Your response

Scope of applicability of this Ofcom Proposal to set the context for my specific responses

The very comprehensive scope of this proposed action by Ofcom (affecting many long-established RF EMF radiation emitters) is somewhat superfluous, when - as everyone is aware- the very real, and pressing, issue is in the area of ever-growing public exposure to RF EMFs from terrestrial mobile network operators who are still rapidly growing, and 'densifying' their network coverage, not only of 5G , but in many cases also of 2G, 3G,and 4G.

For example most terrestrial and satellite point-to-point microwave systems are specifically engineered to avoid obstructions and do not widely 'broadcast' the RF radiation into the general public realm, it being instead in a concentrated, precisely-directed, beam. The same applies to many other forms of radio transmission (eg. temporary event TV studio 'contribution' feeds; satellite earth stations, shipping wireless installations, amateur radio etc.).

The following provides the background context for my specific answers to your 3 Questions:

1) Main focus needs to be on the rapidly-growing mobile network base-stations

The biggest, and still rapidly-growing, issue in terms of public exposure to RF EMF radiation is unquestionably that caused by the roll-out of ever more mobile radio base stations, including increasingly, small cells, many of which are, by design, in relatively close proximity to publicly-accessible areas.

Through examination of recent actual local authority Planning Applications for new mobile network base station sites, it appears that most new mobile base stations that are now being rolled-out seem to be transmitting not just on the new 5G frequency bands but also, almost invariably, provide a large level of retrospective coverage 'in-fill' in the 2G, 3G and 4G frequency bands, using many additional transmitters and multiband antennae.

2) Why so much additional 2G/3G/4G coverage infill by mobile operators at new 5G sites?

It is not clear why this huge level of further coverage in-fill for the more legacy 2G/3G/4G systems is required, given that these systems will have been in satisfactory operation from existing base stations for a large number of years, and that the advent of 5G coverage will gradually enable off-loading of traffic from those more legacy networks?

If network traffic capacity is the issue, then surely the 5G NR network will be capturing almost all the growth in data usage, and thereby to some extent offloading the 3G and 4G networks of data traffic, and the 2G networks of voice traffic. This being the case, why cannot Ofcom issue guidance that any further in-fill of the legacy 2G and 3G bands, in particular, from new base station suites, is to be strongly deprecated?

3) Consequences of proliferation of 'in-fill' transmitters for 2G/3G/4G at new 5G sites

However, an undesirable consequence of this further proliferation of transmitters in these 'legacy' mobile bands is that for RF EMF assessment, each new mobile base station needs to be assessed in each band that it is transmitting in (ie. not just 5G), and then an aggregate view of the total transmitted RF EMF radiation into each sector (usually 120 degrees of rotation) also needs to be determined by the operator, summing the separate RF transmissions in the 4 separate bands to produce a composite view of the radiation pattern and strength.

4) Consequences of pro-active 'mast-sharing' and/or 'site-sharing' by mobile operators

The problem is further compounded when, as a result of 'mast-sharing' (which Ofcom and DCMS rightly strongly encourage, for reasons of economics and logistics and minimisation of visual intrusion), two mobile operators on the same new mast /site can each install transmitters and antennae covering the 2G/3G/4G, as well as 5G, bands.

In the case of 'mast-sharing' there is consequently a need for a further aggregate measure to be documented of the sums of the RF EMF radiation patterns from each of the operators own installations across each of the 2G/3G/4G/5G frequency bands in use at that site, in each sector. It is not clear who, in such an increasingly common case, should provide this further documented cross-operator aggregate view of RF EMF radiation?

One pragmatic, and fully-supported approach, as being proposed by Ofcom in Section A3.35 (page 96), is to say that the operator who last augmented/changed their installation should undertake this holistic review, based on open provision of the relevant operator-specific transmitter/antenna information from the other operator.

5) Operators of Shared and small-cell mobile network base-station sites must <u>not</u> be able to claim the Ofcom-proposed 'Shared Site Exemption'

Noting all of the above, the Ofcom-proposed formal incorporation of the proof of compliance of the power density limits in the ICNIRP Guidelines for the protection of the general public, into spectrum Licence conditions, is strongly welcomed as an excellent first step.

However, the Ofcom - proposed 'Shared Site Exemption' (draft Licence Conditions 1-3 on Pg. 88 and para. A3.28 on pg 94) must be clearly defined so as **not** to enable exemption of the increasingly general and common case of shared mobile network base stations both new and existing. It is not clear if the 'Shared Site Exemption' is currently so-defined, based on the following analysis:

For the reasons already described above, many new '5G' base stations are in fact highly-complex sites potentially featuring as many as 8 transmitters beaming into each of 3 sectors, so 24 transmitters in total (ie. 2G/3G/4G/5G transmitters for each of the two operators, with 3 sectors each).

It is understood that each of these transmitters deployed per band, per sector, per operator, could typically have a transmit power of 80W (40W per polarisation). So a single new shared mobile operator site could be radiating a total power of 24 x 80W (= 1920W), even though each individual transmitter is only 40W or 80W and therefore might arguably (if viewed narrowly) fall within one of the exemption definitions, either a) and/ or b). See below:

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;

With reference to a), it could be argued by those seeking to exempt mobile base stations from coverage by this regulation that, as 'the radio equipment' (typically a Huawei RRU and/or an Ericsson ERS) is only 40W or 80W individually, then it should be exempt. However, of course 24 such 'radio equipments' broadcasting from a single shared site will radiate a total of 1920W so in aggregate they are clearly within scope of the proposed new licence conditions, and must never be exempted through narrow, legalistic, arguments.

With reference to b), it is the cumulative effect of two operators each having separate 80W transmitters driving multiband antennae beaming into each sector for each of 2G/3G/4G and 5G services that could, in aggregate, approach the full ICNIRP limits for publicly-accessible areas. This aggregation effect must absolutely be taken account of in not permitting any exemption allegedly justified by the fact that one individual 80W transmitter may, on its own, account for 'no more than 5% of the ICNIRP general public limits'.

The same must also apply to 5G small-cell sites whether in the 3.4GHz or 26GHz bands. These should NOT be exempt from this regulation even if their individual transmit power is less than 10W, because of their proximity to the general public typically on Local Authority 'street furniture', and the very large numbers of small cells that 5G may cause to be rolled-out in urban areas.

6) Planning Applications must include aggregate radiation pattern diagrams (in plan and elevation) clearly showing the Public Exclusion Zone and the Occupational Exclusion Zone, in addition to the relatively worthless, self-declared, 'ICNIRP Certificate', which is all that is currently required.

Currently, Planning Applications to Local Councils on behalf of mobile operators for new base stations (or for base station enhancements) simply need to provide a self-declared 'ICNIRP Certificate'.

This contains no useful information to any resident or Local Authority concerning the beam shapes in each direction or the size and location of the 'Public Exclusion Zone' or the ‘Occupational Exclusion Zone'- all of which are vital health safety information.

The 'Stewart Report' of many years ago called for this information to be routinely provided with every base station planning application. Most negligently, even 20 years later, Ofcom has still not insisted that such be provided. Now is indeed the time to make this mandatory.

(The Stewart Report: Independent Expert Group on Mobile Phones – 2000:

https://webarchive.nationalarchives.gov.uk/20100910162959/http://www.iegmp.org.uk/report/text.htm)

See paras. 130 to 143 in particular, regarding the Stewart Report proposals on Planning Issues. Also, the following 2 paras. of the Stewart Report specifically address Exclusion Zones:

Exclusion Zones:

1.44 We recommend the establishment of clearly defined physical exclusion zones around base station antennas, which delineate areas within which exposure guidelines may be exceeded (paragraphs 6.49–6.52). The incorporation of exclusion zones should be part of the template of planning protocols that we advocate.

1.45 Each exclusion zone should be defined by a physical barrier and a readily identifiable nationally agreed sign with a logo. This should inform the public and workers that inside the exclusion zone there might be RF emissions which exceed national guidelines. We recommend that the design of the logo should be taken forward by the British Standards Institute and implemented within 12 months (paragraphs 6.49–6.52).

1.46 We recommend that warning signs should be incorporated into microcell and picocell transmitters to indicate they should not be opened when in use (paragraph 6.52).

7) RF EMF Exclusion Zones: applicability to other professions unrelated to radio installation and maintenance- responsibility to be taken by MNOs or their agents

A final observation on Exclusion Zones: For employees of the mobile network operator or their installation/rigging/maintenance agents these are indeed covered by the HSE-administered occupational exclusion zone policies managed under the HSAW Acts.

However, workers in many other professions that may need to routinely access areas within the Workers/Occupational RF/EMF Exclusion Zones should be regarded as members of the public, as they have nothing to do with the mobile radio installations and there is no reason why they should be encumbered with detailed radio safety knowledge as part of these HSAW regulations.

Rather, the mobile operators should be required to reduce transmitter power whenever workers in other professions (eg. lift/air-conditioning equipment maintenance, window cleaners, building inspectors, builders/roofers, insurance assessors etc.) need to undertake work within the 'Workers' Exclusion Zone.

Question	Your response
Question 1: Please provide feedback on the additions, amendments and clarifications we have made to the wording of the licence condition to implement our decisions on the scope of the licence condition in our October 2020 Statement, giving reasons for your response.	Confidential? – N Please see my comments above regarding ensuring that mobile network operators should not, under any circumstances, be able to claim 'Shared Site Exemption', given the substantial radiated power aggregation effects of multiple transmitters on multiple bands for multiple operators on a single site. (Section 5 in the introductory text above). The definitions of the 'Shared Site Exemption' must be tightly drafted with exclusions as necessary to ensure that ALL mobile network operator sites (whether large shared sites or small-cell sites) are in all cases fully subject to these new Licence Conditions.
Question 2: Please provide feedback on the additions and clarifications to our 'Guidance on EMF Compliance and Enforcement', giving reasons for your response.	Confidential? – N As above, in the answer to Q1, and in the general introductory text.

	Also please seriously consider adopting the Stewart Report proposals regarding up-front disclosure of much more information relating to RF EMF radiation aspects in support of each new Planning Application for a new base station site or site expansion. The self-declared 'ICNIRP Certificate' is woefully inadequate in terms of allowing the public and the Local Authority to assess the location and size of 'Public Exclusion Zones' and 'Occupational Exclusion Zones'. (See Section 5 in the introductory text above) Detailed diagrams (in plan and elevation) of the predicted radiated power patterns from all transmitters/antennae on an existing , or proposed new, site must be provided alongside, and in support of, the planning application. This will also engender confidence amongst the general public that nothing is being concealed. (See Section 6 in the introductory text above) Current base station planning applications from all 4 operators driven by 5G roll-out, (but also inexplicably often proposing massive 'in-filling' of coverage for 2G/3G and 4G signals from mature networks), provide almost nothing but self-declared platitudes (or copy and pasted flawed Public Health England platitudes) in terms of their RF EMF radiation strength and pattern and generic 'safety'. Finally, the definition of Occupational/Workers Exclusion zones should be narrowed to refer specifically to radio industry operatives including riggers, installers, commissioning/testing and maintenance technicians. Workers in all other unrelated occupations (eg. window cleaners, builders, roofers, lift/airconditioning engineers, surveyors, architects, insurance inspectors etc.) should be regarded as the General Public and be entitled to undertake their necessary tasks in RF EMF levels complying with the Public Exclusion Zones, **not** the 'Occupational' Exclusion Zones. The mobile network operators must be easily contactable to allow the power to be reduced whenever such workers wish to access the vicinity of the antennae on a site for their work-related reasons. (See Section 6 above).

Question 3: Please provide feedback on the trial version of our EMF calculator, giving reasons for your response.	Confidential? – N This may be a satisfactory and sufficient theoretical tool for many small, simple installations with just a single transmitter and antenna. However, it must **not** be relied upon for the very complex scenarios being routinely introduced by mobile network operators at shared sites radiating in all 4 bands (2G/3G/4G/5G) from 2 or more operators, and in some cases also using MIMO and beam-steering for 4G and 5G. Nor must it be relied upon in the case of small cells for 4G or 5G whether in the 3.4GHZ or 26GHz bands. The use of MIMO antennae potentially with beam steering introduces a huge amount of complexity in assessing radiation patterns that this simple calculator cannot satisfactorily address. Small cell antennae are located in very close proximity to the general public and need specific, per-site attention to designing their precise radiation pattern in order to avoid breaching ICNIRP power density limits in very publicly-accessible areas.