the planning laws locally and issue permission through their own normal planning processes.

4.40 As explained in section 2, compliance with the ICNIRP general public limits is already built into the mobile network operators' Code of Best Practice on Mobile Network Development[20], and the operators sign a declaration (sometimes referred to as an ICNIRP Certificate) confirming that they have complied with the ICNIRP general public limits when applying for planning permission for a new site or a change to an existing site.[21]

4.41 In some cases, however, planning permission may not be needed, e.g. if changes are made to an existing site that are not considered significant from a planning perspective. Some smaller sites may not fall within relevant planning regulations at all. We understand MNOs do evaluate and ensure compliance with the ICNIRP general public limits in all cases where changes to public exposure levels may occur, and not just where planning permission is required. There are nonetheless various scenarios in which planning permission is not required and where there is therefore no opportunity to demonstrate compliance with the ICNIRP general public limits as part of the planning process.

4.42 We also note that on 22 July 2020, the UK Department for Culture, Media & Sport published a statement on proposed reforms to permitted development rights to support the deployment of 5G and extend mobile coverage, in particular to enable:

- the deployment of taller and wider masts;
- building-based masts located nearer to highways; and
- faster deployment of radio equipment housing, such as equipment cabinets.

4.43 These reforms could increase the circumstances in which planning permission is not required and where there is therefore no opportunity to provide evidence of compliance with the ICNIRP general public limits when installing new radio equipment or making changes to an existing site.

Health and safety at work legislation

4.44 The proposals set out in our February 2020 consultation did not, and were not intended to, require spectrum users to comply with the relevant levels in the ICNIRP Guidelines for occupational exposure (i.e. the protection of workers). We recognise that there is pre-existing legislation which already requires employers to protect workers from EMF and that other regulatory bodies have responsibilities in relation to this pre-existing legislation. As a result, our proposals were limited to requiring spectrum users to comply with the ICNIRP general public limits.

[20] The Code of Best Practice on Mobile Network Development in England published 24.11.2016 (Code of Practice)
[21] Code of Practice, paragraph 7.5 and Appendix D and E. The Code of Practice requires MNOs to confirm they have complied with European Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (1999/519/EC). The restrictions in this Recommendation are based on the ICNIRP general public limits.

4.45 Health and safety law in the UK places duties on persons who create risks that relate to work and the workplace.[22] For example:

a) The Health and Safety at Work Act etc. 1974 (the Health & Safety Act) places various duties on employers (and self-employed persons), including a duty to ensure as far as reasonably practicable they do not expose workers to risks to their health or safety; and

b) The Management of Health and Safety at Work Regulations 1999 (the Management Regulations)[23] "*address the general principles of how hazards in the workplace [such as exposure to EMF] need to be managed, through risk assessment and adoption of proportionate control measures to ensure the risks are reduced to as low a level as is reasonably practicable*".[24]

4.46 There is also the following legislation specifically relating to EMF exposure which requires employers to assess the levels of EMF to which workers may be exposed against a set of specific thresholds:[25]

a) The Control of Electromagnetic Fields at Work Regulations 2016.[26] These regulations were introduced by the Health and Safety Executive (HSE) and apply to land-based workers in Great Britain;[27] and

b) The Merchant Shipping (Health and Safety at Work) Electromagnetic Fields Regulations 2016 (the EMF Maritime Worker Regulations).[28] These regulations were introduced by the Department for Transport and apply to work that is carried out on a UK ship. [29]

4.47 The EMF exposure levels permitted under the above legislation is based on the occupational limits in the ICNIRP Guidelines. These limits are higher than the limits for the protection of the general public because employers are in a position to identify and mitigate any risks by implementing health and safety programs and workplace rules.

4.48 We refer to the The Control of Electromagnetic Fields at Work Regulations 2016, The Control of Electromagnetic Fields at Work Regulations (Northern Ireland) 2016 and the EMF Maritime Worker Regulations collectively as the "EMF Worker Regulations".

Ofcom response to consultation responses

4.49 We have described above the current regulatory framework relating to EMF. As noted at the beginning of this section, manufacturers, installers and users of radio equipment

[22] See paragraph 19 of HSE Impact Assessment.
[23] The Management Regulations implemented Framework Directive (89/391/EEC).
[24] See paragraph 44 of HSE Impact Assessment.
[25] See paragraph 15 of HSE Consultation. This legislation implemented European Commission Directive 2013/35/EU. Also see paragraph 20, HSE Impact Assessment.
[26] Also see HSE Guidance. HSE refers to these regulations as the "CEMFAW Regulations".
[27] Northern Ireland has introduced its own regulations, The Control of Electromagnetic Fields at Work Regulations (Northern Ireland) 2016, available at: https://www.legislation.gov.uk/nisr/2016/266/contents/made.
[28] Also see MCA Guidance.
[29] See paragraph 20, HSE Impact Assessment.

should already be aware of the ICNIRP general public limits and be taking EMF exposure into account when conducting their business.

4.50 However, the current absence of any legal obligation (whether in spectrum licences or otherwise) requiring spectrum users to comply with the ICNIRP general public limits means that some spectrum users may not be fully aware of the ICNIRP general public limits and/or may not be taking full account of EMF exposure when installing or modifying radio equipment.

4.51 Our review of consultation responses has confirmed that some spectrum users do not fully understand all the implications of complying with the ICNIRP general public limits. For example, even where licensees are aware of the limits, and are taking them into account in respect to their own operations, there seems to be some confusion over how licensees should assess compliance on a shared site.

4.52 That does not mean these spectrum users are operating radio equipment in breach of the ICNIRP general public limits. However, it does in our view mean our proposal to require spectrum users to comply with the ICNIRP general public limits is an objectively justified and proportionate response.

4.53 Further, for the following reasons, we do not consider these pre-existing regimes to be sufficient to ensure spectrum users comply with the ICNIRP general public limits:

a) **Product safety legislation:** The Radio Equipment Regulations 2017 only impose obligations on manufacturers, importers and distributors to ensure radio equipment meets certain requirements when it is placed onto the market, and that it is accompanied by appropriate safety information. They may not therefore impose any requirements on licensees, installers and users of radio equipment and do not in any event impose a requirement to comply with the ICNIRP general public limits.

b) **Planning policies**:

- The planning polices described above are only applicable in certain scenarios and will not apply to the installation or modification of all radio equipment used by spectrum users and, for some spectrum users, may not apply at all.
- The Code of Best Practice on Mobile Network Development is a voluntary code and there is no legal requirement on operators to comply.
- Local planning authorities do not have expertise in EMF and are advised not to make any judgements on health and safety issues beyond operators' self-certified compliance with the ICNIRP general public limits.[30]
- The ICNIRP Certificate an operator may provide as part of the planning process only confirms the proposed radio equipment and installation identified in the planning application has been designed to be compliant with the ICNIRP general public limits.[31] It does not refer to ongoing compliance.

[30] Code of Practice, paragraph 7.3 (page 13).
[31] Code of Practice, Appendix D (page 58).

c) **Health and safety legislation**: The EMF Worker Regulations described above have a different scope; they require employers to protect workers from exposure to EMF and are not intended to provide protection for the general public from EMF exposure. The EMF Worker Regulations are also based on higher EMF exposure levels than the levels in the ICNIRP general public limits.

4.54 In contrast, our proposals are intended to require – as part of a licence condition and under licence exemption regulations – that spectrum users comply with the basic restrictions in the ICNIRP Guidelines for general public exposure. They therefore have a different scope to the pre-existing regimes and are intended to complement – and not overlap – with these pre-existing regimes.

4.55 We also note that the EMF Worker Regulations were introduced against a backdrop of pre-existing legislation (the Health and Safety Act and the Management Regulations) under which employers were routinely managing EMF risks as well as the relevant levels in the ICNIRP Guidelines for occupational exposure.[32] Notwithstanding this pre-existing legislation and associated guidance, the EMF Worker Regulations were introduced to impose a legal requirement on employers to comply with the relevant levels in the ICNIRP Guidelines for occupational exposure.

4.56 Similarly, the proposals set out in our February 2020 consultation are aimed at turning a generally accepted standard of compliance with the ICNIRP general public limits into a legally binding obligation in an EMF-related condition.

4.57 For the reasons set out above, our view is that requiring spectrum users to comply with the ICNIRP general public limits is objectively necessary and proportionate.

4.58 Taking into account the scope of the EMF Worker Regulations, we discuss below what we mean by the 'general public' and the individuals our proposals are therefore intended to protect.

Meaning of 'general public'

4.59 The proposals set out in the February 2020 consultation to require spectrum users to protect the 'general public' from EMF exposure resulted in some respondents questioning what we mean by the term 'general public'. Some respondents queried what situations would be covered by our EMF-related condition and what situations would be covered by the pre-existing legislation which requires employers to protect workers from EMF exposure.

4.60 Although Vodafone was supportive of our proposals, it warned that compliance with ICNIRP general public limits would be governed by overlapping regulations – HSE for occupational exposure, and Ofcom for the general public. Similarly, BAE Systems said Ofcom was conflating different issues, and operators would be subject to two separate but overlapping compliance/enforcement regimes leading to duplication and confusion.

[32] See paragraphs 44 and 48 of HSE Impact Assessment.

4.61 Mobile UK said the distinction between where occupational and general public limits on EMF exposure applied would have to be absolutely clear, otherwise there would be unacceptable and unworkable confusion over the respective remits of Ofcom and the HSE over which limits applied. The Royal Yachting Association (RYA) also said our proposals will cause confusion with HSE regulation and result in conflicting rules and double regulation.

4.62 Arqiva asked for clarification of where compliance with Ofcom licence conditions on EMF exposure should apply. It said an appropriate definition could be "*all areas legitimately accessible to the public*." The BBC said any measurements or calculations should be assessed at the boundaries of any area accessed by the public.

4.63 A number of amateur radio enthusiasts were concerned that some interpretations of the term 'general public' might mean our proposals extended to their own homes, and members of their families. Some said Ofcom should not interfere in cases where operators were only affecting themselves and were aware of any risks. One respondent said a lone operator should not be liable for exceeding the limit because that is their prerogative in their own space.

4.64 The Maritime and Coastguard Agency (MCA) said that our proposals seemed to be directed at sites where there was continuous transmission from fixed sites with clear boundaries between where employees and the public are exposed. They said distinction between who was an employee and who was a member of the general public was less clear on boats.

Ofcom response

4.65 As explained above, our proposals are not intended to overlap with pre-existing legislation which falls under the remit of HSE and the Department for Transport. Our proposals are not therefore intended to protect workers from EMF who should already be protected under health and safety legislation including the EMF Worker Regulations.

4.66 It follows that our proposals are not intended to require licensees to comply with the ICNIRP general public limits if only workers may potentially be exposed to EMF in breach of those limits. For example, if the only individuals that may potentially be exposed to EMF in breach of the ICNIRP general public limits are window cleaners, roofing contractors, air conditioning engineers, insurance inspectors and antenna riggers, then their employer – whether a site owner, other licensee or otherwise – should already be taking appropriate steps to mitigate the risk of their exposure to EMF in accordance with pre-existing health and safety legislation. In this scenario, licensees would not be required to take any additional steps to comply with the ICNIRP general public limits.

4.67 In terms of the difference between occupationally exposed individuals (workers) and the general public, the 1998 ICNIRP Guidelines explain that:

"The occupationally exposed population consists of adults who are generally exposed under known conditions and are trained to be aware of potential risk and to take appropriate precautions. By contrast, the general public comprises individuals of all ages and of varying health status, and may include particularly susceptible groups or individuals. In many cases, members of the public are unaware of their exposure to EMF. Moreover, individual

members of the public cannot reasonably be expected to take precautions to minimize or avoid exposure. It is these considerations that underlie the adoption of more stringent exposure restrictions for the public than for the occupationally exposed population."[33]

4.68 We have decided that our licence condition should require licensees to comply with the relevant levels in the ICNIRP Guidelines to protect individuals who may have no knowledge of their exposure to EMF, and in any event are not in a position to fully understand, control or mitigate the risk of exposure to EMF.

4.69 In our view, all the individuals identified below are in a position to fully understand, control or mitigate the risk of exposure to EMF. Our licence condition is not therefore intended to require compliance with the ICNIRP general public limits if only one or more of the following individuals may be exposed to EMF in breach of the ICNIRP general public limits:

- the licensee;
- the owner of radio equipment;
- the installer of radio equipment; or
- the user of radio equipment.

4.70 To the extent these individuals are acting as a worker, they may already be protected under pre-existing health and safety legislation which protects workers from EMF. However, to the extent they are not, our proposals are not intended to protect these individuals. For example, an amateur radio licensee does not need to comply with our licence condition in respect of their own exposure to EMF.

4.71 If, however, a licensee exposes an individual who is not (i) a worker who should therefore already be protected under pre-existing legislation; or (ii) an individual identified in paragraph 4.69 above, then they will need to ensure they comply with the ICNIRP general public limits.

4.72 For example, if a licensee exposes family, friends, visitors, neighbours, paying customers or other members of the general public to EMF then they will need to ensure they comply with the ICNIRP general public levels. In our view, such individuals may have no knowledge of their exposure to EMF and in any event are not in a position to fully understand, control or mitigate the risk of exposure to EMF.

4.73 In summary, we have decided to clarify the scope of our licence condition and include a definition of the 'general public'. This definition makes clear that it does not include:

- the licensee, owner, installer or user of radio equipment; or
- an individual not acting under a contract of employment or otherwise acting for purposes connected with their trade, business or profession or the performance by them of a public function (on the basis such individuals should already be protected

[33] https://www.icnirp.org/cms/upload/publications/ICNIRPemfgdl.pdf (page 3). See also pages 3, 10 and 11 of the 2020 ICNIRP Guidelines, available at: https://www.icnirp.org/cms/upload/publications/ICNIRPrfgdl2020.pdf

from EMF exposure under pre-existing health and safety legislation including the EMF Worker Regulations).

4.74 We have also clarified that our licence condition only requires licensees to comply with the ICNIRP general public limits if there is a risk that the limits may be exceeded in any publicly accessible area. There may be circumstances where radio equipment – such as an amateur's radio equipment or radio equipment installed on vehicles used for newsgathering and outside broadcasts – is located on a site that is not accessible to the general public and/or set up in a way which means it is not possible for the EMF exposure levels produced by that radio equipment to exceed the ICNIRP general public limits in areas that are accessible to the general public. In such a scenario, the radio equipment would comply with our licence condition.

4.75 Licensees should however record the basis on which they have made any such decision that their radio equipment complies with the ICNIRP general public limits.

Specific spectrum user cases

4.76 Although many respondents to the February 2020 consultation supported the overall objective of our proposals – i.e. to ensure spectrum users comply with the ICNIRP general public limits – some felt the inclusion of conditions in licences were not necessary in many cases.

4.77 A common theme among this group was that public anxiety was directed almost entirely at mobile networks, and at 5G in particular. Many said that if Ofcom thought it necessary to address public concerns through an additional licence condition, it should apply only to mobile network operators.

4.78 A number of respondents argued that their own use of spectrum should be excluded from our proposals.

Radio amateurs

4.79 We received a total of 255 consultation responses from radio amateurs or on behalf of radio amateur groups – by far the largest volume of submissions. Of these, 83 were submitted by respondents asking for their name and/or their whole response to remain confidential.

4.80 Almost all these individual or group respondents drew on detailed text prepared by the Radio Society of Great Britain (RSGB), a body representing around 22,000 of the estimated 80,000 UK licensed radio amateurs. We note that RSGB alerted its members to our proposals shortly after they were published, and produced its own overview for reference. It later issued guidance to radio amateurs on how they might respond to each of our consultation questions, before submitting a full consultation response of its own.

4.81 Many respondents used all or part of RSGB's wording from one or more of these documents. Others made the same or similar points in their own words. Many attached

the full RSGB guidance document to their response, or included links to the full RSGB consultation response.

4.82 The dominant theme of responses from radio amateurs was that the proposed licence condition should not be applied to amateur licences. Many respondents went on to endorse RSGB's "constructive alternative" whereby the society would enhance its own training and guidance material. They pointed out that RSGB already has radio frequency safety (including an awareness of the ICNIRP guidelines) in its exam syllabus.

4.83 RSGB said it fully supports the ICNIRP general public limits and the principle that radio amateurs need to be aware of the risks relating to EMF exposure, and the ways to mitigate those risks. However, it said it could not agree with our proposals to implement that principle by adding *"a major enforceable condition to amateur licences"*.

4.84 It said the proposals were not proportionate or objectively justified in respect to amateur radio. It noted there was a long-standing requirement in amateur licences that safety precautions should be taken against radio frequency radiation in line with PHE recommendations.

4.85 RSGB said this 'light touch' approach had been successfully applied to regulation of amateur radio since the 1990s without causing any issues. It noted that Ofcom's proposal had arisen because of current health concerns relating to 5G – even though there have been no cases where the ICNIRP general public limits have been breached. It said it was likewise unaware of any cases involving amateur radio.

4.86 Individual respondents from the amateur radio community added additional points, or further expanded on points made by RSGB. Of greatest concern was the potential additional burden required to demonstrate compliance with the new conditions.

4.87 Some noted that ICNIRP was established to cover personal safety in the presence of continuous radio frequency transmissions, such as broadcasting, radar and similar situations. They said amateur radio transmissions were anything but continuous. There was no risk to the general public because of the intermittent nature of transmissions and the general use of only modest power levels.

4.88 Some respondents said Ofcom needed to conduct an equality impact assessment because of the disproportionate impact our proposals would have on disadvantaged people. They said a significant proportion of amateurs are elderly and rely on their radio transmitters for meaningful occupation. Others are blind or disabled in other ways and amateur radio provided a valuable mental stimulus for these groups unable to pursue other hobbies.

Ofcom response

4.89 We acknowledge the concerns of radio amateurs and note that their hobby has existed for many decades with few issues of concern.

4.90 It is not our intention to impose on radio amateur licensees a significant regulatory burden over and above what licensees can already reasonably be expected to be doing to ensure their radio equipment is safe for the general public. Indeed, we note that radio amateurs

should already be aware of the ICNIRP general public limits (as demonstrated in the training they are required to undertake in order to be granted a licence) and consider some respondents have overstated the impact of our proposals on radio amateurs.

4.91 We note that some amateur licences allow transmission powers of up to 400 Watts and it is an important principle that the general public should be protected from EMF exposure from whatever source.

4.92 Our proposed licence condition requires licensees to comply with the basic restrictions in the ICNIRP Guidelines for general public exposure. As explained above, if the general public are not exposed to EMF from an amateur's radio equipment in any area that is accessible to them, then the licensee would comply with the licence condition. Whilst amateurs will need to be mindful of the proximity of neighbours, family and friends (all of whom we consider to be members of the general public who should be protected from EMF), in many cases the radio equipment used by amateurs may not expose the general public to EMF in breach of the ICNIRP general public limits. Where an amateur has determined that their equipment will not expose the general public to EMF in breach of the ICNIRP general public limits, they should record the basis on which they have made that decision.

4.93 We have also explained above that an amateur radio licensee does not need to comply with our licence condition in respect of their own exposure to EMF.

4.94 In circumstances where an amateur radio licensee may risk exposing the general public to EMF in breach of the ICNIRP general public limits, and therefore needs to take appropriate steps to ensure compliance with our licence condition, there are in our view relatively simple ways to demonstrate this. It should not require expensive monitoring equipment or complex calculations. These simple processes are outlined in section 5. We are also introducing an EMF calculator to help licensees assess whether they comply.

4.95 For the reasons set out above, amateurs should in our view be able to demonstrate their compliance with the ICNIRP general public limits in a way that does not place an unreasonable burden on them.

4.96 In relation to the comments that Ofcom should carry out an equality impact assessment, Annex 1 explains our legal obligations relating to equality legislation. We have carefully considered the potential impact of our proposals on persons sharing protected characteristics. We have made a number of changes to our 'Guidance on EMF Compliance and Enforcement' to address some of the concerns raised by amateurs relating to the potential impact of our licence condition. To give stakeholders an opportunity to provide feedback on the changes we have made to our 'Guidance on EMF Compliance and Enforcement' we are publishing a short, focused further consultation alongside this Statement. We are also making additional resources available (such as our EMF calculator) to help licensees such as radio amateurs comply.

4.97 We intend to make our 'Guidance on EMF Compliance and Enforcement' as accessible as possible including in different formats. We will also consider whether an accessible version of the calculator can be made available. Moreover, we intend to engage with RSGB to ensure amateur radio licensees understand what is expected of them.

Volunteer rescue services

4.98 Our February 2020 consultation prompted responses from volunteer rescue services – notably from the Royal National Lifeboat Institute (RNLI) and Scottish Mountain Rescue. They noted that their operations – including potentially life-saving emergency responses – may require high power transmission of radio signals that risked being caught by our EMF licence condition.

4.99 However, the RNLI said there was no evidence of breaches of the ICNIRP Guidelines in respect to the general public, and would prefer us to continue with a light touch approach to compliance. It suggested we should instead focus on sites where it is likely the guideline limits could be breached, rather than imposing a large burden on a huge number of users with little discernible benefit.

4.100 The MCA also noted that in some instances small craft vessels can be crewed by non-paid volunteers e.g. HM Coastguard and RNLI. It urged clarity on whether occupational or general public limits should apply. It suggested emergency use of radio equipment addressed a greater risk to safety than that posed by exceeding the ICNIRP general public limits.

4.101 Scottish Mountain Rescue said that although mountain rescue equipment operates at very high power, it is intermittent only, which affects the way radio frequency exposure is measured. It said it was inconceivable that a mountain rescue transmission would run for 6 minutes, let alone 30.

4.102 It said the February 2020 consultation is focused on the rollout of 5G infrastructure, which will be quite different from high-power radios used in remote places for mountain rescue scenarios. It proposed exempting radio equipment operating intermittently below 200 W EIRP to ensure public safety without imposing huge burdens on emergency and rescue services.

Ofcom response

4.103 We acknowledge the concerns of volunteer rescue services. We have carefully considered the comments we have received on the potential impact of our proposals on the use of radio equipment in emergency situations.

4.104 We note that the EMF Maritime Worker Regulations do not apply where a ship/vessel is being used by the emergency services, other search and rescue services or for public service activities, and the carrying out of such activities conflicts with the requirements under the EMF Maritime Worker Regulations.

4.105 We consider it would be appropriate for us to take a similar approach in our licence condition. We have accordingly added a new licence condition which explains that licensees will not need to comply with the ICNIRP general public limits if both the following two conditions are met:

- Condition 1: radio equipment is being used for the purpose of seeking emergency assistance or reporting or responding to an emergency situation including for search and rescue activities and maritime emergency communications.
- Condition 2: compliance with the ICNIRP general public limits is likely to result in or create an immediate and serious threat to the safety of the public or public health.

4.106 In relation to intermittent radio use, we note that the ICNIRP general public limits are averaged over a time period (e.g. six minutes for frequencies below 10 GHz). We explain in section 5 how licensees may take account of the intermittent nature of radio use when making compliance calculations.

4.107 As explained in our response to amateur radio licensees above, it is an important principle that the general public should be protected from EMF exposure from whatever source. We also consider that in most cases it should be relatively simple for volunteer rescue services to demonstrate compliance with the EMF licence condition. As noted above, we have made a number of additions to our 'Guidance on EMF Compliance and Enforcement' to address some of the concerns raised relating to the potential impact of our licence condition. We discuss this in more detail in section 5.

Maritime use

4.108 We received consultation responses from maritime users of radio equipment, for both commercial and leisure purposes. The Maritime and Coastguard Agency (MCA), which is part of the Department for Transport, is the UK body responsible for safety on the coast and at sea. It produces legislation and guidance on maritime matters, and provides certification to seafarers.

4.109 In its response to the February 2020 consultation it noted that most radio transmitters installed on marine vessels improved the safety of navigation and life. The MCA said no measures should be introduced by Ofcom that reduce safety overall through changes in behaviour or operational capability. In that context, it warned that the owners of pleasure craft, in particular, installed and used radio safety equipment voluntarily, and that Ofcom's proposed EMF compliance requirements could divert resources away from other safety elements. It said this risk would be much greater for non-commercial pleasure craft which fall largely outside UK regulations and which are in greater number.

4.110 The Royal Yachting Association (RYA) said it did not believe our proposals were a proportionate response to the identified issues and would be impossible to enforce. It said Ofcom had offered no evidence of the existing regulations being broken by maritime users.

4.111 Like the MCA, it noted that owners of small craft installed safety radio equipment voluntarily. It said the burden of the proposed new requirements may have the unintended consequence of discouraging installation and so risking safety at sea.

Ofcom response

4.112 We acknowledge the concerns of maritime users of radio communications. In most cases, radio transmission from commercial maritime vessels will not be affected by the new EMF

licence condition. This is because the EMF Maritime Worker Regulations already require employers and ship owners to take appropriate steps to ensure all workers are not exposed to EMF in excess of the levels specified in the legislation.[34] Our proposals require licensees to comply with the basic restrictions in the ICNIRP Guidelines for general public exposure and do not require licensees to protect workers from EMF exposure. We have clarified above what we mean by the 'general public' and in our licence condition.

4.113 Where a commercial vessel or leisure craft carries passengers (who are not workers that are already protected under the EMF Maritime Worker Regulations), our proposals will require licensees to comply with the ICNIRP general public limits. This includes family, friends and visitors that may be invited on board a leisure craft at the invitation of the owner or skipper, as well as paying passengers. In our view, such individuals should be considered members of the general public because they may have no knowledge of their exposure to EMF and in any event are not in a position to fully understand, control or mitigate the risk of exposure to EMF.

4.114 If a commercial vessel or leisure craft carries both workers (who are protected from EMF under the EMF Maritime Worker Regulations) and members of the general public (who the licensee is required to protect from EMF under our licence condition), compliance with the lower levels of EMF exposure in the ICNIRP general public limits in publicly accessible areas should result in compliance with the EMF Maritime Worker Regulations in those same areas.

4.115 We note the concerns raised about the potential for EMF compliance requirements to divert resources away from other safety elements. However, we consider that in most cases it should be relatively simple for maritime users to demonstrate compliance with the EMF licence condition. As noted above, we have made a number of additions to our 'Guidance on EMF Compliance and Enforcement' to address some of the concerns raised relating to the potential impact of our licence condition. We discuss this in more detail in section 5.

4.116 As noted in relation to volunteer rescue services above, we have also added a new licence condition which explains that licensees will not need to comply with the ICNIRP general public limits if radio equipment is being used in an emergency situation and they satisfy the conditions relating to such use.

Fixed links and other uses

4.117 Some operators of fixed link radio services said they could not support our proposals. A common theme was that the measures proposed in the February 2020 consultation appeared to be designed to address concerns about exposure to EMF from mobile phone services. They said there was no similar concern about other services.

[34] See https://www.legislation.gov.uk/uksi/2016/1026/contents/made (Regulations 3(1) and 5(1)) and MCA Guidance, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/564168/MGN559.pdf

4.118 For example, Telefónica said it was unsure why Ofcom saw the need to include fixed links in the proposals because of the directional nature of their transmissions, as opposed to the wide-area coverage achieved by mobile.

4.119 JRC said that if Ofcom is going to impose these new rules, they should only apply to public mobile networks. These networks are designed to serve the public whereas energy networks, for example, are deployed well away from the general public and hence do not pose any risk of harm.

Ofcom response

4.120 We note the concerns identified by some fixed link operators and others. As with radio amateurs, fixed links operators should already be aware of the ICNIRP Guidelines and be taking EMF exposure into account when conducting their business. Our review of consultation responses has confirmed that some spectrum users are not fully taking into account EMF exposure when installing or modifying radio equipment. Our proposals were intended to address these risks and ensure we are in a position to take appropriate enforcement action in the event of non-compliance with the ICNIRP general public limits. This rationale applies to fixed link operators in the same way as it applies to other licensees we have decided should be subject to our EMF licence condition. A presumption that fixed links operators are already compliant with the ICNIRP general public limits is not a reason to exclude them from the scope of our licence condition.

4.121 As discussed in section 5, we are introducing a simple EMF calculator to assist licensees to assess their compliance and do not consider the administrative burden of ensuring compliance to be disproportionate. We also note that, compared to some other users, it should be easier for fixed link operators to comply with the ICNIRP general public limits because of the fixed direction of their beams. Further, and as explained in section 5, we are introducing certain exemptions for shared sites which will mean that most fixed link licensees (i.e. licensees with radio equipment that has an antenna gain that is equal to or above 29 dBi) will only need to take account of EMF exposure levels produced by their own equipment at shared sites (and will not need to consider the aggregate EMF exposure from all equipment on a shared site).

Consultation responses on the 10 Watt EIRP threshold

4.122 In our February 2020 consultation we said our proposed licence condition requiring compliance with the ICNIRP general public limits should apply to all radio equipment which is authorised to transmit at powers higher than 10 Watts EIRP.

4.123 Some respondents agreed with our proposals. For example, the BBC and BT said the proposed threshold of 10 Watts EIRP was proportionate. Another company agreed with the 10 Watt power threshold.

4.124 The Federation of Communication Services (FCS) said it agreed with the limit but noted that the compliance distances calculated for typical business radio systems are so low that there is very little chance of the system not complying with the ICNIRP general public

limits. It also noted that some fixed links will be very low risk and suggested any administrative burden on operators could be reduced in clear cut cases.

4.125 In a confidential response, one company said the power limit was sensible, but questioned whether, for example, a single structure (mast or tower) with 40 transmitters each radiating at 8 Watts EIRP present a greater or lesser health and safety risk than a structure with 2 transmitters each radiating at 12 Watts.

4.126 JRC noted the low risks involved and said the systems it managed presented very little risk of breaching the ICNIRP general public limits. It said that if Ofcom pushed ahead with proposals, the threshold for outdoor Private Mobile Radio (PMR) systems should be 100 Watts EIRP and fixed links should be 50 dBW EIRP.

4.127 BAE said the 10 Watt threshold may be counter-productive. It said an EIRP independent of frequency and distance with respect to the near/far field transition is not easily related to power densities, Specific Absorption Rate (SAR) or level of risk to people. This is particularly relevant since hazards often exist in the near field. A power density threshold or one based on transmitter power level would be more appropriate.

4.128 Another company that wished to remain anonymous said the February 2020 consultation was "*very confused and ambiguous*" between power and EIRP and this needed to be clarified as a matter of urgency. It said the instructions issued by equipment manufacturers usually referred to power rather than EIRP which could result in confusion.

4.129 Raynet-UK said it could not see where our proposed 10 Watt threshold came from and said it seemed entirely arbitrary - especially when noting that ICNIRP Guidelines acknowledge different limits for different frequencies. S Carter also questioned the 10 Watt threshold describing it as *"technically nonsensical"*. He said EMF concerns focussed primarily on near-field exposure, where the concept of EIRP is meaningless (and potentially dangerously confusing).

4.130 SeaCall said the 10 Watt threshold was far too low, especially where exposure is brief. It pointed to limited evidence of harm to human health from transmissions below 100 Watts as long as a 1 metre separation was observed (for frequencies below 450 MHz). Siae Microelettronica said the 10 Watt threshold did not take into account antenna directivity. For fixed links, it said the EIRP is much higher but directivity meant the public will not be exposed to this.

Ofcom response

4.131 As explained in the February 2020 consultation, our proposed threshold was chosen based on our review of one of the key international standards for demonstrating compliance with the ICNIRP Guidelines, IEC 62232, "Determination of RF field strength, power density and SAR in the vicinity of radiocommunication base stations for the purpose of evaluating human exposure" (CENELEC: EN 62232, BSI: BS EN 62232:2017).

4.132 This standard sets out the calculations that an installer should make when installing radio equipment to ensure compliance. As noted in our consultation, the recommended

calculations for installations operating at powers higher than 10 Watts EIRP (i.e. falling within product installation classes E100 and above) are more involved than for powers equal to or lower than 10 Watt EIRP.

4.133 We note the arguments of some respondents that the 10 Watt threshold is too low because installations operating at these power levels would run a very low risk of breaching the ICNIRP general public limits. We agree that in most cases the risk from powers just higher than 10 Watts EIRP will be low because, for example, the antenna will be installed in an area that is not accessible to the general public or the transmitter will not be transmitting continuously.

4.134 However, there is a very wide range of potential radio installations and usage types, and we cannot rule out the possibility that some installations operating near to the 10 Watt EIRP threshold may be installed in a way that breaches the ICNIRP general public limits, especially if the installer has not given any consideration to EMF safety.

4.135 We note the example of 40 transmitters each radiating at 8 Watts, highlighted in a confidential response, and agree there may be scenarios where equipment transmitting at powers below the 10 Watts EIRP threshold could potentially produce higher aggregate exposure levels than equipment transmitting at powers higher than the threshold. One way to deal with this might be to create a more complicated threshold. However, we think there is a benefit in having a clear and simple threshold which is easy to understand and administer. We have also set the threshold at a level which means that in our view, even in scenarios like the one highlighted by the company (which we think is unlikely to occur in practice), the risk to the general public is still low. We do not therefore consider that it is necessary to create a more complicated threshold to deal with this point.

4.136 We recognise that some of the concerns around this threshold stem from concerns about the possible additional administrative or financial burden that complying with the licence condition may entail. However, we think that any burden of complying with this condition should be limited. We discuss this in more detail in section 5, including in relation to the concerns about demonstrating compliance on a shared site with multiple transmitters.

4.137 In relation to comments from BAE Systems and S Carter, we would clarify that the 10 Watt EIRP threshold will only be used for the purposes of deciding which licences should contain the EMF condition. The licence condition itself will require licensees to ensure that their transmissions comply with the ICNIRP general public limits.

4.138 We acknowledge that the draft licence condition in the February 2020 consultation referred to total EIRP. This was an error and has been corrected in the revised licence condition contained in this Statement. We discuss this in more detail in paragraphs 5.186 – 5.192 below.

4.139 Having carefully considered consultation responses, we continue to believe that 10 Watts EIRP is an appropriate boundary for determining whether it is objectively justified and proportionate to impose EMF-related conditions in spectrum authorisations.

Conclusions

4.140 We have carefully considered the concerns of some respondents in relation to the scope of our proposed EMF-related condition. We have considered all the points made, including comments about whether the current regulatory regime is sufficient and whether we need to intervene at all as well as whether particular users should be included in its scope.

4.141 We acknowledge that we have seen no evidence that spectrum users are operating radio equipment in breach of the ICNIRP general public limits. It does not however follow that our intervention is not justified. Our review of consultation responses has confirmed that some spectrum users do not fully understand all the implications of complying with the ICNIRP general public limits and are not fully taking into account EMF exposure when installing or modifying radio equipment.

4.142 As the organisation that authorises spectrum use, and that has expertise in measuring EMF levels, we continue to believe we are well placed to help mitigate these risks.

4.143 We disagree with those respondents who say pre-existing health and safety legislation and planning policy provide adequate protection from EMF for the general public. As explained above, specific health and safety legislation relating to EMF is intended to protect workers from EMF and not the general public. It therefore has a different scope to our proposals. Whilst mobile network operators have agreed to confirm they comply with the ICNIRP general public limits as part of planning processes, there is no legal obligation on them to do so. In any event, there are various scenarios in which planning permission is not required and where there is therefore no opportunity to demonstrate compliance with the ICNIRP general public limits as part of the planning process.

4.144 In our view, the current regulatory regimes do not therefore provide sufficient protection from EMF exposure for the general public and they do not put Ofcom in a position where we could take appropriate enforcement action in the event the ICNIRP general public limits are breached.

4.145 We have therefore decided to proceed with the adoption of a new condition in spectrum licences requiring compliance with ICNIRP general public limits. We have also decided to apply a similar approach for licence exempt equipment (and will amend relevant licence exemption regulations on a case-by-case basis in line with this policy decision). We continue to believe that 10 Watts EIRP is an appropriate boundary for imposing EMF-related conditions in spectrum authorisations.

4.146 For the reasons set out above, our EMF-related condition will complement – and not overlap – with the regulatory regimes that currently exist.

4.147 We have however listened to the concerns of respondents and clarified the scope of our EMF-related condition, including by clarifying what we mean by the ‘general public’. This means that licensees will not be required to comply with the ICNIRP general public limits if the only individuals that may be exposed to EMF in breach of the ICNIRP general public limits are workers or the licensee, owner, installer or user of radio equipment. We have

also clarified that we are only requiring licensees to comply with the ICNIRP general public limits if there is a risk that the limits may be exceeded in any publicly accessible area.

4.148 The ICNIRP Guidelines set limits on the level of public exposure to EMF from all radio equipment and are endorsed by PHE. We do not therefore see any reason to exclude particular spectrum users/uses from the scope of our EMF licence condition, even if there is no immediate evidence that limits are being exceeded or that the public is at risk. Our rationale for intervening applies in the same way to all licensees we have decided should be subject to our EMF licence condition.

4.149 We have however decided to allow licensees to exceed the ICNIRP general public limits in emergency situations where there is an immediate and serious threat to the safety of the public or public health and where certain conditions are met.

4.150 We have also listened to respondents' concerns in relation to the potential administrative burden of complying with our licence condition. As we explain in the next section of this Statement, we believe it should be relatively simple for licensees to demonstrate compliance with the EMF licence condition. We have introduced certain exemptions for equipment on shared sites which, for example, means that most fixed link licensees will only need to take account of EMF exposure levels produced by their own equipment. We are also introducing an EMF calculator to help licensees assess whether they comply with our licence condition and have made a number of additions to our 'Guidance on EMF Compliance and Enforcement' to address some respondents' concerns. We discuss these in more detail in the next section.

5. Compliance and enforcement

5.1 We presented draft 'Guidance on EMF Compliance and Enforcement' in Annex 2 of our February 2020 consultation.

5.2 It described the processes licensees, installers and users should have in place to ensure compliance with the EMF-related condition and the circumstances in which Ofcom may take enforcement action for failing to comply.

5.3 Some respondents who already have procedures in place for demonstrating compliance with EMF limits supported the general approach in our compliance and enforcement proposals, but requested clarification and further guidance on a number of detailed points. Other respondents were concerned about the feasibility and cost of assessing and demonstrating compliance, with some suggesting that they did not have the technical capability to do this.

5.4 In this section we review the key points raised by respondents under the following topics, and provide our views on each:

- general points on compliance and enforcement;
- evidence required for demonstrating compliance;
- managing compliance on marine vessels;
- frequency of EMF measurements;
- definition of a site;
- shared sites;
- licensee specific scenarios;
- approach to compliance monitoring, checks and measurements; and
- approach to enforcement.

5.5 Whilst the following discussion focuses on respondents' comments in relation to our proposed EMF licence condition, the discussion and decisions we make in this section relate to both our EMF licence condition and also to any EMF-related condition we include in licence exemption regulations in the future. We note that our 'Guidance on EMF Compliance and Enforcement' applies to licensees as well as installers and users of licence-exempt radio equipment.

General points on compliance and enforcement

5.6 A number of respondents, particularly those from the maritime, search and rescue and radio amateur sectors, were concerned about the financial and administrative burdens involved in testing and demonstrating compliance.

5.7 For example, the Maritime and Coastguard Agency (MCA) said that demonstrating compliance with the proposed approach may be prohibitively expensive. The Royal Yachting Association (RYA) commented that the cost of equipment needed to measure EMF ranges from £100-400 for uncalibrated equipment to £2000+ for calibrated equipment, which would be unaffordable for recreational users.

5.8 Scottish Mountain Rescue thought the proposals would not materially reduce the public's exposure to EMF as a result of mountain rescue operations, but would impose a financial and administrative burden on a charity providing an emergency service.

5.9 As noted in section 4 above, S. Carter said the scope of our proposals could have *"dramatic and unintended consequences for many operators"* and could lead to the adoption of changes that are potentially far worse than the risks involved. He said many transmitters are operated under circumstances where documentation of compliance, in all possible circumstances, is extremely difficult, and cited examples of situations where people may be able to get close to antennas.

5.10 Some respondents also highlighted that they did not have qualified personnel or the technical expertise to carry out EMF compliance checks.

5.11 A confidential respondent said it simply could not comply. It explained that it bought equipment off the shelf, either as a new-build or as a retrofit and at no stage receive, or even see, any records regarding the level of non-ionising energy. It thought that neither the installers nor operators of some stations have the competence to comply with the relevant standards. The RNLI said that there was a lack of suitably qualified personnel to conduct the necessary measurements and that this activity would be a huge cost and distraction away from RNLI's operational purpose.

Ofcom response

5.12 We note the concerns expressed by stakeholders in relation to the potential impact of our licence condition on their business or activities. As highlighted in our February 2020 consultation and previous sections of this Statement, we consider that licensees should already be aware of the ICNIRP general public limits and be taking EMF exposure into account when conducting their business. It is not our intention to impose on licensees a significant regulatory burden over and above what licensees can already reasonably be expected to be doing to ensure their radio equipment is safe for the general public.

5.13 It is clear from a number of the responses that our proposals may not have been fully understood by some licensees. As explained in section 4, and in this section of the Statement, we have decided to make a number of amendments and additions to our licence condition and 'Guidance on EMF Compliance and Enforcement'. These revisions clarify the scope of the EMF-related condition in order to address many of the concerns raised by stakeholders relating to its potential impact.

5.14 Taking into account the intended scope of the EMF-related condition and the requirements we intend to put on licensees, our view is that the potential impact of our licence condition is much less burdensome than many respondents believed. In particular, we do not think that the requirement to comply with the ICNIRP general public limits should result in a large additional financial or administrative burden for licensees.

5.15 Some of the concerns about the cost of demonstrating compliance reflect a misunderstanding of our proposals. For example, RYA commented on the cost of equipment needed to measure EMF. As explained in paragraph A2.9 of our February 2020

consultation, an EMF assessment may include one or more of physical measurements; tests; calculations; and simply following manufacturer's guidance or instructions.

5.16 While measurements may be helpful in certain cases, e.g. at shared sites and/or sites with a complex radio environment, we expect that in most cases, licensees will be able to perform a simple calculation to determine a safe separation distance between the radio equipment and publicly accessible areas, and that this would be sufficient to demonstrate compliance.

5.17 To help licensees with this, we will be publishing an EMF calculator on our website[35] which will allow licensees to enter basic parameters of their radio system (frequency and transmitter power). The calculator will provide a conservative estimate of the safe separation distances that the licensee would need to maintain between the radio equipment and members of the public.

5.18 In most cases it would be appropriate for licensees (or licence applicants) to enter the maximum EIRP of the radio equipment in the transmitter power field. However, licensees may also choose to enter an average power (e.g. over the six minute averaging period specified in the ICNIRP Guidelines) which takes into account the duty cycle (or factor) of the equipment and/or the maximum percentage of time that a transmitter will be operating during the averaging period. We present an example of how to calculate the average power in paragraph 5.58. Where licensees choose to enter an average power level, they should be able to explain how they have established the average level and why they are confident that the level they have chosen will not be exceeded over any six-minute period.

5.19 Licensees would also be free to decide whether they (or their chosen installer) should undertake a more detailed analysis using additional and/or less conservative assumptions (e.g. by taking into account the antenna characteristics), which would likely result in more accurate and thus potentially smaller separation distances.

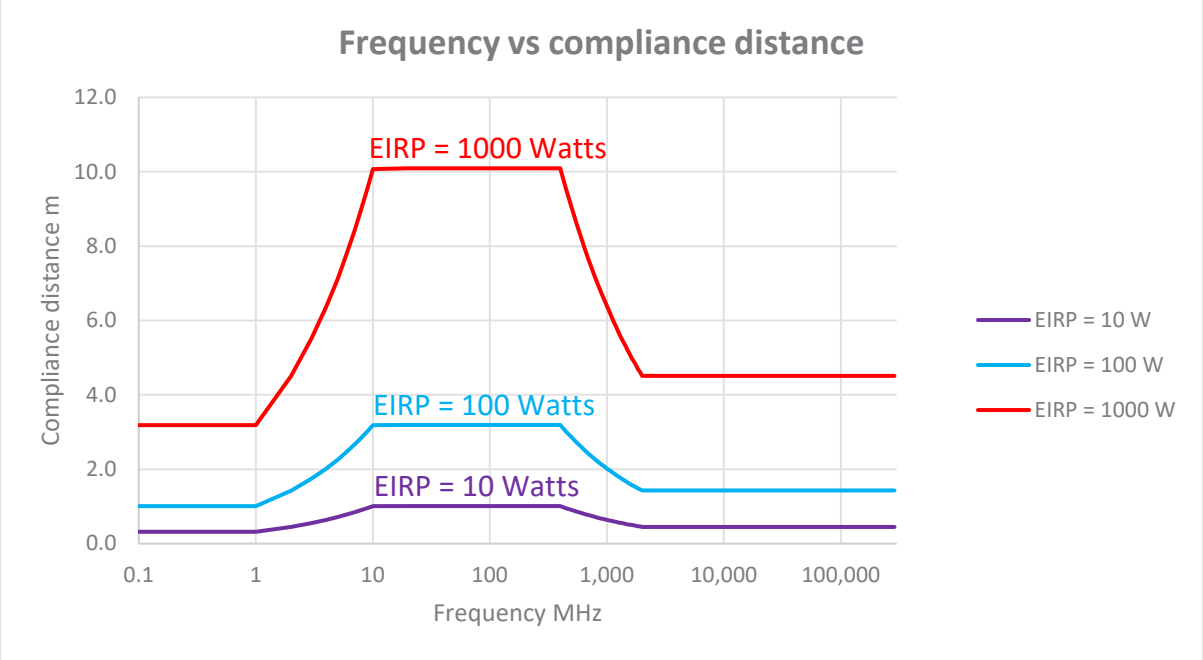
5.20 Licensees would then be able to check whether they needed to take any specific action to ensure that this safe separation distance is maintained, e.g. by the introduction of a barrier between the antenna and areas accessible to the general public. However, we expect that in most cases the radio installation will be compliant by virtue of the antenna's location (e.g. on a roof which is inaccessible to the public) or its height above ground level.

5.21 For example, the typical separation distance of a transmitter operating at 100 Watts EIRP on a frequency of 450 MHz would be about 3 metres. This means that, as long as the antenna is more than 3 metres in any direction from a publicly accessible area (e.g. a walkway) the installation would be compliant.

[35] We are publishing a trial version of the calculator on our website alongside this Statement. Information on the assumptions used in the calculator are provided in the notes section within the calculator spreadsheet. For example, the calculator uses a reflection coefficient $\Gamma = 0.6$ for typical ground reflection conditions. Feedback on this calculator and the assumptions used will be welcome and we intend to publish a final version before we start the formal licence variation process.

5.22 Figure 5.1 below shows typical separation distances that are needed for power levels of 10, 100 and 1,000 Watts EIRP at different frequencies.

Figure 5.1 Typical separation distances



5.23 Licensees can also use the EMF calculator to calculate distances for multiple radio transmitters on the same site. In this scenario, the licensee can sum the power (in Watts) of its transmitters and enter the result of this sum in the power field in the calculator. For example, if a licensee has two transmitters each transmitting at 25 Watts EIRP, it would calculate the sum of 2 x 25 W (50 W) and enter this figure in the power field.

5.24 In case multiple transmitters use different frequencies with distinct ICNIRP general public limits, users should calculate the separation distance for the summed power for every frequency the transmitters use and take the largest calculated separation distance to give a conservative result. For example, if a licensee has two transmitters each transmitting at 25 Watts EIRP but operating at two different frequencies of 400 MHz and 2 GHz, it would:

i) calculate the sum of 2 x 25 W (i.e. 50 W);

ii) enter 50 W in the power field;

iii) enter 400 MHz in the frequency field, perform the calculation and note the separation distance;

iv) repeat the calculation with 2 GHz in the frequency field and note the separation distance;

v) It could then take the larger of the two separation distances as a conservative result.

5.25 Licensees would be able to print the output of the EMF calculator and keep this with their licence as proof of compliance. In our view, documenting compliance should therefore be

relatively simple in many cases. We have updated our 'Guidance on EMF Compliance and Enforcement' to make reference to this calculator and confirm that licensees can use outputs from the calculator as part of its compliance records.

5.26 Compliance assessments for shared sites may be more involved depending on the complexity of the site; we discuss shared sites later in this section.

5.27 In cases where licensees choose to use a professional installer, we would encourage them to use an installer with the technical expertise to install the equipment in a way that complies with the ICNIRP general public limits and can provide the licensee with relevant information to support the record keeping requirements in the EMF licence condition.

5.28 In summary therefore, we consider that for the vast majority of licensees there will be a minimal additional financial and administrative burden involved in complying with our licence condition.

Evidence required for demonstrating compliance

5.29 As noted above, we explained in our February 2020 consultation that an EMF assessment may include one or more of the following:

- physical measurements;
- tests;
- calculations;
- following manufacturers' guidance/instructions.

5.30 We explained that in cases where manufacturers' guidance/instructions are followed, it is the responsibility of the licensee, installer or user to ensure that these are adequate and appropriate for their particular circumstances. We recommended that licensees, installers and users apply methods from recognised standards such as BS EN 62232:2017, PD IEC TR 62669:2019, BS EN 50385 and BS EN 50401, as they may be amended.

5.31 Some respondents asked for further guidance to be provided on what evidence would be considered acceptable in demonstrating compliance.

5.32 Arqiva said that further information on the level of detail would be helpful including the criteria for what constitutes "appropriate" evidence. The BBC commented that the proposals did not give clear guidance on what level of compliance the licensee will need to demonstrate, and hoped that Ofcom would issue further guidance before engaging in punitive enforcement (i.e. that a "bedding-in" period be included). TAUWI was supportive of our proposals but wanted more guidance to understand the level of cost/complexity that this would create for the water industry.

5.33 BT suggested that some additional detail be provided on the evidence that is expected, particularly with reference to the use of statistical methods. It asked, for example, whether back-off factors in PD IEC TR 62669:2019 could be used or some other approach, and suggested Ofcom provide a framework for ongoing measurements.

5.34 Other respondents gave specific suggestions on additional ways that licensees might be able to demonstrate compliance.

5.35 The Joint Radio Company (JRC) suggested that, if Ofcom decides to proceed with the policy, it should publish an ICNIRP Compliance Information Sheet that contains guidance on the method Ofcom will use to benchmark the performance of installed systems, which the installer could complete and then provide to the licensee. Another respondent said it was important for Ofcom to explain how it would carry out its own compliance checks so licensees can use the same methodology to carry out their EMF checks and perform a like-for-like comparison.

5.36 The FCS noted that their document FCS 1331 already provides tables to show conservative separation distances based on the ICNIRP Guidelines, and suggested that a declaration by the installer of radio equipment that they have consulted the tables and determined that the fields fall within the safety limits at a stated exclusion distance would then provide Ofcom with the necessary proof that the issue has been addressed.

5.37 A number of respondents made comments on the standards that Ofcom referenced in its proposals.

5.38 BAE Systems questioned the appropriateness of referencing BSI/CENELEC standards; it observed that these are not freely available public domain documents and said that they were tailored to the International Mobile Telecommunications (IMT) sector.

5.39 Echostar/Hughes and the EMEA Satellite Operators Association (ESOA) requested that Ofcom identify other similar standards as acceptable for managing EMF exposure and, at a minimum, requested that we confirm that EN 50665:2017 and EN 62311:2020 could be used to demonstrate compliance. ESOA and Inmarsat requested that Ofcom additionally accept the use of IEEE standard C95.1-2019 for determining compliance.

Ofcom response

5.40 Some radio equipment will include an instruction manual or guidelines that provides information on the safe separation distance which is required between the antenna and the general public to be compliant with the ICNIRP general public limits. Licensees would then need to ensure that this safe distance is maintained, and could use the information from the manufacturer's instructions as part of their records demonstrating how they have ensured compliance with the licence condition.

5.41 In other cases, licensees can calculate the safe separation distance that is needed to comply with the ICNIRP general public limits. As highlighted above, Ofcom is planning to make available on its website an EMF calculator which licensees can use to check the safe separation distance for their equipment, and will be able to print the output of the calculator and keep it as part of their compliance records. Alternatively, there are a number of other resources or calculators available online which licensees may be able to use to calculate safe separation distances. As highlighted in its response, the FCS also provides a document (FCS 1331) which includes information on how to calculate safe distances for business radio users.

5.42 In view of the above, we do not think that it is necessary for Ofcom to provide an ICNIRP Compliance Information Sheet as suggested by JRC.

5.43 In some cases licensees may choose to undertake measurements to satisfy themselves that they are compliant with the ICNIRP general public limits, e.g. for a site where there are multiple high power transmissions or where there is some uncertainty as to the magnitude of EMF exposure in one or more areas.

5.44 As we set out in our February 2020 consultation, where licensees choose to undertake measurements, we would recommend that they use the methodology set out in the relevant standards (as listed in our 'Guidance on EMF Compliance and Enforcement').

5.45 With regard to the statistical methods set out in PD IEC TR 62669:2019, we note that the statistical analysis is used in case studies to complement evaluation methods specified in BS EN 62232:2017. In these case studies, a power reduction factor is calculated and used to define the compliance boundary. The appropriate power reduction factor used may vary depending on the particular radio equipment or technology in use, and licensees choosing to use this approach should be able to demonstrate why the approach they use will ensure that the ICNIRP general public limits are not exceeded over time. For example, this could include evidence from measurements or through use of tools developed by manufacturers for monitoring and control of relevant characteristics of the base stations.

5.46 We provide more information later in this section about when Ofcom might undertake measurements, and the measurement methodology we would use.

5.47 In relation to standards, we note BAE Systems' point that the BSI/CENELEC standards are not freely available public domain documents. However, it is not uncommon for recognised standards from bodies such as BSI, CENELEC, and IEC to be used to help demonstrate compliance with regulations. In addition, we expect that Ofcom's decision to provide an EMF calculator will mean that most licensees will be able to assess and demonstrate compliance without needing to directly refer to these standards.

5.48 On BAE Systems' point that the standards identified in the February 2020 consultation are tailored to the International Mobile Telecommunications (IMT) sector, e.g. BS EN 62232:2017, while this standard does cover IMT technologies, it is not specific to these technologies and applies to a wide range of radiocommunication equipment operating between 110 MHz and 100 GHz.

5.49 With regard to other standards that may be used, we note that BS EN 50665:2017 and BS EN 62311:2020 explain that they are designed to cater for "*electronic and electrical equipment for which no dedicated product standard or product family standard regarding human exposure to electromagnetic fields applies*".

5.50 The explanatory text for EN 50665 explains that if a dedicated product *"standard does exist then it shall be used and this standard shall not"*. Therefore, we can confirm that licensees can refer to these standards in demonstrating compliance where the standards listed in our February 2020 consultation (i.e. BS EN 50385, BS EN 50401, BS EN 62232:2017 and PD IEC TR 62669:2019) do not apply. We would also note that the key principles and criteria

for evaluation in BS EN 62311:2020 are in line with standards such as BS EN 62232:2017. We have updated the list of relevant standards in our 'Guidance on EMF Compliance and Enforcement' to include BS EN 50665:2017 and BS EN 62311:2020.

5.51 IEEE standard C95.1-2019 provides a set of safety limits for the protection of persons against the established adverse health effects of exposures to EMF. As such, it is similar in purpose to the ICNIRP Guidelines, and the safety limits contained within it are similar in many respects. However, the Ofcom licence condition will refer to the ICNIRP general public limits only and therefore licensees that choose to refer to the IEEE standard will need to ensure that the limits they are referencing are no less restrictive than those included in the ICNIRP general public limits.

Managing compliance on marine vessels

5.52 The MCA commented that most of the consultation discussion seemed more appropriate to continuous transmission from fixed sites where boundaries could be installed to prevent approach by members of the public. It added that the options for antenna installation on marine vessels is limited and therefore that compliance with the ICNIRP general public limits cannot always be achieved through minimum safe distances based on continuous maximum transmission. It said it would prefer to see industry guidelines on safe distances and any necessary operational controls to achieve safe exposure in lieu of continuous transmission safe distances.

5.53 The MCA further noted that a vessel's radio transmits intermittently with a corresponding low duty cycle and Ofcom's proposals did not consider how an appropriate duty cycle should be derived over the specified time period. It provided some examples of radio technologies used on marine vessels with commentary on typical transmit powers and duty cycles.

Ofcom response

5.54 We have explained in section 4 that the new EMF licence condition would only apply in scenarios which are not already covered by the EMF Maritime Worker Regulations.

5.55 Where the ICNIRP general public limits do apply, licensees on marine vessels will need to take appropriate steps to ensure compliance with these limits. As explained above, licensees will be able to make use of the EMF calculator that Ofcom will make available on its website.

5.56 Entering the maximum EIRP in the calculator will produce minimum safe distances based on continuous maximum transmission. Licensees may also choose to enter an average power level which takes into account the duty cycle (or factor) of the equipment and/or the maximum percentage of time that a transmitter will be operating during a six-minute averaging period.

5.57 This can be done by multiplying the maximum transmit power of the equipment by the duty factor of the equipment and then by the maximum percentage of time that the equipment will be operating within the averaging period.

5.58 For example, taking a transmitter with a maximum EIRP of 100 Watts, a duty factor of 50%, and a maximum percentage of time transmitting of 50%, we can calculate an average power of 25 Watts (100 Watts * 50% * 50% = 25 Watts average power).

5.59 As noted by the MCA, limited space on some marine vessels may mean that compliance could still be challenging in some scenarios, and additional controls may be needed. For example, if a licensee on a marine vessel calculates that radio equipment would only be compliant if it is used for less than a given percentage of the time (but there is a risk that the equipment could be used for more than this given percentage of time), they should ensure operational controls are in place to control this risk. This could for example involve ensuring all potential users of the equipment are aware of, and comply with, time limits for use.

5.60 Another scenario could be where compliance risks only occur when the marine vessel is moored in port or in a marina, and members of the public are able to approach the vessel. In this scenario, operational controls could involve ensuring that the equipment is not used while moored in port or in the marina or is only used for less than a given percentage of the time.

5.61 Where licensees implement operational controls, they should ensure that a description of these controls are recorded as part of their EMF compliance records.

5.62 We have made some changes to our 'Guidance on EMF Compliance and Enforcement' to incorporate the above guidance.

Frequency of EMF measurements

5.63 One stakeholder indicated that one of the key issues was the frequency with which they will be expected to take EMF measurements. BT noted that no reference was made to the need for ongoing measurements and suggested Ofcom provide a framework for ongoing measurement.

Ofcom response

5.64 As explained above, it is not our intention to impose on licensees a significant regulatory burden over and above what licensees can already be expected to be doing to ensure their radio equipment is safe for the general public.

5.65 It is ultimately for licensees to determine if and how often they measure EMF levels at a particular site depending on the circumstances at that site. What may be appropriate on one site may not be appropriate on another site.

5.66 As a general principle, we would expect licensees to reassess compliance (including conducting measurements where they deem it appropriate) when they make any change

or addition to a site which is likely to increase the EMF exposure in publicly accessible areas above the levels in their most recent EMF assessment.

5.67 Where licensees are using measurements as part of their compliance assessment, they should consider what measurement interval would be appropriate taking into account the extent to which the EMF exposure levels from a site are likely to change over time, e.g. as a result of changes to traffic loading.

5.68 We have updated our 'Guidance on EMF Compliance and Enforcement' to include this clarification.

Definition of a site

5.69 Two respondents suggested it would be helpful to include a definition of the term 'site' in the licence condition. Arqiva noted that there are many different examples of complex site arrangements where different parties may have different interpretations on what constitutes 'the site' and so a clear definition of the term would be helpful.

5.70 A confidential respondent noted that the term 'site' is not well defined but has a significant impact on the proposed changes in procedure. It said this made understanding the scope of some compliance and enforcement details difficult to ascertain.

5.71 On a similar note, JRC encouraged Ofcom to consider what would be the appropriate separation between wireless systems deployed on structures within the same compound and/or in close proximity for those structures to be considered discrete from the point of view of the proposed emissions regulations, i.e. the emission levels for the structures to be assessed separately.

Ofcom response

5.72 For the purposes of our EMF licence condition, and to provide additional clarity to stakeholders, we have decided to define 'site' as "*a physical structure, building, vehicle or moving platform*". All radio equipment that is part of, or attached to, such structure, building, vehicle or moving platform should be considered as part of the same site.

5.73 We recognise that this will mean that the licence condition will not specifically require licensees to consider radio equipment located on another site in the vicinity of their own radio equipment, e.g. radio equipment on neighbouring buildings in a built-up area, or on newsgathering trucks parked nearby.

5.74 Whilst not covered by our licence condition and thus subject to legal enforcement action, if Ofcom becomes aware of a breach of the ICNIRP general public limits in any publicly accessible area which is the result of EMF exposure produced by radio equipment on more than one site, Ofcom expects licensees to cooperate and take action to ensure the ICNIRP general public limits are not exceeded. If licensees fail to cooperate and/or take such action, we may consider using soft enforcement tools (which, if considered appropriate in the circumstances, may include identifying the names of such licensees).

Shared sites

5.75 In the February 2020 consultation, we proposed that, on a shared site, licensees, installers and users should have processes in place to enable them to coordinate amongst themselves for the sole purpose of ensuring the site remains compliant with the ICNIRP general public limits. We said it was the party who makes the last change to a site that is responsible for ensuring the total EMF exposure levels produced by the site continue to comply with the basic restrictions.

5.76 We received a large number of comments on this aspect of our proposals. Some respondents agreed with the principle of our approach but suggested that further guidance or industry engagement was needed. Others thought that the approach was unworkable or would be overly burdensome and/or complex to manage. We discuss the key themes of responses on this topic in the following subsections.

General comments on shared sites

5.77 Some respondents suggested that our proposed approach to compliance for shared sites would discourage their use, would be unduly burdensome and/or overly complex.

5.78 A confidential respondent noted that it was Ofcom's policy to encourage users to share masts but said this proposal would discriminate against users of shared sites by requiring them to carry out surveys to ensure the collective limits are not exceeded. It thought the technical and financial burden would be extremely onerous and could even cause community and charity organisations to cease operating, to the detriment of the public. JRC thought that it had the potential to reduce the likelihood for increased site sharing and would run counter to Government policy to encourage the widespread deployment of Public Mobile Networks.

5.79 Siklu thought that it would be very complex to calculate exposure from multiple transmitters, saying that it would require a complex computer simulation that has accurate knowledge of the devices' exact position, orientation, beam pattern, nearby reflecting surfaces, etc., all of which it said was not practically available. It suggested some alternative approaches, e.g. creating a 'rule of thumb', or using a threshold to make this only an issue for higher power transmitters.

5.80 JRC also thought that compliance on shared sites would be complex – it said that sites hosting public mobile broadband systems have the potential to be remotely operated and are subject to frequent changes from one day to the next to address user demand - in particular where beam forming functionality is enabled. It said that additional complications relating to certainty over exposure levels will result where Ofcom has licensed systems with Automated Transmit Power Control (ATPC) and Adaptive Modulation.

5.81 BT explained that the established practices of technical cooperation amongst mobile network operators enables a licensee to take account of emissions from *other* operators'

equipment (that is co-located on the site) when assessing compliance with ICNIRP requirements.

5.82 However, it thought that this may not be as straightforward in the case of other radio systems. It noted in particular that a fixed link transmitter is very different to a mobile base station; it explained that because public exposure to emissions outside of the narrow beam of the fixed link is much lower, the risks associated with not taking fixed links into account is also much lower. It said it was therefore not necessary (nor reasonable) to require a consideration of signal aggregation as a licence condition in all cases.

Ofcom response

5.83 The ICNIRP Guidelines provide information on how to take account of simultaneous EMF exposure from multiple sources, and the relevant standards for EMF compliance also contain information setting out methods for determining compliance in this scenario.

5.84 We acknowledge that compliance calculations on shared sites are more complex than for single licensee sites. We have given careful thought to this issue and, in particular, considered whether it is necessary to require licensees to assess signal aggregation in all cases. As highlighted by BT, some radio equipment at shared sites will make a smaller contribution to the total EMF exposure than others.

5.85 In view of this, we consider that it should be sufficient to require licensees who are subject to the EMF licence condition, but who are operating radio equipment meeting certain criteria, to only take account of the EMF exposure levels produced by their own radio equipment.

5.86 We have therefore decided to introduce certain exemptions for shared site scenarios. If one or more of the exemptions apply to a licensee's own radio equipment, then the licensee will **not** be required to take into account the EMF exposure levels produced by other licensees' radio equipment on that site. The exemptions are as follows:

- The licensee's radio equipment is authorised to transmit higher than 10 Watts EIRP but not higher than 100 Watts EIRP.
- The licensee has calculated that the electromagnetic field exposure produced by its own equipment in any area that is accessible to the general public is no more than 5% of the ICNIRP general public limits.
- The licensee's radio equipment has an antenna gain that is equal to or above 29 dBi and has a fixed beam.

5.87 It is our judgement that radio equipment to which any of the exemptions apply will, in general, be unlikely to cause a shared site to breach the ICNIRP general public limits.

5.88 In the case of the exemption for antennas with a gain equal to or above 29 dBi, radio equipment using antennas meeting this criteria will typically be highly directional and have a relatively narrow main beam (and be used for applications such as point to point fixed links and satellite uplinks). It is unlikely that the main beam of this type of equipment will be pointing towards areas accessible to the general public and/or overlap with the

coverage footprint of lower gain higher power (>100 Watts) equipment (e.g. cellular base stations or broadcast transmitters) on a shared site.

5.89 We have also decided that where a licensee can reasonably assume that one or more of the above exemptions apply in relation to another licensee's radio equipment on a shared site, we will not require the licensee to take into account the EMF exposure levels from that other licensee's radio equipment.

5.90 We expect that in most cases licensees should be able to readily identify which other radio equipment on a shared site is likely to be covered by one or more of the exemptions. For example, PMR transmitters will in most cases transmit at powers below 100 Watts EIRP, and most point to point fixed links will have antenna gain that is equal to or above 29 dBi.

5.91 In summary, on a shared site occupied by Licensee A and Licensee B, we have decided that:

- Licensee A will **not** be required to take into account the EMF exposure levels produced by Licensee B's radio equipment where one or more of the above exemptions apply in relation to Licensee A's radio equipment.
- If none of the above exemptions apply in relation to Licensee A's radio equipment, Licensee A **will** be required to take into account the EMF exposure levels produced by Licensee B's radio equipment **unless** Licensee A can reasonably assume that one or more of the above exemptions apply in relation to Licensee B's radio equipment.

5.92 In cases where none of the shared site exemptions apply to a licensee's radio equipment or to other licensees' radio equipment on a shared site, licensees should calculate the total EMF exposure levels taking into account other licensees' radio equipment on the same site. In doing so, licensees should:

- take reasonable steps to obtain relevant information in relation to other licensees' radio equipment; and/or
- make reasonable assumptions about other licensees' radio equipment (and make allowances for a degree of uncertainty in making such assumptions).

5.93 Licensees on a shared site that are not covered by a shared site exemption should have records in place that will enable them to explain:

a) how they have determined whether they need to take into account the EMF exposure levels of other radio equipment on a shared site;

b) where the licensee can reasonably assume that none of the shared site exemptions apply to other radio equipment on a shared site:

   i) what processes they have in place to take account of the EMF exposure levels of that other radio equipment;

   ii) the steps they have taken to obtain relevant information about that other radio equipment and/or any reasonable assumptions they have made.

5.94 We have updated our EMF licence condition to include the shared site exemptions. This should help to ensure that our licence condition is not unduly burdensome or overly complex and does not discourage the use of shared sites. Taking into account the addition

of the shared site exemptions, we have also included a separate licence condition requiring licensees to ensure their own radio equipment complies with the ICNIRP general public limits (without any requirement to take into account the EMF exposure levels produced by another licensee's radio equipment on the same site).

5.95 We have also updated our 'Guidance on EMF Compliance and Enforcement' to provide guidance on the shared site exemptions and amend our guidance on the processes licensees should have in place to ensure compliance on shared sites.

5.96 Our further consultation published alongside this Statement provides stakeholders with an opportunity to provide feedback on the changes we have made to our licence condition and 'Guidance on EMF Compliance and Enforcement' in order to implement our decisions on shared sites.

Responsibility for shared sites compliance

5.97 Some respondents agreed that it should be the party who makes the last change to a site who is responsible for ensuring continued compliance. Others however thought this was unworkable and suggested that the site owner would be better placed to do this, or that Ofcom should be involved in performing audits of shared sites.

5.98 Vodafone agreed with this approach, noting that this is already what MNOs do, but said they had some concerns about whether less experienced users would understand the implications and have the competence to carry out the assessment. It suggested that Ofcom should play a role in educating those licensees who are less familiar with the process.

5.99 A confidential respondent argued that the proposal would only be reasonable and proportionate if it imposed obligations on users in relation to emissions from their own equipment.

5.100 The RNLI said it did not see this proposal as practical on busy masts shared by multiple broadcast and cellular users. It noted that it uses 100W 3rd party paging repeaters on high transmitter masts used by multiple cellular and broadcast users, and did not see how it could possibly implement the 'party to make the last change' rule.

5.101 TAUWI suggested that the radio site owner needed to be involved in discussions regarding the various processes that need to be followed.

5.102 Cambium Networks said that it was important that the site owner had these responsibilities, and JRC thought that the responsibility for shared sites compliance would sit best with the site owner/operator rather than the licensee making the last change. They indicated that it is only the site owner that has a legal right to obtain information about radio equipment on its site.

5.103 Arqiva on the other hand was concerned about impacts on site owners. It agreed in principle with the proposal but said that it was easy to underestimate the extra workload required. As an example, it noted that where a licence holder is dependent on another

company to manage and operate equipment, the licence holder would want the operator to provide proof of compliance.

5.104 Related to this, a few respondents highlighted potential issues with the sharing of information between operators on shared sites.

5.105 Arqiva warned that the problem in obtaining all the required information for the assessment at shared sites should not be underestimated. It said it would be useful if some text could be added requiring licence holders to share relevant information at shared sites.

5.106 BT said it was unclear what legal obligation other operators or site owners would have to share information with a licensee who seeks it for the purpose of providing documented calculations for compliance with an Ofcom licence condition.

5.107 It suggested that Ofcom could require that where detailed information of other deployments at a site is not available, a licensee may need to make calculations using reasonable assumptions to reflect unknown additional signal sources (and for allowances to be made for a degree of uncertainty in making such assumptions).

5.108 A confidential respondent noted that individual organisations do not have access to the parameters of the transmitting sources, the gain of antennas or their radiation patterns and would therefore be unable to calculate total EIRP in every direction through 360°. It suggested the only organisation that could hold the collective information for each site is Ofcom. It suggested that having Ofcom perform audits of shared sites would remove any security issues that some potential users may have and the confidentiality of any competing network operators.

Ofcom response

5.109 Ofcom issues licences under the Wireless Telegraphy Act 2006 (the WTA) authorising licensees to establish, install, modify and use radio equipment in accordance with the terms of their licence. As explained in Annex 1, Ofcom has legal powers to impose conditions in WTA licences to protect the public from EMF, and we proposed in our February 2020 consultation to include the EMF condition in WTA licences.

5.110 WTA licences require licensees to comply with the terms and conditions of their licence and we explained in our February 2020 consultation that we have legal powers to hold licensees to account in the event of non-compliance with the terms and conditions of their licence.

5.111 In most cases it is the owner of radio equipment that holds a WTA licence although a site owner may also hold a WTA licence. If a site owner holds a WTA licence which authorises the radio equipment to transmit at powers higher than 10 Watts EIRP, then they will also be required to comply with our EMF condition. We do not have any legal powers to hold persons who are not licensees to account in the event of non-compliance with the ICNIRP general public limits.

5.112 We continue to consider that it is appropriate for licensees to be responsible for ensuring compliance with the ICNIRP general public limits at shared sites. We do not agree that it is

appropriate or necessary for Ofcom to take responsibility for compliance at shared sites. In any event, this would not be feasible due to the very large numbers of radio installations across the UK.

5.113 As explained above, we have decided that if a licensee's radio equipment meets certain criteria, it will be exempt from the requirement to take into account EMF exposure levels from other licensees' radio equipment on the same site (on the basis it is unlikely that the licensee's own equipment would cause a site to breach the ICNIRP general public limits). Where a licensee's own radio equipment is not exempt, we have also decided that they only need to take into account EMF exposure levels from other non-exempt equipment on the same site. This should reduce the potential burden on licensees and the need to cooperate with and obtain relevant information from other licensees.

5.114 It also remains our view that it should be the licensee who makes the last change to a site that is responsible for ensuring the total EMF exposure levels from the site continue to comply with the ICNIRP general public limits. However, this is now subject to our shared site exemptions meaning it is now the licensee who makes the last change to a site (and is not covered by a shared site exemption) that is responsible for ensuring the total EMF exposure levels from the site (i.e. from all radio equipment not covered by a shared site exemption) continue to comply with the ICNIRP general public limits.

5.115 As noted by Vodafone, the approach of the last licensee to make a change being responsible for the compliance of a site is already successfully used by mobile operators. We consider that it is a fair and practical way of ensuring that licensees take responsibility for the impact of their own changes. Licensees, installers and users (whether on a shared site or not) should keep records of the date when they last made a change to the site and any EMF assessment that they undertook at that time.

5.116 We also note that there may already be certain arrangements in place between licensees on a site to ensure they or a site owner complies with their obligations under The Control of Electromagnetic Fields at Work Regulations 2016 to protect workers from EMF exposure. For example, there may already be processes in place to protect individuals that are employed to access rooftops to carry out building inspection and maintenance tasks from EMF (including window cleaners, roofing contractors, air conditioning engineers, insurance inspectors and antenna riggers). Licensees may be able to adapt any such existing processes to comply with our licence condition.

5.117 Taking the above points into account, our view is that it is not necessary to make sharing of information between licensees for the purpose of calculating EMF compliance at shared sites a requirement in licences.

5.118 As explained above, where appropriate licensees should take reasonable steps to obtain relevant information in relation to other licensees' radio equipment and/or make reasonable assumptions about other licensees' radio equipment.

Further guidance and industry engagement on shared sites

5.119 A number of respondents requested further guidance around the practical processes for managing compliance at shared sites. Others suggested that Ofcom could engage further with industry on this issue.

5.120 The BBC said that it agreed with the draft of the proposed EMF licence condition but that further guidance was needed for its application at sites with multiple licensees. It thought that individual licensees' responsibility for a breach of basic restrictions would be difficult to attribute and their records may be at odds with Ofcom compliance checks if there had been subsequent changes, for example, to the layout of a site.

5.121 Arqiva commented that it would be helpful to have additional clarification on who is responsible when multiple licence holders start new transmissions simultaneously. It noted that, for sites with many different existing licences, determining the order in which changes had been made historically would not be a trivial exercise.

5.122 Vodafone suggested that there was a need for Ofcom to facilitate multilateral discussions to agree the practical processes around enforcement of the proposed licence terms.

5.123 Telefonica also said it would welcome further discussions between Ofcom and stakeholders in order to further understand the proposals and details of the processes. It said this was particularly important due to the inherent complexity involved with multi-tenancy sites and also infrastructure and planning considerations which should be examined with a view to ensuring processes are efficient and effective and do not impose an undue burden or create a barrier to rollout.

Ofcom response

5.124 We have carefully reviewed responses on the subject of shared sites and held further discussions with interested respondents to understand their concerns in more detail. As discussed above, we have made a number of updates and additions to our 'Guidance on EMF Compliance and Enforcement' which should provide more clarity on how we intend to manage compliance for shared sites.

5.125 We recognise that a number of respondents had concerns about shared sites. We have therefore decided to issue a further consultation published alongside this Statement to give affected stakeholders a further opportunity to provide feedback on the specific drafting changes we have made to the wording of the licence condition to implement our decisions on shared sites as well as the associated changes we have made to our 'Guidance on EMF Compliance and Enforcement'.

5.126 With regard to Arqiva's request for additional clarification on who is responsible when multiple licence holders start new transmissions simultaneously, we note that it is unlikely to be the case that licensees make a change to a site at exactly the same time. Our general rule that it is the licensee who makes the last change to a site that is responsible for ensuring the total EMF exposure levels from the site continue to comply with the ICNIRP general public limits will therefore still apply. If licensees consider this to be a risk for a

particular site then it would be prudent for licensees to cooperate with each other in relation to this specific issue. We also note that the new shared site exemptions we are introducing will reduce the number of licensees that will need to take account of other radio equipment on the same site, and for non-exempt licensees, reduce the amount of other radio equipment on a site they will need to take into account. Our decisions should therefore reduce the risk of this happening.

Actions of third parties

5.127 Several respondents highlighted that there are situations where third parties could take actions near to shared sites which might result in the ICNIRP general public limits being breached, but the licensee would not necessarily be made aware.

5.128 Arqiva asked who would be deemed responsible if the last change was one within the surrounding environment, for example, if a new multi-storey building is erected immediately adjacent to the site. The BBC made a similar point, observing that there may be changes of use to surrounding properties, including new public access that may result in increases in public exposure of which licensees would have no knowledge. MNOs and Mobile UK also asked for advice on how to handle this scenario.

5.129 BT suggested that the advice should cover how this issue should be managed and also highlight responsibilities which would reside with other organisations - for example, in the scenario where a new building is developed within the compliance distance of a site.

5.130 Vodafone noted that there have been cases where, for instance, a prohibited access zone on the roof of a building had later been made available to residents as a communal space, without an MNO being told about this. It believed that there should be a statutory requirement for liaison with mobile operators where planning applications are submitted within a defined distance of existing mobile masts, with the presumption that if the development would cause the operator to be in breach of safety requirements, the developer would be responsible for ensuring this does not happen.

Ofcom response

5.131 Whilst we acknowledge that it may not be possible for licensees to become aware of all changes near to sites on which it has radio equipment, we expect licensees to be mindful of the environment surrounding a site. If licensees become aware of certain developments around a site which could in the future cause a site to breach the ICNIRP general public limits, we expect licensees to monitor the progress of such developments and engage with relevant authorities and other persons, as considered appropriate to ensure a site remains compliant with the ICNIRP general public limits.

5.132 In general, if changes around a site are made by third parties of which the licensee is unaware, and which make the site non-compliant, Ofcom would not expect to take enforcement action immediately. However, once the licensee becomes aware of this situation, we would expect licensees to take appropriate action to bring the site back into compliance.

5.133 Depending on the specific circumstances of the case and the risk of harm to the public, Ofcom may require licensees to take immediate action to reduce transmitter power or make other adjustments to their sites until a more permanent solution to the issue can be arranged. We have included some text in our updated 'Guidance on EMF Compliance and Enforcement' to cover this scenario.

5.134 We provide further information on our approach to enforcement later in this section.

Licensee specific scenarios

5.135 A number of respondents said there were some scenarios which were not specifically considered in the February 2020 consultation, including temporary and mobile use.

5.136 The BBC said that there needs to be particular consideration for short term Programme Making and Special Events (PMSE) use. Examples include newsgathering and outside broadcasts where vehicles may travel to a location for only a few hours and deploy a range of licensed transmitting equipment. Sky said that Ofcom's proposed guidance did not cover a number of important use cases, including Sky's direct-to-home (DTH) uplink systems and mobile satellite newsgathering trucks.

5.137 The RNLI said that the February 2020 consultation made no mention of transmissions from moving locations, such as boats or land vehicles, and Yaesu said there was no real information on how transmissions from portable equipment would be dealt with. A confidential respondent also noted that transmissions can be made from a vast range of emitters and from both static and moving platforms (e.g. helicopters, lorries, boats, etc.). It recommended that further discussion was needed to refine the scope of EMF compliance data that is required for each different transmission scenario.

5.138 Seacall went further, suggesting that the licence provisions should only apply to fixed base stations and that mobile, including marine (and amateur radio), should be exempt.

Ofcom response

5.139 Whilst not all radio types or scenarios were specifically referred to in our February 2020 consultation, we had considered whether our proposals should apply to all licence types. We decided that our licence condition should apply to all radio equipment which is authorised to transmit at powers higher than 10 Watts EIRP which meant it would apply to a wide range of different types of radio equipment.

5.140 We did not consider it appropriate to specifically refer to each licence type in our February 2020 consultation. Moreover, one of the purposes of the consultation was to give respondents the opportunity to identify areas where they thought further clarification was needed.

5.141 Whilst we did not specifically refer to temporary and mobile base station use in our February 2020 consultation, we did cover this issue in a Frequently Asked Questions document that was published on our website during the consultation period. Here, we explained that licensees would need to ensure that their radio equipment was always

operated in a way that is compliant with the ICNIRP general public limits. In cases where equipment is moved but the operating parameters remain the same, demonstrating compliance may not require a new assessment and may simply involve ensuring that a safe separation distance is maintained between the equipment and the general public.

5.142 For situations where transmissions are being made from moving locations, platforms or vehicles, the key principle remains that licensees need to ensure that their equipment is compliant with the ICNIRP general public limits at all times.

5.143 Licensees should be aware of the safe separation distance needed to maintain compliance with the ICNIRP general public limits, and where necessary, undertake a risk assessment and have measures or mitigations in place to ensure that members of the public are not exposed to EMF levels which exceed the ICNIRP general public limits.

5.144 In this regard, we would note that the ICNIRP general public limits are averaged over a time period (e.g. six minutes for frequencies below 10 GHz). As such, the licensee will need to consider whether it is likely that the moving platform or vehicle will be close to any publicly accessible area for a sufficient time, in relation to the averaging period, for the limits to be breached.

5.145 We have updated our 'Guidance on EMF Compliance and Enforcement' to include guidance on how to demonstrate compliance in situations where radio equipment is not at a permanent fixed location.

5.146 We have also explained in section 4 that where radio equipment installed on vehicles used for newsgathering and outside broadcasts is located on a site that is not accessible to the general public and/or set up in a way which means is not possible for the EMF exposure levels from that radio equipment to exceed the ICNIRP general public limits in areas that are accessible to the general public, then that equipment will comply with our licence condition.

5.147 We recognise that our definition of 'site' in the licence condition will mean that it will not specifically require licensees which operate radio equipment on a vehicle used for newsgathering and outside broadcasts to take into account the EMF exposure levels from other vehicles in the vicinity that are also being used to transmit radio signals.

5.148 As noted above, if Ofcom becomes aware of a breach of the ICNIRP general public limits in any publicly accessible area which is the result of EMF exposure levels produced by radio equipment on more than one vehicle, Ofcom will notify licensees whose radio equipment is contributing to the exposure levels in the affected area and will expect licensees to cooperate and take action to bring the exposure levels back below the ICNIRP general public limits.

Approach to compliance monitoring, checks and measurements

5.149 Respondents who commented on Ofcom's proposed approach to monitoring compliance were generally supportive. Echostar/Hughes and ESOA said that they supported Ofcom's approach of making compliance checks on an ad hoc basis, where there is some evidence

of a potential risk of non-compliance. They thought that attempting to check all satellite earth stations in operation today would be overly burdensome on both Ofcom and satellite service providers.

5.150 Vodafone suggested that the best approach would be for Ofcom to carry out random measurement assessments, and where there is any suspicion of the ICNIRP general public limits being approached, liaise with the licensee(s) so that they can provide evidence that the site is planned to be compliant and operating per design. It also believed that sharing Ofcom measurement data with licensees would be valuable in further refining the accuracy of models. However, it said it would be less supportive of licensees being required to proactively provide compliance evidence for sample sites.

5.151 A confidential respondent asked for clarification on whether Ofcom envisaged that EMF compliance data would be supplied to Ofcom for review, or whether the licensee would only confirm compliance (on the understanding that the detailed calculations or measurements would be available if required by Ofcom).

Ofcom response

5.152 We set out our proposed approach to monitoring and checking compliance in paragraphs 4.41 - 4.45 of our February 2020 consultation. We noted that Ofcom already carries out compliance checks of licensed radio equipment as part of its ongoing spectrum assurance work programme and that, if the EMF condition was included in licences, Ofcom intends to include an additional check of EMF compliance records as part of these activities.

5.153 In response to the request for clarification, we would expect compliance records to show what checks have been carried out (e.g. the results of the compliance assessments), rather than just a confirmation that this has been done. Ofcom could also, at its discretion, undertake measurements to confirm licensees, installers and users were complying with the EMF-related condition. Where we carry out such measurements, we may choose to share these with licensees if appropriate.

5.154 This continues to be our planned approach. Ofcom's Spectrum Assurance team will continue to carry out random, routine compliance checks on licensees and these will now include a check of EMF compliance records. Where there is any doubt about the compliance of the site based on compliance records, Ofcom's field engineers may undertake measurements to check that the radio equipment is compliant with the ICNIRP general public limits.

5.155 Initial compliance check measurements would use broadly the same methodology as set out in the EMF summary test report published on our website[36]. If these measurements

[36] The measurements included in this report used equipment which can take measurements across frequencies between 420 MHz to 6 GHz. Different measurement equipment would be used for other frequency ranges, and there may be some differences in how the measurement equipment operates. However the general approach to measurement will be the same, i.e. identifying the publicly accessible areas in the vicinity of the site with the highest exposure levels and carrying out field strength measurements (generally at 1.5m above ground level) over the frequencies of interest which will be averaged over the relevant time period (6 minutes in the 1998 ICNIRP Guidelines, 30 minutes in the 2020 ICNIRP Guidelines).

indicated that there may be a compliance issue, Ofcom may take further, more detailed, measurements, most likely using a measurement methodology based on one set out in the relevant standard (as identified in our 'Guidance on EMF Compliance and Enforcement').

5.156 Separately to our routine compliance checks, Ofcom will continue to undertake EMF measurements close to mobile phone base station sites as it has done for many years and publish these measurements on its website. In general, we aim to take these measurements in busy publicly accessible areas near to mobile phone masts where we can expect to see high levels of mobile phone use. As explained in our February 2020 consultation and our April 2020 EMF technical report, all of the measurements we have taken to date have shown that EMF exposure levels around mobile sites are well within the ICNIRP general public limits.

5.157 We may also undertake EMF measurements at non-mobile sites (again separate to our routine compliance checks) to confirm licensees, installers and users are complying with the EMF-related condition. These results will also be published.

Notice of proposed compliance checks

5.158 One stakeholder indicated that a key concern was the practical impact and uncertainty around Ofcom's proposed compliance checks, including the impact of having to have staff available to provide Ofcom with access to a site or having to produce portable or movable equipment for Ofcom to check at short notice. It requested that Ofcom provide more clarity on the level of notice it would provide to licensees where Ofcom wanted to check the compliance of a site or equipment.

Ofcom response

5.159 As explained in Annex A2.15 and 2.17 of our February 2020 consultation, Ofcom has existing powers in spectrum licences that allow us to have access to radio equipment and to inspect, examine and test it. Licensees should facilitate Ofcom being provided with access to a site in order to carry out its own EMF exposure measurements. Under the terms of their licence, licensees are required to permit Ofcom to access and inspect radio equipment at "*any and all reasonable times*" or "*at any time*" if in our view an "*urgent situation exists*". We are not intending to place any additional obligations on licensees in terms of providing access to radio equipment over and above what is already required under their licence.

5.160 Where we do decide to exercise our discretion and undertake EMF measurements at a particular site, the amount of advance notice we will provide to a licensee (if any), will depend on the circumstances and what we consider to be appropriate taking all relevant factors into account. We reserve the right to not provide any notice and have clarified this in our 'Guidance on EMF Compliance and Enforcement'. It is in our view important for deterrent purposes for there to be an element of uncertainty around if and when we may carry out EMF measurements at a site.

Approach to enforcement

5.161 Several respondents asked for further guidance on how Ofcom would approach enforcement issues. RAYNET-UK said that it approved of Ofcom's proposal to hold conversations with licensees before moving to enforcement procedures but suggested Ofcom should provide more explicit guidance on this process, and what inspectors would be looking for. Yaesu thought that more guidance should be offered, with less focus on hard enforcement options.

5.162 Echostar/Hughes recommended that Ofcom factor in whether an installation was made prior to the licence condition being added to licences when determining what enforcement action may be appropriate. It thought that installations made prior to the application of the EMF licence condition should be allowed more leeway in simply fixing an issue versus other more punitive enforcement action.

5.163 The Royal Yachting Association commented that the penalties outlined including fines, civil and criminal proceedings and licence revocation seemed disproportionate to the issue at hand.

5.164 The BBC commented on enforcement as it applies to shared sites and suggested that, where Ofcom suspect a breach, the licensees should be required to engage with the site manager or landlord to provide Ofcom with complete and current site and licensee information before appropriate enforcement action is considered.

Ofcom response

5.165 Ofcom has a wide range of enforcement powers available to it in the event of non-compliance with an EMF licence condition. These include taking regulatory action and issuing financial penalties of up to 10% of a licensee's turnover; criminal action including prosecution; and revoking licences and requiring equipment to be closed down. Different enforcement options are likely to be appropriate in different circumstances and we intend to consider which option may be the most appropriate on a case-by-case basis.

5.166 We set out in Annex A2.20 of our February 2020 consultation the types of factors that may be relevant to our decision whether to take enforcement action and what enforcement action may be the most appropriate in the circumstances. In addition to the factors identified in the consultation, we will also consider the type of licensee against which we are considering taking enforcement. For example, it would not be appropriate to take regulatory action against a licensee that is an individual. This is because individuals do not have any annual turnover within the meaning of sections 43 and 44 of the WTA which could be used as the basis for imposing a financial penalty. We have amended our 'Guidance on EMF Compliance and Enforcement' to refer to this additional factor.

5.167 We explained in section 4 above that if a licensee exposes family, friends, visitors, neighbours, paying customers or other members of the general public to EMF then they will need to ensure they comply with the ICNIRP general public limits. This is because in our

view such individuals may have no knowledge of their exposure to EMF and in any event are not in a position to fully understand, control or mitigate the risk of exposure to EMF.

5.168 We recognise that in certain situations, a licensee (such as an amateur or ship radio licensee) may take certain steps to mitigate exposure to EMF and ensure family and friends are clearly informed of any EMF risks – and accept them – before they are exposed. As we have explained, we will take all relevant circumstances into account when deciding whether to take enforcement action and what enforcement action may be the most appropriate. It is ultimately for licensees to take appropriate steps to comply with our licence condition.

5.169 We recognise that some licensees are concerned about their ability to ensure compliance with our licence condition on a shared site and that there may be circumstances where some licensees have difficulty obtaining relevant information from other licensees. As explained above, we have introduced new shared site exemptions which reduce the number of licensees that will need to take account of other radio equipment on the same site and, for non-exempt licensees, reduce the amount of other radio equipment on a site which they will need to take into account.

5.170 We have also explained above how we expect licensees to take into account EMF exposure levels produced by other licensees' radio equipment on shared site where none of the exemptions apply. These decisions should reduce the potential burden on licensees and address some of respondents' concerns.

5.171 We have also decided to amend our 'Guidance on EMF Compliance and Enforcement' to note that the steps a licensee has taken to ensure compliance with our licence condition is another factor that may be relevant to our decision whether to take enforcement action - and what enforcement action may be the most appropriate in the circumstances.

5.172 Whilst other factors may be relevant in the particular circumstances of a case, in our view the factors we identify in A3.44 of our updated 'Guidance on EMF Compliance and Enforcement' are likely to be the most relevant to our decision whether to take enforcement action and what enforcement action may be the most appropriate in the circumstances.

5.173 We intend to take a proportionate and pragmatic approach to compliance and enforcement. It is not our intention to immediately take enforcement action and impose a financial penalty or other sanctions on a licensee if a site on which it is present is found to be in breach of the ICNIRP general public limits regardless of the circumstances. Whilst we may consider such action to be appropriate in certain circumstances, our key objective is to foster and facilitate a climate of compliance across all licensees, installers and users caught by an EMF-related condition. Our key objectives are to ensure licensees, installers and users are:

- taking appropriate steps to ensure they are and remain compliant with the ICNIRP general public limits when installing, using or modifying their radio equipment (which may in some cases require licensees, installers and users to cooperate with other

licensees, installers and users on a shared site and/or make reasonable assumptions); and

- keeping appropriate records which demonstrate the steps they have taken and why they considered them to be appropriate in the circumstances.

5.174 We are less likely to take enforcement action against a licensee, installer or user that can demonstrate it has taken such appropriate steps.

Detailed comments on licence conditions and guidance

5.175 In addition to the key themes around compliance and enforcement that we have identified and discussed, we also received a number of detailed comments and suggestions on the wording of the licence condition and some aspects of our 'Guidance on EMF Compliance and Enforcement'. We discuss these below.

Changes to the ICNIRP Guidelines

5.176 A number of respondents noted that the ICNIRP Guidelines were being updated this year and requested further information on how changes would be managed. A confidential respondent asked Ofcom to provide an indication of when the 2020 ICNIRP Guideline levels would start to be used.

5.177 Echostar/Hughes noted that references to table numbers in the ICNIRP Guidelines may need to be updated to point to the correct references in updated ICNIRP Guidelines. It also thought that if there were substantive changes to the requirements in amended ICNIRP Guidelines, another Ofcom consultation would be warranted to review the updated requirements and to implement grandfathering of already deployed and tested equipment against the prior standard.

5.178 Arqiva asked more generally about what would be done if there were significant changes to the ICNIRP Guidelines during the lifetime of a licence.

Ofcom response

5.179 We noted in our February 2020 consultation that an updated version of the Guidelines was being prepared for publication by ICNIRP and we anticipated this being published shortly. This updated version, the 'ICNIRP Guidelines 2020'[37], was published in March 2020. We also indicated that if the ICNIRP Guidelines were updated before we issued our final statement, or before we started the process of varying any spectrum licences, we intended to update the definition of the 'ICNIRP Guidelines' to refer to the updated version.

5.180 The ICNIRP Guidelines 2020 were developed to take account of the increased scientific evidence that has become available since the 1998 Guidelines were published. We have reviewed the new Guidelines and noted the following points:

[37] The ICNIRP Guidelines for limiting exposure to electromagnetic fields (100 KHz to 300 GHz), published in: Health Physics 118(5): 483–524; 2020 and available at: https://www.icnirp.org/cms/upload/publications/ICNIRPrfgdl2020.pdf

- The protection limits have mostly been retained and are very similar to those in the 1998 Guidelines;
- ICNIRP continues to consider that the restrictions in the 1998 Guidelines provide protection against adverse health effects from technologies currently in use (including those used by mobile operators);
- They have not identified any new adverse health effects, i.e. the restrictions are still designed to prevent adverse health effects related to heating of body tissue;
- According to ICNIRP, *"minor changes that have been made to improve the precision of the restrictions have resulted in more conservative restrictions, but as the differences are small relative to the strongly conservative restrictions themselves, these changes will not make an appreciable difference to health protection against exposure from current RF EMF-emitting devices.*[38]*"*

5.181 PHE has also updated its website with information on the ICNIRP Guidelines 2020.

5.182 We have carefully considered whether we should require licensees to comply with the 1998 version of the ICNIRP Guidelines or the updated 2020 version. We note that the relevant standards explaining the methodology to assess whether radio equipment complies with the 2020 version of the ICNIRP Guidelines have not yet been developed.

5.183 Whilst we cannot predict a definite timetable for this, we expect that it is likely to take in the region of 2-3 years. To address this, we have amended our licence condition to require compliance with the version of the ICNIRP Guidelines which we identify in our separate 'Guidance on EMF Compliance and Enforcement' (rather than identify the specific version of the ICNIRP Guidelines licensees need to comply with in the licence condition itself).

5.184 Initially we will identify the 1998 version of the ICNIRP Guidelines in our 'Guidance on EMF Compliance and Enforcement'. Once work on the relevant standards has progressed sufficiently, we will consult on updating our 'Guidance on EMF Compliance and Enforcement' to explain that going forward we will be requiring licensees to comply with the 2020 version. Following consultation, we will publish an updated version of our 'Guidance on EMF Compliance and Enforcement' on our website. We will follow the same process for any subsequent versions of the ICNIRP Guidelines. We have explained this process in a footnote in the licence condition included at Annex 2.

5.185 When we consult on updating our 'Guidance on EMF Compliance and Enforcement' we will also consider if it may be appropriate to put any temporary measures in place to assist licensees in their transition to complying with the 2020 version of the ICNIRP Guidelines. Whilst protection limits in the original 1998 ICNIRP Guidelines have mostly been retained in the 2020 version, there have been some changes to the way in which ICNIRP recommend some EMF measurements are carried out. It may therefore be appropriate to allow licensees a period of time to consider if they need to carry out any further EMF

[38] See: https://www.icnirp.org/en/differences.html

assessments to ensure they continue to comply with their EMF licence condition and update their records.

Reference in licence condition to EIRP

5.186 A small number of respondents highlighted that the wording in the licence condition referring to *"the total EIRP emanating from all wireless telegraphy stations"* was incorrect.

5.187 Arqiva noted that the ICNIRP Guidelines set limits based on human exposure rather than limits on antenna output power. It suggested that alternative wording could include a requirement that the cumulative exposure resulting from all emissions from the site is below the basic restrictions.

5.188 BT said that it is not the EIRP of the transmitter that must be below the threshold field strengths; rather it is the signal strength at the relevant locations in the proximity of the transmitter, where the general public may be present, that has to be below the thresholds.

5.189 The RSGB thought that there was a lack of clarity around use of 'power' and 'EIRP': it said that for ICNIRP compliance purposes, 'power' must be clearly defined as Average Power during the appropriately defined period of several minutes and that use of EIRP to regulate EMF exposure would frequently produce inaccurate results.

5.190 S Carter commented that the proposal that the EMF licence condition would only apply to equipment *"…that is authorised to transmit at powers above 10 Watts EIRP"* was technically nonsensical since EMF concerns primarily focus on near-field exposure, whilst the concept of EIRP is meaningless (and potentially dangerously confusing) with respect to near-field EMF exposure.

Ofcom response

5.191 We agree that the wording in the draft licence condition referring to *"the total EIRP emanating from all wireless telegraphy stations"* was incorrect. We have amended the licence condition so that it now refers to the electromagnetic field exposure levels produced by the relevant radio equipment. The updated licence condition is included at Annex 2.

5.192 We also note that some licences refer to ERP rather than EIRP and have clarified in a footnote in the licence condition that in licences which refer to ERP, we intend to make clear the relationship between ERP and EIRP, i.e. in linear units (EIRP (W) = 1.64 x ERP (W); in decibels EIRP (dB) = ERP (dB) + 2.15.

References to basic restrictions and reference levels

5.193 Some respondents, including Arqiva, BT and ESOA, requested that Ofcom amend the licence condition to refer explicitly to the reference levels. Both Arqiva and Echostar/Hughes suggested specific wording that could be included in the licence condition to achieve this.

5.194 Arqiva also suggested that it was unnecessary to refer explicitly to the table numbers from the ICNIRP Guidelines in the licence condition.

Ofcom response

5.195 We have included a footnote in the licence condition to clarify that compliance with the reference levels will ensure compliance with the relevant basic restriction. As explained above, we have also changed the way that we refer to the ICNIRP general public limits in the licence condition which means that we no longer refer to specific table numbers.

Condition on record-keeping and retrospective nature of licence condition

5.196 Several respondents provided comments on the proposed wording in relation to record-keeping and the retrospective nature of the licence condition.

5.197 A confidential respondent said the retrospective nature of the licence condition meant that a lot of time and effort would be needed to check compliance. BT thought that the clause regarding keeping and making available records did not seem suitable for existing licences as presently worded, and that Ofcom should clarify that it is not retrospective and would only cover future deployments under existing or new licences. BT added that it should be sufficient to require operators to demonstrate current compliance to Ofcom on request.

5.198 The BBC suggested that the clause could be given added clarity by being revised to make it clear that, where the licensee's radio equipment is managed by a contractor, the contracted operator of the equipment could keep records on behalf of the licensee.

5.199 Echostar/Hughes and ESOA recommended that Ofcom factor in whether an installation was made prior to the licence condition being added in determining any potential enforcement action.

Ofcom response

5.200 For existing licences, the licence condition will not be retrospective i.e. it will only be effective/come into force from the day on which we notify a licensee that its licence has been varied to include the EMF licence condition. However, it will apply to all a licensee's radio equipment including equipment that was deployed before the licence condition comes into force as well as new deployments and any changes to existing or new radio equipment.

5.201 It is in our view appropriate to require licensees to hold compliance records for all its radio equipment. If we only required licensees to hold records for any new radio equipment or changes it makes to existing radio equipment then licensees may not be required to have any EMF compliance records for the vast majority of their equipment. This would significantly undermine our objective of ensuring spectrum users are taking full account of EMF exposure when installing or modifying radio equipment and is unlikely to help reassure the public. It could be the case that a licensee's radio equipment that is a higher

risk of breaching the ICNIRP general public limits is equipment that was installed several years ago.

5.202 As explained above, licensees should already be aware of the ICNIRP Guidelines and be taking EMF exposure into account when conducting their business. We also noted in section 4 above that operators sign a declaration (sometimes referred to as an ICNIRP Certificate) confirming that they have complied with the ICNIRP general public limits when applying for planning permission for a new site or a change to an existing site. In many cases therefore, licensees should already have some records in place that may provide evidence of compliance with the licence condition.

5.203 We set out our implementation plans for licence variations in the section 6 below. As explained in that section, licence variations will not take place immediately and licensees will therefore have some time in advance to consider whether they have appropriate records demonstrating compliance. If not, they will need to take appropriate steps to ensure they do have such records in place. We would encourage licensees who have not already ensured compliance with the ICNIRP general public limits to take any necessary actions now to ensure that they will be compliant with the new condition when it is included in their licence(s).

5.204 We do however recognise that this process will take time (in particular for licensees with multiple licences on multiple sites). We have therefore decided to allow existing licensees a period of 6 months following the variation of their licence to ensure that their EMF compliance records are in place and up-to-date. During this time however, where Ofcom carries out routine compliance checks and requests access to EMF compliance records for a specific site, licensees will need to provide evidence to Ofcom that the site is compliant with the ICNIRP general public limits within a period of 20 calendar days. We have updated our 'Guidance on EMF Compliance and Enforcement' to include this point.

5.205 With regard to the BBC's point, we recognise that for some licensees it may be appropriate for a contractor acting on behalf of a licensee to keep the relevant records. We have therefore decided to amend our licence condition to require records to be kept by the licensee, or for the licensee to procure that records are kept by any contractor working on its behalf. The obligation to make such records available to Ofcom on request will remain an obligation on the licensee.

Requests for clarification and other miscellaneous points

5.206 We also received requests for clarification on a number of other issues, which we respond to in the following paragraphs.

Shared use of antennas

5.207 Arqiva noted that it is common practice within some industries (e.g. broadcasting and cellular) for services operating under different licences to be transmitted from a common antenna, and asked how the 10 Watts EIRP threshold applies in such cases.

Ofcom response

5.208 We can confirm that the condition will be included in all licences in licence classes which authorise transmissions at powers higher than 10 Watts EIRP, including in cases where the antenna is shared between licensees. All licensees with the EMF condition in their licence will be responsible for complying with this condition.

Practicality of applying requirement to licence exempt devices

5.209 Siae Microelettronica noted that the presence of 'unlicensed' mass market radio devices with high EIRP would render a 'legally clear' declaration impossible. It thought that, even if pre-licensing field tests were done, there would be no guarantee that the situation would remain constant in future.

Ofcom response

5.210 As explained above, we intend to amend relevant licence exemption regulations as considered appropriate on a case-by-case basis in line with our policy decision to require licence exempt equipment that is authorised to transmit at powers higher than 10 Watts EIRP to comply with the ICNIRP general public limits.

5.211 As explained in our February 2020 consultation, it would be the responsibility of the installer or user of any licence-exempt equipment to ensure that the equipment is compliant with the ICNIRP general public limits, taking into account our 'Guidance on EMF Compliance and Enforcement'. Failure to comply with the requirements in the licence exemption regulations could lead to Ofcom taking enforcement action.

Measurement uncertainty

5.212 A confidential respondent asked what measurement uncertainty allowance would be considered acceptable (e.g. if Ofcom measurements showed that the exposure levels produced by a licensee were in breach of the licence condition).

Ofcom response

5.213 We expect that this will only be an issue in a very small fraction of cases where the calculated exposure levels are very close to the exposure limits (i.e. equal to or less than the measurement uncertainty). We note that the standards for EMF compliance (listed in our 'Guidance on EMF Compliance and Enforcement') provide guidance on recommended methods for the analysis of measurement uncertainty.

Dummy loads

5.214 A confidential respondent asked for clarification on whether a licence is required when a dummy load is used and whether EMF compliance requirements would apply in this situation.

Ofcom response

5.215 Licence applicants who plan to use a dummy load to suppress radiation from radio equipment need to make their own decision on whether a wireless telegraphy licence is required for their particular circumstances. This is because use of a dummy load does not always guarantee that radiation will not occur. In particular, licence applicants should have regard to the definitions of wireless telegraphy in the Wireless Telegraphy Act 2006 (sections 116 and 117).

5.216 For certain frequencies under 960 MHz, testing and development work is exempt from licensing if transmissions can be carried out under suppressed radiation conditions. Further information is set out in our 'Innovation and Trial licensing: Guidance notes for applicants' on our website.

5.217 Any licensee with a licence that contains the EMF condition and that authorises a transmit power higher than 10 Watts EIRP will need to ensure compliance with the EMF licence condition.

Responsibility of manufacturers

5.218 A confidential respondent asked Ofcom to confirm that, where it supplies a product to a customer and the customer installs/operates the product in a non-recommended and/or non-compliant manner, the responsibility for compliance in this situation would fall solely on the owner and operator of the product.

5.219 It also asked for clarification that, in situations where its product is installed on a platform belonging to a third party and is under the control of the third party (e.g. an antenna loaned for a demonstration), it would be the third party that would be responsible for compliance with the ICNIRP general public limits (i.e. maintaining the recommended safe distance).

Ofcom response

5.220 The licensee will be responsible for ensuring that the radio equipment complies with the conditions in the licence, including the ICNIRP general public limits. Obligations on manufacturers in relation to EMF are contained in the Radio Equipment Regulations; we discuss this in more detail in paragraphs 4.32-4.36.

Summary of revisions

5.221 In this section we have discussed a number of areas where we have decided to make additions, amendments and clarifications to our licence condition and to our 'Guidance on EMF Compliance and Enforcement'. We summarise the key changes below. The revised licence condition and 'Guidance on EMF Compliance and Enforcement' are included at Annexes 2 and 3.

Revisions to licence condition

5.222 In order to implement the decisions we have made on the scope of the licence condition, we have made the following key additions, amendments and clarifications to the licence condition to:

- define the "general public" as any person who is not: (1) the Licensee, owner, operator or installer of the radio equipment; or (2) acting under a contract of employment or otherwise acting for purposes connected with their trade, business or profession or the performance by them of a public function*;*
- clarify that our licence condition only requires licensees to comply with the ICNIRP general public limits in areas that are accessible to the general public;
- include the "shared site exemptions", which will mean that many licensees will only need to assess the EMF exposure produced by their own radio equipment or will not need to take into account the EMF exposure produced by all other radio equipment on shared site;
- taking into account the addition of the shared site exemptions, included a separate licence condition requiring licensees to ensure their own radio equipment complies with the ICNIRP general public limits (without any requirement to take into account another licensee's radio equipment on the same site);
- define 'site' as 'a physical structure, building, vehicle or moving platform' and add a definition of a 'shared site';
- remove the reference to the 1998 version of our ICNIRP Guidelines and instead require compliance with the version of the ICNIRP Guidelines which we identify in our 'Guidance on EMF Compliance and Enforcement';
- reword the main condition so that it refers to the "electromagnetic field exposure levels" rather than "the total EIRP";
- clarify that compliance with the reference levels in the ICNIRP Guidelines will ensure compliance with the relevant basic restriction;
- clarified that our licence condition to require records to be kept by the licensee also allows the licensee to procure that records are kept by any contractor working on its behalf;
- added a new licence condition which explains that licensees will not need to comply with the relevant levels in the ICNIRP general public limits if (i) radio equipment is being used for the purpose of seeking emergency assistance or reporting or responding to an emergency situation including for search and rescue activities and maritime emergency communications; and (ii) compliance with the relevant levels in the ICNIRP Guidelines for the protection of the general public is likely to result in or create an immediate and serious threat to the safety of the public or public health.

5.223 Alongside this Statement, we have published a short further consultation on the implementation of our decisions. As part of this consultation, stakeholders will be given an opportunity to provide feedback on the additions, amendments and clarifications we have made to the wording of the licence condition.

Revisions to our 'Guidance on EMF Compliance and Enforcement'

5.224 We have updated our 'Guidance on EMF Compliance and Enforcement' to include additional guidance and clarifications for licensees, users and installers including the following key changes:

- note that we are making an EMF calculator available on our website and explain how it can be used to demonstrate compliance;
- include BS EN 50665:2017 and BS EN 62311:2020 in the list of relevant standards;
- clarify expectations around when and how often licensees, users and installers should reassess compliance (including conducting measurements where licensees deem it appropriate);
- explain how to demonstrate compliance in situations where the radio equipment is not at a permanent fixed location;
- explain the new shared site exemptions and amend what we expect of licensees, installers and users in terms of compliance records for shared sites;
- explain how we intend to deal with situations where the actions of third parties may result in the ICNIRP general public limits being breached;
- provide additional information on factors we may consider when deciding whether to take enforcement action;
- explain that we do not intend to take enforcement action against a licensee for a failure to have appropriate records in place demonstrating EMF compliance for a period of up to 6 months after their licence is varied (although licensees will need to provide evidence to Ofcom on request that a specific site is compliant with the ICNIRP general public limits within a period of 20 calendar days).

5.225 As part of the consultation on implementation, we will be providing stakeholders with a further opportunity to provide feedback on our revised 'Guidance on EMF Compliance and Enforcement' as well as our EMF calculator.

Legal tests

5.226 For the reasons set out below, we consider our decision to include an EMF-related condition in spectrum authorisations for equipment that is authorised to operate at powers higher than 10 Watts EIRP is objectively justified, proportionate, non-discriminatory and transparent.

Objectively justifiable

5.227 Licensees, installers and users of radio equipment should already be aware of the ICNIRP Guidelines and be taking EMF exposure into account when conducting their business. In our February 2020 consultation, we identified a number of risks with the current approach, namely that that some spectrum users may not be fully aware of the ICNIRP general public limit and/or may not be taking full account of EMF exposure when installing or modifying radio equipment. As explained in section 4 above, our review of consultation responses has confirmed that some spectrum users do not fully understand all the implications of

complying with the ICNIRP general public limits and are not fully taking into account EMF exposure when installing or modifying radio equipment.

5.228 We also consider that the pre-existing regimes do not provide sufficient protection from EMF exposure for the general public or ensure spectrum users comply with the ICNIRP general public limits. This is because they either have a different scope to our EMF-related condition or do not put Ofcom in a position where we could take appropriate enforcement action in the event the ICNIRP general public limits are breached.

5.229 Our EMF-related condition is intended to complement – and not overlap – with the regulatory regimes that currently exist and enables us to address the risks identified in paragraph 4.12 of our February 2020 consultation.

Non-discriminatory

5.230 Our decision applies to all radio equipment (whether authorised under a Wireless Telegraphy Act licence or licence exemption regulations) where we consider there is a risk that a spectrum user could inadvertently (or otherwise) install or operate equipment in a way that breaches the ICNIRP general public limits. We have determined the appropriate level to be where equipment is authorised to transmit at powers higher than 10 Watts EIRP.

Proportionate

5.231 It is not our intention to impose on licensees, installers and users a significant regulatory burden over and above what they can already be expected to be doing to ensure their radio equipment complies with the relevant levels in the ICNIRP Guidelines for the protection of the general public. Taking into account the intended scope of the new licence condition and the requirements we intend to put on licensees, and for the reasons set out in section 5 above, our view is that the potential impact of our licence condition is much less burdensome than many respondents believed. In particular, we do not believe the requirement to comply with the ICNIRP general public limits should result in a large additional financial or administrative burden for licensees.

5.232 As explained in sections 4 and 5 above, we have however decided to make a number of additions, amendments and clarifications to our licence condition and 'Guidance on EMF Compliance and Enforcement' to address a number of concerns raised by respondents relating to the potential impact of our EMF-related condition. We are also introducing an EMF calculator to help licensees, installers and users assess whether they may comply.

5.233 Moreover, we are not imposing an EMF-related condition where we consider there to be a particularly low risk of breaching ICNIRP general public limits i.e. where equipment is authorised under a licence in a licence class which does not authorise transmission at powers higher than 10 Watts EIRP.

5.234 Accordingly, we consider our decision to be the minimum necessary to address the risks identified in paragraph 4.12 of our February 2020 consultation, and help reassure the public, without giving rise to disproportionate effects.

Transparent

5.235 It is clear what the new EMF-related condition is intended to achieve. Further, we intend to issue 'Guidance on EMF Compliance and Enforcement' which provides guidance on the processes licensees, installers and users should have in place to ensure compliance with the EMF-related condition and the circumstances in which Ofcom may take enforcement action for failing to comply.

5.236 As explained in sections 4 and 5 above, we have decided to make a number of additions, amendments and clarifications to our licence condition and 'Guidance on EMF Compliance and Enforcement' document to clarify the scope of our licence condition and ensure our licence condition and 'Guidance on EMF Compliance and Enforcement' are transparent. We have also explained in section 5 that we are giving stakeholders an opportunity to provide further feedback on (i) the specific drafting changes we have made to the wording of the licence condition to implement our decisions on its scope; and (ii) the changes we have made to our 'Guidance on EMF Compliance and Enforcement', as well as our EMF calculator.

6. Implementation and next steps

6.1 In our February 2020 consultation we explained that, in order to include the new EMF condition in spectrum licences, we would need to include it in all relevant licences issued from a given date, with the date to be confirmed in our policy statement. We explained that we would also need to vary existing licences following the procedure set out in Schedule 1 of the Wireless Telegraphy Act 2006 (the WTA).

6.2 We also explained that we planned to phase variation of existing licences over a period of time, starting with licence classes which authorise equipment at relatively high power levels, and continue to vary other licence classes as our programmatic work plan permits.

6.3 In relation to radio equipment that is authorised to transmit at powers higher than 10 Watts EIRP but which is exempt from the requirement to obtain a WTA licence, we said that we would consult separately on any proposals to amend licence exempt regulations on a case-by-case basis as considered appropriate.

6.4 Respondents did not express concerns about the planned variation process or our proposed approach to licence exempt equipment. In this section we provide further information on next steps and timing of the implementation of changes to licences.

6.5 As highlighted in section 5, we have decided that it would be helpful to give stakeholders another opportunity to provide feedback on the specific drafting changes we have made to the wording of the licence condition to implement our decisions on its scope and on our revised 'Guidance on EMF Compliance and Enforcement' including our EMF calculator. We have therefore published a further consultation alongside this Statement.

6.6 Taking into account any comments we receive in response to our further consultation, we will publish updated versions of the wording of the EMF licence condition, our 'Guidance on EMF Compliance and Enforcement' and our EMF online calculator (as appropriate).

6.7 We will then start the formal licence variation process under Schedule 1 of the WTA to include the new EMF condition in existing licences for all licence classes which authorise radio equipment to transmit at powers higher than 10 Watts EIRP. We will also include the new EMF condition in new licences.

6.8 We have carefully considered our proposed approach to licence variation and have decided it would be possible, and appropriate, to vary all existing licences around the same time rather than phasing this work over a longer period of time as we had proposed in our February 2020 consultation. We provide further detail on the variation process later in this section.

Including the EMF condition in licences

6.9 At the time of publication of this Statement, Ofcom administers 128 different types of wireless telegraphy licences (licence classes), with a total of approximately 380,000 live WTA licences currently issued.

6.10 Some licence classes authorise use of radio equipment solely at powers below the 10 Watts EIRP threshold and we are not planning to include the EMF condition in these licences. These licence classes include, for example, the Shared Access (Low Power) and Maritime Ship Portable radio licences.

6.11 The majority of licence classes include at least some licences which authorise use of equipment transmitting at powers higher than 10 Watts EIRP. Currently there are 110 licence classes which fall into this category, covering a total of approximately 340,000 live licences.

6.12 Not all of the licences in these licence classes currently authorise powers higher than 10 Watts EIRP. However, licensees may be able to apply to vary their licence to allow use of higher power levels in the future.

6.13 To address this risk, and to ensure consistency across all licences classes, we plan to include the new EMF condition in all licences within all licence classes which authorise equipment to transmit at powers higher than 10 Watts EIRP (regardless of whether or not an individual licence currently authorises transmissions at powers higher than 10 Watts EIRP). The way the licence condition is drafted means that licensees will not however be required to comply with the licence condition unless their individual licence authorises radio equipment to transmit at powers higher than 10 Watts EIRP.

6.14 We intend to include the licence condition in licence classes which authorise radio equipment to transmit at powers higher than 10 Watts EIRP as follows:

a) **Annually renewable licences:** We intend to include the licence condition in the new version of any licence issued to a licensee that decides to renew their licence (including as part of any automatic renewal process) following the publication of the final version of our licence condition and 'Guidance on EMF Compliance and Enforcement', which will follow the further consultation.

b) **New fixed term and lifetime licences:** We intend to update our licence templates to include the licence condition in any new fixed term or lifetime licence which is issued to a licensee. We intend to update licence templates for all affected licence classes following the publication of the final version of our licence condition and 'Guidance on EMF Compliance and Enforcement', which will follow the further consultation.

c) **Existing fixed term and lifetime licences:** We intend to include the licence condition by varying existing licences in accordance with the process set out in Schedule 1 of the WTA, as explained in more detail below. The licence variation process will start shortly after the publication of the updated versions of our licence condition and 'Guidance on EMF Compliance and Enforcement', following the further consultation.

Licence variation process

6.15 The licence variation process for varying existing licences is set out in Schedule 1 of the WTA and explained in Annex 1 of this Statement.

6.16 As explained in Annex 1, we can vary licences:

- by a notice in writing given to the holder of the licence; or
- by a general notice applicable to licences of the class to which the licence belongs, published in such way as may be specified in the licence.

6.17 Some licence classes, such as licences issued to mobile network operators, require us to issue a notice in writing to a licensee proposing to vary their licence.

6.18 However, the vast majority of licence classes are subject to general terms and conditions which explain that we can vary the licence by a general notice published on our website.[39] For such licence classes, we intend to use general notices as part of the licence variation process. For the purposes of this licence variation process, we intend to individually contact all licensees in a particular licence class and follow the process set out below:

- We intend to individually contact each licensee via their preferred contact method to explain that we have issued a general notice on our website proposing to vary the relevant licence class; explain at a high level what it is and the process for making individual representations; identify the licences they hold that are affected by our proposal; and provide a link to the relevant page on our website.
- We intend to provide the details of our proposal to vary the relevant licence class in a general notice on our website.
- Licensees will be able to make individual representations in response to our proposal to vary their licence and will have at least one month in which to do so. Whilst it will be open to licensees to provide representations, we note that licensees would have already had the opportunity to comment on our February 2020 consultation as well as our further consultation on the implementation of the decisions we have made in this Statement and our revised 'Guidance on EMF Compliance and Enforcement'. We do not anticipate receiving many representations (if any) as part of the licence variation process. If we do receive any representations, we expect them to focus on specific implementation issues relating to their licence(s) that we have proposed to vary (and not, for example, the policy decisions we have already made in this Statement).
- Within one month of the deadline for representations to be made, we will consider any representations made in response to our general notice proposing to vary the relevant licence class and make our final decision. We will respond to representations received in our final decision which we intend to publish in another general notice on our website.
- We intend to again write to each licensee via their preferred contact method to explain that we have issued a general notice on our website making a final decision in relation to our proposals to vary the relevant licence class; identify the licences they hold that are affected by our decision; explain that their licence, or the general terms and conditions applicable to their licence, has been varied (as appropriate); provide a clean copy of their new licence or terms and conditions applicable to their licence or explain

[39] See, for example, Clause 1.3 of our February 2006 General Licence Conditions Booklet; our April 2010 General Licence Conditions Booklet; Clause 3 of the Amateur Radio Licence Terms and Conditions; Clause 3 of Ship Radio Licence Terms and Conditions.

where a copy can be downloaded; and provide a link to the relevant page(s) on our website.

6.19 As explained above, it is our intention to individually contact all licensees whose licences we propose to vary. However, if licensees have not ensured Ofcom has up-to-date contact details then that may not be possible. Licensees should therefore ensure they have provided Ofcom with up-to-date contact details as soon as possible and in advance of Ofcom commencing the licence variation process for the relevant licence class. In many cases, failure to provide Ofcom with up-to-date contact details will constitute a breach of licence for which Ofcom may take appropriate enforcement action that may lead to the licence being revoked.

6.20 For licence holders who are already registered on our online licensing portal, we recommend accessing this portal to update your contact details.

6.21 If you do not have an online account or do not have access to the portal, please send an email to Spectrum.licensing@ofcom.org.uk with the following information:

- One of: Customer Reference Number ***OR*** Licence Number(s) ***OR*** Call Sign;
- Name;
- Name of organisation (if applicable);
- Address;
- Email Address;
- Main Phone Number.

Timing of licence condition coming into effect

6.22 For new licences, we have decided that the EMF licence condition should be effective from the start date of the licence. Applicants for new licences should therefore take the necessary steps to ensure that their use of radio equipment will comply with the ICNIRP general public limits before they start operating it.

6.23 For existing licences, we recognise that some licensees have multiple licences on multiple sites and it may take some time for these licensees to carry out any checks to ensure that they are compliant with the EMF licence condition.

6.24 As explained in section 5 above, we have therefore decided to allow existing licensees a period of 6 months following the variation of their licence to ensure that their EMF compliance records are in place and up-to-date. During this time however, where Ofcom carries out routine compliance checks and requests access to EMF compliance records for a specific site, licensees will need to provide evidence to Ofcom that the site is compliant with the ICNIRP general public limits within a period of 20 calendar days.

6.25 We would nonetheless encourage licensees who have not already ensured compliance with the ICNIRP general public limits to take any necessary actions now to ensure that they will be compliant with the new condition when it is included in their licence(s).

Licence exemptions

6.26 In our February 2020 consultation we said that where licence exemption regulations are already in place that authorise use of equipment transmitting at powers higher than 10 Watts EIRP, we would separately consult on proposals to amend licence exempt regulations on a case-by-case basis as appropriate.

6.27 We did not receive any comments on this proposed approach. However, as noted in paragraph 5.209, we received one comment from Siae Microelettronica on the practicality of assessing EMF exposure levels in licence exempt bands; we provided our response to this point in paragraphs 5.210 - 5.211.

6.28 We continue to believe that the same general approach should apply to licence exempt equipment, i.e. that, in general, 10 Watts EIRP is an appropriate boundary for determining whether EMF-related conditions are objectively justified and proportionate.

6.29 As we explained in our February 2020 consultation, in many cases, the application of the criteria for exemption will mean that equipment exempt from the requirement to obtain a Wireless Telegraphy Act licence will in any case only be permitted to operate at relatively low powers (i.e. 10 Watts or below). In a small number of cases, however, equipment (e.g. certain types of satellite terminals) may be exempt but is authorised to operate at powers higher than 10 Watts.

6.30 Whilst we have no immediate plans to amend licence exemption regulations with respect to EMF, we consider it would be objectively justifiable and proportionate to amend relevant licence exemption regulations to include a regulation requiring installers and users of the relevant licence exempt equipment to comply with the ICNIRP general public limits. We will separately consult on our specific proposals to amend licence exempt regulations, on a case-by-case basis, as appropriate.

Consultation on implementation of decisions on scope of licence condition and revised 'Guidance on EMF Compliance and Enforcement'

6.31 As explained in the previous section, we have listened to respondents' concerns and have made a number of additions, amendments and clarifications to our licence condition and 'Guidance on EMF Compliance and Enforcement' to address issues raised in consultation responses and to provide additional guidance for licensees.

6.32 In view of this, we think it would be useful to give licensees an opportunity to provide feedback on:

a) the specific drafting changes we have made to the wording of the licence condition to implement our decisions on its scope (in particular on the specific criteria identified in the shared site exemptions); and

b) the changes we have made to our 'Guidance on EMF Compliance and Enforcement'.

6.33 We are therefore conducting a short, focused further consultation on the revised wording of the licence condition and our revised 'Guidance on EMF Compliance and Enforcement' that is included at Annexes 2 and 3. We welcome stakeholders' comments, with a deadline for providing responses of **5pm on 16 November 2020**.

6.34 We have also published a trial version of our EMF calculator on our website alongside this Statement. We would also welcome feedback from stakeholders on this calculator. We expect to publish a finalised version of this calculator around the same time that we publish updated versions of our licence condition and 'Guidance on EMF Compliance and Enforcement' (as appropriate) following further consultation.

A1. Legal framework

A1.1 This section provides an overview of the main UK legislative provisions relevant to wireless telegraphy licensing and licence exemption regulations (including our proposals to vary licences and amend licence exemption regulations). It is not a full statement of all the legal provisions which may be relevant to Ofcom's functions and to wireless telegraphy licensing.

A1.2 The applicable legal framework derives from our duties and powers in the Communications Act 2003 (the 2003 Act) and the Wireless Telegraphy Act 2006 (the 2006 Act).[40]

Ofcom's Principal Duty

A1.3 Section 3 of the 2003 Act states the general duties of Ofcom. Under section 3(1), it is the principal duty of Ofcom in carrying out its functions:

- to further the interests of citizens in relation to communications matters; and
- to further the interests of consumers in relevant markets, where appropriate by promoting competition.

Restrictions in licences

A1.4 Section 9ZA(1) of the 2006 Act explains that "Ofcom may grant a wireless telegraphy licence subject to a limitation on the nature of a station that may be established or used, or the apparatus that may be installed or used, only if the limitations is necessary for a purpose specified in subsection (2)".

A1.5 Section 9ZA(2)(a) identifies one of those purposes as "the protection of public health against electromagnetic fields".

A1.6 Section 9ZA(1) of the 2006 Act therefore allows Ofcom to impose licence conditions to protect the public from electromagnetic fields both in new licences and by varying existing licences.

Licence Variation

Ofcom's powers to vary a licence

A1.7 Ofcom's powers to carry out its spectrum functions are set out in the 2006 Act. Such powers include, under sections 9 and 10, the general power to vary any wireless telegraphy licences. Schedule 1 of the 2006 Act sets out a procedure for the variation of wireless telegraphy licences.

[40] We refer to the Wireless Telegraphy Act 2006 in other sections of this Statement as the WTA.

A1.8 Ofcom has a duty set out in section 9(7) of the 2006 Act to ensure that wireless telegraphy licence conditions are objectively justified in relation to networks and services to which they relate, non-discriminatory, proportionate and transparent. Ofcom considers that this obligation is ongoing and must be assessed against market circumstances and the state of technology development at the time.

A1.9 Ofcom has a broad discretion under paragraph 6 of Schedule 1 of the 2006 Act to vary licences, subject to certain limitations. For example:

- pursuant to paragraph 6A of Schedule 1 of the 2006 Act, any variation of a wireless telegraphy licence must be objectively justifiable;
- any variation of a wireless telegraphy licence to include a restriction in a licence must be necessary for one of the purposes identified in section 9ZA of the 2006 Act; and
- Ofcom must act in accordance with its statutory duties including our general duties under section 3 of the 2003 Act and section 3 of the 2006 Act.

Licence variation procedure

A1.10 Schedule 1 of the 2006 Act sets out a procedure for the variation of wireless telegraphy licences. In accordance with paragraph 7 of Schedule 1 to the Act, if Ofcom proposes to vary a wireless telegraphy licence, it must:

- notify the licensee of the reasons for the proposed variation;
- specify a period of at least one month in which the licensee may make representations; and
- within one month of the end of that period, decide whether or not to vary the licence, notify the licensee of our decision and vary the licence in accordance with our decision.

A1.11 Paragraph 6 of Schedule 1 to the 2006 Act explains that Ofcom can vary a wireless telegraphy licence either:

a) by a notice in writing given to the holder of the licence; or

b) by a general notice applicable to licences of the class to which the licence belongs, published in such way as may be specified in the licence.

Licence Exemptions

A1.12 Under section 8(1) of the 2006 Act, it is unlawful to establish or use a wireless telegraphy station or install or use wireless telegraphy apparatus except under and in accordance with a wireless telegraphy licence granted under the 2006 Act.

A1.13 Under section 8(3) of the 2006 Act, Ofcom may make regulations exempting from the licensing requirements under section 8(1) the establishment, installation or use of wireless telegraphy stations or wireless telegraphy apparatus of such classes or description as may be specified in the regulations, either absolutely or subject to such terms, provisions and limitations as may be specified.

A1.14 Under section 8(4) of the 2006 Act, we must make regulations to exempt equipment if its installation or use is not likely to:

- involve undue interference with wireless telegraphy;
- have an adverse effect on technical quality of service;
- lead to inefficient use of the part of the electromagnetic spectrum available for wireless telegraphy;
- endanger safety of life;
- prejudice the promotion of social, regional or territorial cohesion; or
- prejudice the promotion of cultural and linguistic diversity and media pluralism.

A1.15 This means that, if the installation or use of equipment is not likely to result in any of the above, Ofcom must make regulations to exempt the relevant equipment.

A1.16 In accordance with the requirements of section 8(3B) of the 2006 Act, the terms, provisions and limitations specified in the regulations must be:

- objectively justifiable in relation to the wireless telegraphy stations or wireless telegraphy apparatus to which they relate;
- not such as to discriminate unduly against particular persons or against a particular description of persons;
- proportionate to what they are intended to achieve; and
- transparent in relation to what they are intended to achieve.

A1.17 We make exemption regulations by means of a statutory instrument. Before making any such regulations, we are required by section 122(4) of the 2006 Act to give notice of our proposal to do so. Under section 122(5), the notice must state that we propose to make the regulations in question, set out their general effects, specify an address from which a copy of the proposed regulations or order may be obtained, and specify a time period of at least one month during which any representations with respect to the proposal must be made to us.

A1.18 Section 122(7) of the 2006 Act explains that Ofcom's power to make regulations under section 122 includes a power to make different provision for different cases; to make provision subject to such exemptions and exceptions as Ofcom think fit; and to make such incidental, supplemental, consequential and transitional provision as Ofcom think fit.

Impact Assessment

A1.19 We explained in our February 2020 consultation that our consultation as a whole, including its annexes, comprised an impact assessment as defined in Section 7 of the 2003 Act.

A1.20 Impact assessments provide a valuable way of assessing different options for regulation and showing why the preferred option was chosen. They form part of best practice policy-making.

A1.21 Some respondents argued that our proposed licence condition would have a significant impact on their business or on specific licence types such as amateurs and argued that we did not carried out a proper impact assessment in relation to our proposals.

A1.22 We note the concerns expressed by stakeholders in relation to the potential impact of our licence condition on their business or activities.

A1.23 As highlighted in our February 2020 consultation and previous sections of this Statement, we consider that licensees should already be aware of the ICNIRP Guidelines and be taking EMF exposure into account when conducting their business. It is not our intention to impose on licensees a significant regulatory burden over and above what licensees can already be expected to be doing to ensure their radio equipment complies with the ICNIRP general public limits.

A1.24 Our February 2020 consultation carefully considered whether including a new condition in all spectrum authorisations was objectively justified and proportionate, taking into account the potential impact of our proposals on licensees who are only authorised to transmit radio equipment at 10 Watts or below. We explained in paragraph 4.18 of our February 2020 consultation that we considered including a new condition in spectrum authorisations where there is a low risk of breaching EMF exposure safety levels may result in those affected spending a disproportionate amount of time and resource to understand and put appropriate processes in place to ensure compliance with the ICNIRP general public limits.

A1.25 We have carefully considered respondents' comments in relation to the potential impact of our proposals. Taking into account the intended scope of the new licence condition and the requirements we intend to put on licensees, and for the reasons set out in section 5 of our Statement, our view is that the potential impact of our licence condition is much less burdensome than many respondents believed. In particular, we do not think that the requirement to comply with the ICNIRP general public limits should result in a large additional financial or administrative burden for licensees.

A1.26 As explained in sections 4 and 5 of this Statement, we have however decided to make a number of additions, amendments and clarifications to our licence condition and 'Guidance on EMF Compliance and Enforcement' to clarify the scope of our licence condition and address concerns raised by stakeholders relating to the potential impact of our licence condition.

A1.27 Moreover, in light of the changes we have made to our licence condition and 'Guidance on EMF Compliance and Enforcement', we have explained that we are giving stakeholders an opportunity to provide further feedback on:

a) the specific drafting changes we have made to the wording of the licence condition to implement our decisions on its scope; and

b) the changes we have made to our 'Guidance on EMF Compliance and Enforcement', as well as our new EMF calculator.

A1.28 We intend to continue the dialogue with key stakeholders to address their concerns in relation to the potential impact of the new licence condition.

Equality Impact Assessment

A1.29 Section 149 of the Equality Act 2010 (the 2010 Act) imposes a duty on Ofcom, when carrying out its functions, to have due regard to the need to eliminate discrimination, harassment, victimisation and other prohibited conduct related to the following protected characteristics: age; disability; gender reassignment; marriage and civil partnership; pregnancy and maternity; race; religion or belief; sex and sexual orientation. The 2010 Act also requires Ofcom to have due regard to the need to advance equality of opportunity and foster good relations between persons who share specified protected characteristics and persons who do not.

A1.30 Section 75 of the Northern Ireland Act 1998 (the 1998 Act) also imposes a duty on Ofcom, when carrying out its functions relating to Northern Ireland, to have due regard to the need to promote equality of opportunity and have regard to the desirability of promoting good relations across a range of categories outlined in the 1998 Act. Ofcom's Revised Northern Ireland Equality Scheme explains how we comply with our statutory duties under the 1998 Act.

A1.31 To help us comply with our duties under the 2010 Act and the 1998 Act, we assess the impact of our proposals on persons sharing protected characteristics and in particular whether they may discriminate against such persons or impact on equality of opportunity or good relations.

A1.32 As explained in section 4 of this Statement, some respondents said Ofcom needed to conduct an equality impact assessment to assess the impact our proposals would have on disadvantaged people (such as elderly and disabled amateurs). Other respondents suggested Ofcom should conduct an equality impact assessment to assess the impact of 5G on vulnerable groups.

A1.33 We recognise that our licence condition will apply to all licensees that have a WTA licence issued by Ofcom in licence classes which authorise radio equipment to transmit at powers higher than 10 Watts EIRP. It will apply to all licence types and a broad range of licensees including large companies as well as individuals such as amateur and ship radio licensees.

A1.34 We have carefully considered the potential impact of our proposals on persons sharing protected characteristics. We discuss the comments in relation to the impact of our proposals on amateurs in paragraphs 4.79 - 4.97 above and discuss the comments which urged Ofcom to assess the impact of 5G on vulnerable groups in paragraphs 3.40 to 3.54 above.

A1.35 We do not otherwise consider that our proposals have equality implications under the 2010 Act or the 1998 Act.

A2. EMF licence condition[41]

Definitions applicable to Licence Condition

"dBi" *means the ratio in dB (decibel) when comparing the gain of the antenna to the gain of an isotropic antenna. An isotropic antenna is a theoretical antenna which radiates power uniformly in all directions.*

"EIRP" *means equivalent isotropically radiated power which is the product of the power supplied to an antenna and the absolute or isotropic antenna gain in a given direction relative to an isotropic antenna.*[42]

*"**general public**" means any person who is not: (a) the Licensee, owner, operator or installer of the Relevant Radio Equipment; or (b) acting under a contract of employment or otherwise acting for purposes connected with their trade, business or profession or the performance by them of a public function.*[43]

"ICNIRP Guidelines" *means the version of the Guidelines published by the International Commission on Non-Ionizing Radiation Protection for limiting exposure to electromagnetic fields which are identified in Ofcom's Guidance on EMF Compliance and Enforcement that is in force at the relevant time.*[44]

"Other Radio Equipment" *means wireless telegraphy stations and wireless telegraphy apparatus other than Relevant Radio Equipment (whether or not it is operated by the Licensee or by other users).*

"Relevant Radio Equipment" *means the Radio Equipment that is authorised by this Licence to transmit at powers higher than 10 Watts EIRP.*

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[41] Unless otherwise stated, we intend to include all footnotes in this Annex in the licence condition.
[42] If a licence already contains a definition of EIRP then we do not intend to add any further definition or amend the current definition. In licences which refer to ERP, we intend to make clear the relationship between ERP and EIRP in the definition of EIRP to be added to those licences i.e. in linear units (EIRP (W) = 1.64 x ERP (W); in decibels EIRP (dB) = ERP (dB) + 2.15. *[Footnote not to be included in licence condition]*
[43] There is pre-existing health and safety legislation which already requires employers to protect workers from EMF including the following legislation specifically relating to EMF: The Control of Electromagnetic Fields at Work Regulations 2016, The Control of Electromagnetic Fields at Work Regulations (Northern Ireland) 2016 and The Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Electromagnetic Fields) Regulations 2016.
[44] Ofcom's Guidance on EMF Compliance and Enforcement will initially require the Licensee to comply with the ICNIRP Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz), published in: Health Physics 74(4):494-522, dated April 1998 and available at: https://www.icnirp.org/cms/upload/publications/ICNIRPemfgdl.pdf ("1998 Guidelines"). We note that in March 2020, ICNIRP published an updated version of its Guidelines, referred to as the ICNIRP Guidelines for limiting exposure to electromagnetic fields (100 kHz to 300 GHz), published in: Health Physics 118(5): 483–524; 2020 and available at: https://www.icnirp.org/cms/upload/publications/ICNIRPrfgdl2020.pdf ("2020 Guidelines"). However, the relevant standards explaining the methodology for assessing compliance with the 2020 Guidelines have not been developed. Once work on these standards has progressed sufficiently, Ofcom will consult on updating its Guidance on EMF Compliance and Enforcement to explain that going forward Ofcom will be requiring the Licensee to comply with the 2020 Guidelines. Following consultation, we will publish an updated version of our Guidance on EMF Compliance and Enforcement on our website. We will follow the same process for any subsequent versions of the ICNIRP Guidelines.

"Shared Site Exemption" *means any of the following three situations apply:*

The first situation is that the wireless telegraphy station or wireless telegraphy apparatus is authorised to transmit higher than 10 Watts EIRP but not higher than 100 Watts EIRP.

The second situation is that the electromagnetic field exposure levels produced by the wireless telegraphy station or wireless telegraphy apparatus in any area that is accessible to the general public is no more than 5% of the basic restrictions in the relevant tables for general public exposure identified in the ICNIRP Guidelines.[45]

The third situation is where the wireless telegraphy station or wireless telegraphy apparatus has an antenna gain that is equal to or higher than 29 dBi and has a fixed beam.

"shared site" means a site that is shared by the Licensee and at least one other person for the purposes of establishing, installing, modifying or using wireless telegraphy stations or wireless telegraphy apparatus.

"site" means a physical structure, building, vehicle or moving platform.

Draft Licence Condition[46]

Sites which are not a shared site

1. *The Licensee shall only establish, install, modify or use Relevant Radio Equipment if the electromagnetic field exposure levels produced by the Relevant Radio Equipment are below the basic restrictions*[47] *in the relevant tables for general public exposure identified in the ICNIRP Guidelines*[48] *in any area that is accessible to the general public.*

Sites which are a shared site

2. *In the case of a shared site where the Shared Site Exemption applies to the Relevant Radio Equipment, the Licensee shall comply with paragraph 1 above.*

3. *In the case of a shared site where the Shared Site Exemption does not apply to the Relevant Radio Equipment, the Licensee shall only establish, install, modify or use the Relevant Radio Equipment if the electromagnetic field exposure levels produced by the Relevant Radio Equipment, together with the total electromagnetic field exposure levels produced by all Other Radio Equipment on the same site for which the Licensee can reasonably assume that a Shared Site Exemption does not apply, are below the basic restrictions in the relevant tables for general*

[45] The relevant tables for general public exposure are identified in our Guidance on EMF Compliance and Enforcement.
[46] The precise wording of the licence condition may differ depending on the format and structure of the spectrum licence we intend to vary but the substance of the draft licence condition will be the same. The paragraph numbers in this licence condition have been added for illustrative purposes only. *[Footnote not to be included in licence condition]*
[47] Compliance with the reference levels for general public exposure identified in the ICNIRP Guidelines will ensure compliance with the basic restrictions.
[48] The relevant tables for general public exposure are identified in our Guidance on EMF Compliance and Enforcement.

public exposure identified in the ICNIRP Guidelines[49] in any area that is accessible to the general public.

Emergency Situations

4. The obligations in paragraphs 1, 2 and 3 above will not apply if:

(a) the Relevant Radio Equipment is being used for the purpose of seeking emergency assistance or reporting or responding to an emergency situation including for search and rescue activities and maritime emergency communications; and

(b) compliance with paragraph 1, 2 or 3 above is likely to result in or create an immediate and serious threat to the safety of the public or public health.

Relationship with authorised transmission levels

5. The Licensee shall comply with paragraphs 1, 2 and 3 above notwithstanding the maximum transmission levels identified in [insert reference to relevant clause identifying maximum transmission levels in Licence] of this Licence.

Records

6. *The Licensee shall keep, or shall procure that each of its contractors shall keep, and shall make available to Ofcom on request, records (including the results of any calculations, measurements and/or tests) that demonstrate how it has complied with the basic restrictions in the relevant tables for general public exposure identified in the ICNIRP Guidelines when Relevant Radio Equipment is established, installed, modified or used.*

Ofcom's Guidance on EMF Compliance and Enforcement

7. *When evaluating its compliance with paragraphs 1, 2 and 3 above, the Licensee shall take into account Ofcom's Guidance on EMF Compliance and Enforcement that is in force at the relevant time.*

[49] The relevant tables for general public exposure are identified in our Guidance on EMF Compliance and Enforcement.

A3. Guidance on EMF Compliance and Enforcement

Introduction

A3.1 This document provides guidance on compliance with the basic restrictions for general public exposure to electromagnetic fields (EMF) identified in Tables 4 and 5 of the guidelines published by the International Commission on Non-Ionizing Radiation Protection for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz), published in: Health Physics 74(4):494-522 dated April 1998 ("1998 ICNIRP Guidelines").[50] It applies to:

a) Licensees that are subject to an EMF condition in their spectrum licence(s)[51]; and

b) Installers and users of radio equipment that is exempt from the requirement to obtain a spectrum licence but which is subject to licence exemption regulations that contain an EMF-related condition.

A3.2 We refer to an EMF licence condition and any EMF-related condition we may include in licence exemption regulations in the future collectively as an EMF-related condition. The EMF-related conditions discussed in this guidance concern radio equipment that is authorised to operate at powers higher than 10 Watts EIRP.[52]

A3.3 For the avoidance of doubt, any licence condition that requires licensees to comply with the basic restrictions in the relevant tables in the ICNIRP Guidelines, requires licensees to comply with the basic restrictions identified in Tables 4 and 5 of the 1998 ICNIRP Guidelines. We refer to these limits as the ICNIRP general public limits.

A3.4 This guidance covers the following key areas:

- exposure to the general public;
- assessing compliance and the procedures a licensee, installer or user may use to demonstrate compliance;
- frequency of assessments;
- assessments of radio equipment at temporary or mobile sites;
- records of processes and other information that a licensee, installer or user should keep in order to demonstrate how it is complying with an EMF-related condition;
- how to ensure compliance when a site is shared with other spectrum users;
- the impact of the actions of third parties on compliance;
- site access requirements; and

[50] See: https://www.icnirp.org/cms/upload/publications/ICNIRPemfgdl.pdf.
[51] Spectrum licences are also referred to as Wireless Telegraphy Act licences.
[52] EIRP stands for Equivalent Isotropically Radiated Power. It is a measure of the strongest power emitted in any direction from an antenna. In this document, when we refer to the power transmitted by a piece of radio equipment, we are referring to EIRP unless explicitly stated otherwise.

- the enforcement options available to Ofcom in the event of breach of an EMF-related condition.

Exposure to the general public

A3.5 This guidance concerns public exposure to EMF i.e. exposure to the general public. It does not concern occupational exposure which is governed by pre-existing legislation, and which falls under the remit of the Health and Safety Executive and the Department for Transport.

A3.6 This guidance does not therefore apply to the protection of workers from EMF who should already be protected under health and safety legislation including The Control of Electromagnetic Fields at Work Regulations 2016,[53] The Control of Electromagnetic Fields at Work Regulations (Northern Ireland) 2016 and The Merchant Shipping (Health and Safety at Work) Electromagnetic Fields Regulations 2016.[54]

A3.7 For example, this means that if the only individuals that may potentially be exposed to EMF in breach of the ICNIRP general public limits are window cleaners, roofing contractors, air conditioning engineers, insurance inspectors and antenna riggers, then their employer – whether a site owner, other licensee or otherwise – should already be taking appropriate steps to mitigate the risk of their exposure to EMF in accordance with pre-existing health and safety legislation. In this scenario, licensees, installers and users are not required to take any additional steps to comply with the ICNIRP general public limits.

A3.8 Licensees, installers and users are also not required to comply with the ICNIRP general public limits if only the licensee, owner, installer or user of radio equipment may be exposed to EMF in breach of the ICNIRP general public limits. For example, an amateur radio licensee does not need to comply with our licence condition in respect of their own exposure to EMF.

A3.9 If, however, a licensee, installer or user exposes an individual who is not (i) a worker who should therefore already be protected under pre-existing health and safety legislation; or (ii) the licensee, owner, installer or user of radio equipment, then they will need to ensure they comply with the ICNIRP general public limits. For example, if a licensee exposes family, friends, visitors, neighbours, paying customers or other members of the general public to EMF then they will need to ensure they comply with the ICNIRP general public levels.

A3.10 Licensees, installers and users are also only required to comply with the ICNIRP general public limits if there is a risk that the relevant levels may be exceeded in any publicly accessible area. There may be circumstances where radio equipment – such as an amateur's radio equipment or radio equipment installed on vehicles used for newsgathering and outside broadcasts – is located on a site that is not accessible to the general public and/or set up in a way which means is not possible for the EMF exposure levels from that radio equipment to exceed the ICNIRP general public limits in areas that

[53] Also see Guidance issued by the Health and Safety Executive.
[54] Also see Guidance issued by the Maritime and Coastguard Agency.

are accessible to the general public. In such a scenario, the radio equipment would comply with the ICNIRP general public limits.

Assessing compliance with the ICNIRP general public limits

A3.11 Licensees, installers and users should ensure that their use of radio equipment authorised by their licence or licence exemption regulations complies with the ICNIRP general public limits in any areas that are accessible to the general public.

A3.12 This means that they should not establish, install, modify or use radio equipment on a site unless the EMF levels produced by their radio equipment are below the ICNIRP general public limits in any publicly accessible area.

A3.13 It should be noted that the reference levels for general public exposure identified in Table 7 of the 1998 ICNIRP Guidelines '… *are given for the condition of maximum coupling of the field to the exposed individual, thereby providing maximum protection*'. Therefore, if the reference levels are met this will ensure compliance with the basic restrictions.[55]

A3.14 In order to comply with an EMF-related condition, licensees, installers may need to carry out an EMF assessment. An EMF assessment may include one or more of the following:

- following manufacturers' guidance/instructions;
- desk-top calculations;
- measurements.

A3.15 In cases where manufacturers' guidance/instructions are followed, it is the responsibility of the licensee, installer or user to ensure that these are adequate and appropriate for their particular circumstances.

A3.16 For calculations, the EMF calculator on Ofcom's website may be used. Licensees, installers and users may print out the results of the calculations using this calculator and use these as records for demonstrating compliance with an EMF-related condition.

A3.17 Licensees, installers and users may also conduct calculations using:

- methods in recognised standards such as BS EN 62232:2017, PD IEC TR 62669:2019, BS EN 50385, BS EN 50401, BS EN 50665:2017 and BS EN 62311:2020 as they may be amended;
- other EMF calculators that the licensee, installer or user can demonstrate produce accurate results.

A3.18 Where licensees, installers and users choose to undertake measurements, we recommend that they use the methodology set out in any of the relevant standards listed above.

[55] The 1998 ICNIRP Guidelines indicate that "*if measured values are higher than reference levels, it does not necessarily follow that the basic restrictions have been exceeded, but a more detailed analysis is necessary to assess compliance with the basic restrictions*."

Frequency of assessments

A3.19 We expect licensees, installers and users to reassess compliance (including conducting measurements where they deem it appropriate) when they make any change or addition to a site which is likely to increase the EMF exposure levels in publicly accessible areas above the levels in their most recent EMF assessment.

A3.20 Where licensees are using measurements as part of their compliance assessment, they should consider what measurement interval would be appropriate taking into account the extent to which the EMF exposure levels from a site are likely to change over time, e.g. as a result of changes to traffic loading.

A3.21 It is for licensees, installers and users to determine if and how often they measure EMF levels at a particular site depending on the circumstances at that site. What may be appropriate on one site may not be appropriate on another site.

Assessments of radio equipment at temporary or mobile sites

A3.22 In cases where radio equipment is moved but the operating parameters remain the same, demonstrating compliance may not require a new assessment and may simply involve ensuring that a safe separation distance is maintained between the equipment and members of the public.

A3.23 Licensees, installers and users should be aware of the safe separation distance needed to maintain compliance with the ICNIRP general public limits, and where necessary, undertake a risk assessment and have measures or mitigations in place to ensure that members of the public are not exposed to EMF levels which exceed the ICNIRP general public limits.

A3.24 The ICNIRP general public limits are averaged over a time period (e.g. six minutes for frequencies below 10 GHz). For radio equipment installed on vehicles or moving platforms, the licensee, installer or user will need to consider whether it is likely that the moving platform or vehicle will be stationary close to any publicly accessible area for a sufficient time, in relation to the averaging period, for the limits to be breached.

Processes to ensure compliance with ICNIRP general public limits

A3.25 Ofcom may, from time to time, conduct EMF compliance checks and audits. Licensees, installers and users should therefore be in a position to explain the steps they have taken to ensure compliance with the ICNIRP general public limits and provide records demonstrating their compliance. To this end, they should have appropriate processes in place that will enable them to:

a) Provide evidence that a site is compliant with the ICNIRP general public limits, including by providing, as appropriate:

i) information from manufacturer's guidance/instructions, calculation results, measurement results or other procedures they have carried out; or

ii) information on the location of a site and/or the set-up of radio equipment which means it is not possible for the EMF exposure levels from radio equipment to exceed the ICNIRP general public limits in areas that are accessible to the general public.

b) Explain why they considered the steps they have taken to ensure compliance with the ICNIRP general public limits were appropriate for a particular site.

c) Explain how they ensure they continue to comply with the ICNIRP general public limits, including:

i) when they have made a change to a site which may have resulted in the EMF exposure in publicly accessible areas increasing above the levels in their most recent EMF assessment;

ii) when they become aware that a site may not be complying with the ICNIRP general public limits; and

iii) the frequency at which they carry out calculations, measurements or other procedures at a particular site.

d) Explain what measures are in place to ensure members of the public cannot unknowingly enter areas close to antennas where exposure may exceed the ICNIRP general public limits.

A3.26 All licensees, installers and users should keep records of the date when they made the last change to the site and any EMF assessment that they undertook at that time.

A3.27 Licensees, installers and users will have a period of 6 months after the EMF-related condition comes into effect to ensure that EMF compliance records for all their radio equipment that is subject to the EMF-related condition are in place and up-to-date. During this time, however, where Ofcom carries out a compliance check and requests access to EMF compliance records for a specific site, licensees, installers and users need to provide evidence to Ofcom that the site is compliant with the ICNIRP general public limits within a period of 20 calendar days.

Shared Sites

A3.28 Licensees, installers and users are not required to take into account the EMF exposure levels produced by other radio equipment on a site if one or more of the following shared site exemptions (identified in an EMF-related condition) apply to a licensee's, installer's or user's radio equipment:

a) The radio equipment is authorised to transmit higher than 10 Watts EIRP but not higher than 100 Watts EIRP;

b) The electromagnetic field exposure produced by the radio equipment in any area that is accessible to the general public is no more than 5% of the ICNIRP general public limits;

c) The radio equipment has an antenna gain that is equal to or above 29 dBi and has a fixed beam.

A3.29 If a licensee, installer or user has determined that a shared site exemption applies to its own radio equipment then they should have records in place that demonstrate one or more of the exemptions apply.

A3.30 Licensees, installers and users that are not covered by any of the shared site exemptions above should only establish, install, modify or use radio equipment on a shared site where they have undertaken a compliance assessment to confirm that the total electromagnetic field exposure levels at the shared site will remain below the ICNIRP general public limits in any area that is accessible to the general public.

A3.31 In undertaking this assessment, licensees, installers and users will need to take into account EMF exposure levels produced by both their own equipment and other licensees' equipment on the same site. However, they only need to take account of other licensees' radio equipment on a site that is not (or that they can reasonably assume is not) covered by one or more of the above shared site exemptions.

A3.32 For example, on a shared site occupied by Licensee A and Licensee B:

a) Licensee A **will not** be required to take into account the EMF exposure levels produced by Licensee B's radio equipment where one or more of the above exemptions apply in relation to Licensee A's radio equipment.

b) If none of the above exemptions apply in relation to Licensee A's radio equipment, Licensee A **will be** required to take into account the EMF exposure levels produced by Licensee B's radio equipment **unless** Licensee A can reasonably assume that one or more of the above exemptions apply in relation to Licensee B's radio equipment.

A3.33 Licensees, installers and users on a shared site that are not covered by a shared site exemption should calculate the total EMF exposure levels taking into account other radio equipment on the same site by:

a) taking reasonable steps to obtain relevant information in relation to other radio equipment on shared site; and/or

b) making reasonable assumptions about other radio equipment on a shared site (and making allowances for a degree of uncertainty in making such assumptions).

A3.34 Licensees, installers and users on a shared site that are not covered by a shared site exemption should have records in place that will enable them to explain:

a) how they have determined whether they need to take into account the EMF exposure levels of other radio equipment on a shared site;

b) where the licensee, installer or user can reasonably assume that none of the shared site exemptions apply to other radio equipment on a shared site:

i) what processes they have in place to take account of the EMF exposure levels of that other radio equipment;

ii) the steps they have taken to obtain relevant information about that other radio equipment and/or any reasonable assumptions they have made.

A3.35 For the avoidance of doubt, it is the party who makes the last change to a site (and is not covered by a shared site exemption) that is responsible for ensuring the total EMF exposure levels from the site (i.e. from all radio equipment not covered by a shared site exemption) continue to comply with the basic restrictions. If they are unable to demonstrate the continued compliance of the site, they should not make any changes.

Impact of actions of third parties on compliance

A3.36 Whilst it may not be possible for licensees, installers and users to become aware of all changes near to sites on which it has radio equipment, we expect licensees, installers and users to be mindful of the environment surrounding a site. If they become aware of certain developments around a site which could in the future cause a site to breach the ICNIRP general public limits, we expect licensees to monitor the progress of such developments and engage with relevant authorities and other persons, as considered appropriate to ensure a site remains compliant with the ICNIRP general public limits.

A3.37 In general, if changes around a site are made by third parties that the licensee, installer or user is unaware of and which make the site non-compliant, Ofcom would not expect to immediately take enforcement action. However, once the licensee, installer or user becomes aware of this situation, it should take appropriate action to bring the site back into compliance. Depending on the specific circumstances of the case and the risk of harm to the public, Ofcom may require licensees, installers or users to take immediate action to reduce transmitter power or make other adjustments to their sites until a more permanent solution to the issue can be arranged.

Access to Sites

A3.38 Ofcom has existing powers in spectrum licences that allow Ofcom to have access to radio equipment and to inspect, examine and test it. Ofcom also has powers under the Wireless Telegraphy (Inspection and Restrictions on Use of Exempt Stations and Apparatus) Regulations 2005[56] to require installers and users to permit and facilitate the inspection by Ofcom of certain licence exempt radio equipment.

A3.39 Ofcom may carry out its own EMF measurements from a particular site.

A3.40 Licensees, installers and users should facilitate Ofcom being provided with access to a site in order to carry out its own EMF measurements.

A3.41 Where we do decide to exercise our discretion and undertake EMF measurements at a particular site, the amount of advance notice we will provide to a licensees, installer or user (if any), will depend on the circumstances and what we consider to be appropriate taking all relevant factors into account. We reserve the right to not provide any notice.

[56] See: https://www.legislation.gov.uk/uksi/2005/3481/regulation/4/made

Potential Enforcement Action

A3.42 Ofcom has a range of enforcement options available to it to ensure compliance with a licence condition or licence exemption regulations that require compliance with the ICNIRP general public limits. These include:

a) Engaging with licensees, installers and users to provide information, advice and/or warnings

b) Varying or revoking Wireless Telegraphy Act licences

c) Requiring licensed radio equipment to be temporarily or permanently closed down or requiring the use of certain licence exempt equipment to be ceased or restricted

d) Taking criminal action including:

i) Issuing fixed penalty notices;

ii) Issuing cautions; and

iii) Instigating criminal proceedings

e) Taking regulatory enforcement action for breach of a Wireless Telegraphy Act licence which may result in a financial penalty being imposed on a licensee.

A3.43 Ofcom may decide to pursue more than one of these options in the particular circumstances of the case and as permitted by the relevant legislation.

A3.44 When deciding whether to take enforcement action and what enforcement action may be the most appropriate, Ofcom will consider all relevant factors. These may include the following factors (as appropriate) although other factors may also be relevant:

- the available evidence indicating a licensee, installer or user may be in breach of the ICNIRP general public limits;
- the risk of harm to the public including (a) the location of the relevant site and proximity to busy public spaces; and (b) the age and health status of the public at risk;
- whether any breach may be ongoing;
- the steps a licensee, installer or user has taken to ensure compliance with the ICNIRP general public limits including the processes and records a licensee, installer or user has in place to ensure compliance (and the extent to which they have in place the processes and records identified in this guidance);
- the length of time and time of day during which the ICNIRP general public limits were exceeded;
- whether any breach may be repeated, intentional or particularly flagrant;
- whether the licensee, installer or user has a history of similar breaches or a poor record of compliance;
- whether timely action was taken to bring a site into compliance; and

- the type of licensee, installer or user that we are considering taking enforcement action against.[57]

A3.45 Ofcom intends to take a proportionate and pragmatic approach to compliance and enforcement. It is not our intention to immediately take enforcement action and impose a financial penalty or other sanctions on a licensee, installer or user if a site on which they are present is found to be in breach of the ICNIRP general public levels regardless of the circumstances. Whilst we may consider such action to be appropriate in certain circumstances, our key objective is to foster and facilitate a climate of compliance across all licensees, installers and users caught by an EMF-related condition. Our key objectives are to ensure licensees, installers and users are:

a) taking appropriate steps to ensure they are and remain compliant with the ICNIRP general public levels when installing, using or modifying their radio equipment (which may in some cases require licensees, installers and users to cooperate with other licensees, installers and users on a shared site and/or make reasonable assumptions); and

b) keeping appropriate records which demonstrate the steps they have taken and why they considered them to be appropriate in the circumstances.

A3.46 We are less likely to take enforcement action against a licensee, installer or user that can demonstrate it has taken such appropriate steps.

Variation or revocation of licence

A3.47 Ofcom has the power to vary or revoke a spectrum licence in accordance with the procedure set out in Schedule 1 of the Wireless Telegraphy Act (the 2006 Act). Variation or revocation of a licence may ultimately require radio equipment to be temporarily or permanently closed down.

A3.48 If Ofcom identifies "*an immediate risk of … a serious threat to the safety of the public [or] to public health*"[58] it can take urgent action to vary or revoke a licence.

Restricting use of licence exempt equipment

A3.49 Ofcom has the power to require an installer or user of certain radio equipment that is exempt from the requirement to obtain a licence but which is subject to licence exemption regulations, to cease or restrict its use of the licence exempt equipment.[59]

[57] For example, it would not be appropriate to take regulatory action against a licensee that is an individual. This is because individuals do not have any annual turnover within the meaning of sections 43 and 44 of the Wireless Telegraphy Act 2006 which could be used as the basis for imposing a financial penalty.
[58] See paragraph 7(7) of Schedule 1 of the 2006 Act.
[59] See Regulation 4 of the Wireless Telegraphy (Inspection and Restrictions on Use of Exempt Stations and Apparatus) Regulations 2005.

Criminal offences

A3.50 Breach of a spectrum licence or licence exemption regulations can constitute a criminal offence. In the event a licensee has its licence revoked, use of radio equipment without a licence is also a criminal offence.[60]

A3.51 Ofcom has the power to issue fixed penalty notices if it has reason to believe that a person has committed a breach of the 2006 Act that constitutes a criminal offence.[61]

A3.52 Ofcom can also pursue a prosecution for breach of licence or licence exemption regulations. In England and Wales, the decision to proceed with a court case rests with Ofcom. We decide whether to prosecute after considering the strength of the evidence and the guidance set down by the Director of Public Prosecutions in the Code for Crown Prosecutors. Ofcom may decide to pursue criminal action if, for example, there is evidence *"of an immediate risk of … a serious threat to the safety of the public [or] to public health*".[62]

A3.53 No prosecution may go ahead unless the prosecutor considers there is sufficient evidence to provide a realistic prospect of conviction and that a prosecution would be in the public interest.

A3.54 The Code for Crown Prosecutors requires that the decision to prosecute is kept under continuous review so that any new facts or circumstances, in support of or undermining the prosecution's case, are taken into account in the decision to continue or terminate the proceedings. Where the circumstances warrant it and the evidence to support a case is available, Ofcom may prosecute without prior warning or recourse to alternative sanctions.

A3.55 In Scotland, the Procurator Fiscal decides whether to bring a prosecution. This may be based on a recommendation by Ofcom. Ofcom decides whether to report a case to the Procurator Fiscal with a view to prosecution. Before prosecutions can be instituted, the Procurator Fiscal will need to be satisfied that there is sufficient evidence and that prosecution is in the public interest. Therefore, in Scotland the decision to prosecute is made by the prosecutor rather than by Ofcom although Ofcom's views will typically be taken into account.

A3.56 If a case is taken to court, penalties for breach of a spectrum licence can include an unlimited fine and/or prison sentence of up to 51 weeks in England and Wales (or 6 months in Scotland and Northern Ireland).[63]

Regulatory enforcement

A3.57 Ofcom may also consider taking regulatory enforcement action for breach of a Wireless Telegraphy Act licence, including where there is evidence to suggest a licensee may not be

[60] See Sections 8 and 35 of the 2006 Act.
[61] See paragraphs 1 and 3 of Schedule 4 of the 2006 Act.
[62] See section 41(4) of the 2006 Act. The procedure for prosecutions is set out in sections 39 and 41 of the 2006 Act.
[63] See Sections 8 and 35(5) and (6) of the 2006 Act.

complying with an EMF-related condition.[64] This may result in Ofcom opening an investigation which may result in a financial penalty being imposed on a licensee.

A3.58 If Ofcom decides to open a regulatory investigation and take enforcement action against a licensee, we will follow the procedures set out in our Enforcement Guidelines for regulatory investigations.[65]

A3.59 Ofcom has the power to fine a licensee up to 10% of its relevant gross revenue if Ofcom determines it is in breach of a condition of its licence.[66]

A3.60 When deciding whether to impose a financial penalty in a specific case and if so, what level of penalty would be appropriate and proportionate, Ofcom will have regard to its Penalty Guidelines.[67] Ofcom will also consider the factors identified in paragraph A3.44 above (as appropriate) and any other relevant factors.

A3.61 Ofcom also has the power to require a licensee to take steps to remedy its breach by ensuring its radio equipment complies with the ICNIRP general public limits or by bringing a site into compliance which may include requiring radio equipment to be closed down.

[64] See Sections 39 and 42-44 of the 2006 Act.
[65] See: https://www.ofcom.org.uk/__data/assets/pdf_file/0015/102516/Enforcement-guidelines-for-regulatory-investigations.pdf.
[66] See Sections 42(1), 43(2A) and 44(3) of the 2006 Act.
[67] See: https://www.ofcom.org.uk/about-ofcom/policies-and-guidelines/penalty-guidelines