
UK preparations for the World Radiocommunication Conference 2023 (WRC-23)

UK provisional views and positions for WRC-23

CALL FOR INPUT:

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Contents

Section

1. Overview	3
2. Introduction	8
3. The WRC-23 agenda	11
4. Wireless Broadband Connectivity	15
5. Broadcast TV & Support Applications	24
6. Satellites and Earth Station Connectivity	28
7. Transportation Matters	37
8. Science	47
9. Standing Agenda Items & Ad Hoc Issues	54

Annex

A1. Responding to this call for input	60
A2. Ofcom's consultation principles	63
A3. Consultation coversheet	64
A4. Questions	65
A5. WRC-23 Agenda and UK priorities	70
A6. Ofcom Contacts for WRC-23 Agenda Items	76
A7. Timeline of key events	77
A8. Glossary of terms	78

1. Overview

- 1.1 The use of radio spectrum, and its role in today's technology focused society, has never been so important. Most of us make direct use of spectrum in our everyday lives when we use mobile/smart phones, laptops, tablets and when we watch television (which may receive signals from transmitters on the ground or from satellites that orbit the earth). Outside these more familiar examples, radio spectrum is also used for many other purposes including for aviation, maritime and by the scientific community for the detection of emissions from space (radio astronomy) or from the earth itself.
- 1.2 To assist this usage, frequency band harmonisation plays a pivotal role. The most important global spectrum harmonisation activities are undertaken at World Radiocommunication Conferences (WRCs)¹, of the International Telecommunication Union (ITU)². These Conferences are held approximately every four years and take key decisions concerning the identification and international harmonisation of spectrum bands. Ofcom represents the UK at WRCs.
- 1.3 The next WRC will take place between 20 November - 15 December 2023. As with previous WRCs it will discuss and revise the Radio Regulations³, an international treaty of the ITU which contains rules and coordination arrangements covering all the different uses of spectrum. Thousands of engineers, diplomats and business executives from up to 193 countries will be taking part. The decisions reached will set the framework for how spectrum is used, throughout the world, for the next few years and beyond. It is therefore important that the UK's voice is heard to ensure that the future wireless needs of UK consumers and businesses are appropriately taken into account in the development of the international frameworks.
- 1.4 This call for input invites stakeholders to help us, as representatives of the UK, to play an important part in shaping this international framework. It sets out the key issues to be discussed at WRC-23 and explains why they matter to the UK. The document spells out our early thinking, where known, on the outcomes we'd like to achieve. It also explains the engagement process which Ofcom manages in order to allow stakeholders to feed into the development of UK positions for the WRC.
- 1.5 The issues for discussion at WRC-23 include the balance between broadcasting TV and mobile broadband usage in the UHF band, as well as the question of whether further spectrum for mobile broadband is required to enhance the regional development of the future generations of mobile technology. In addition, decisions will be taken relating to international regulatory provisions for space weather sensing, sub orbital vehicles and non-geostationary satellite constellations. Decisions taken at the conference on these and a

¹ <https://www.itu.int/en/ITU-R/conferences/wrc/Pages/default.aspx>

² The International Telecommunication Union (ITU) is the United Nations specialized agency for information and communication technologies – ICTs. <https://www.itu.int/en/Pages/default.aspx>

³ The Radio Regulations, Edition of 2020 <http://handle.itu.int/11.1002/pub/814b0c44-en>

wide range of other matters, which are the culmination of 4 years of preparatory work and discussions, could affect thousands of businesses and consumers in the UK.

- 1.6 It is Ofcom's role to lead the UK delegation at the WRC and in the relevant preparatory work, including the various regional preparatory meetings. Ofcom undertakes this role in accordance with a government direction and we liaise closely with Government throughout the preparatory phases of the WRC process. Part of that process will include Ofcom confirming with Government the positions we will take into the WRC across the agenda items, to ensure consistency and coherency with UK policy. We also commit the UK to the outputs of the conference by signing the Final Acts to amend the ITU Radio Regulations.

Stakeholder views

- 1.7 The views of stakeholders who currently use, or plan to use, spectrum are vital in informing the UK's position. Ofcom engages regularly with companies with an interest in the items relevant to WRCs, both on an individual and multilateral basis. We aim to ensure that stakeholders are kept informed of our overall strategic approach and emerging UK views - and that they can bring ideas and proposals into the WRC preparatory process. This call for input is part of this engagement, and we are particularly interested in hearing from those stakeholders not already involved in the WRC preparatory process.
- 1.8 In addition to seeking views on the development of UK positions on the individual agenda items, we also hope that this call for input helps to draw out linkages between different agenda items which may not be apparent otherwise.

The Agenda of WRC-23

- 1.9 The issues to be discussed at WRC-23 are wide and varied and can go into a level of technical detail that is not always easy to follow. The purpose of this document is to explain more simply the process and UK preparations for WRC and the objectives behind the various agenda items. The full agenda for WRC-23 is shown in Annex 5.
- 1.10 There are two main types of WRC spectrum related decisions:
- Those which support services which are inherently international (for example satellites, maritime and aeronautical), where the nature of the service means that a consistent approach is required across national boundaries; and
 - Those where there is more scope for decisions to be taken at a national level. However, even in these cases there may be significant advantages in aligning with international frameworks. These include international harmonisation to support economies of scale and the need to prevent harmful cross-border interference.
- 1.11 One of the highest profile issues being considered at WRC-23 concerns the future of the **UHF band currently used by digital television**. The WRC in 2015 (WRC-15) agreed to allocate parts of the 470-694 MHz band, on a co-primary basis, to mobile including

identification for IMT (International Mobile Telecommunications⁴) in several areas around the world. Those discussions did not make changes to the region which encompasses Europe, Africa and the Middle East, but the agreement in 2015 was that it be addressed at the conference in 2023.

- 1.12 Other items of interest are related to several agenda items that look to provide allocations to **spectrum for mobile broadband**, predominantly on a regional basis. This includes a variety of bands from 3.3 up to 10.5 GHz. Some of these would be for global allocation whilst others would be limited to allocation on a regional basis only. We reported on some of these bands in our discussion paper “*Mobile networks and spectrum - Meeting future demand for mobile data*” (February 2022)⁵. In that document we reflected that the band 6425-7125 MHz (‘the upper 6 GHz band’) is being promoted by the mobile industry primarily as a means of enabling additional capacity for 5G in towns and cities. The Wi-Fi industry is also arguing that it requires future use of this band, and several international markets have made this spectrum available for license exempt Wi-Fi type use.
- 1.13 A third important issue for the UK, relates to providing regulatory certainty for **Space Weather Sensors**⁶ at an international level. Currently space weather sensors operate under allocations for other services and have no recognition in the Radio Regulations (RR) for their spectrum use. A wide range of space weather sensors currently operate relatively free of harmful interference. However, the radio interference environment could change as a result of changes made to the Radio Regulations at WRCs (i.e., new allocations etc.) and this could put space weather spectrum use at risk.
- 1.14 The UK has significant interests in space weather and our UK Meteorological Office operate one of three space weather prediction centres around the globe (the other two being in the USA and Australia). Space weather is recognised as a significant potential threat by the UK Government and was added to the National Risk Register (NRR) of Civil Emergencies in 2011.
- 1.15 Another mobile broadband related item is looking at the **protection of stations of the aeronautical and maritime mobile services located in international airspace and waters** from other stations located within national territories. This relates to an issue first discussed at WRC-15 where some countries wished to see international recognition for IMT usage in the band 4.8-4.99 GHz.
- 1.16 The conference in 2015 (WRC-15) agreed to add footnotes to the Radio Regulations which formally recognised IMT identification in the 4.8 – 4.99 GHz band in a limited number of countries. The number of countries in these footnotes was increased at WRC-19 to around 40. One of these footnotes required countries to protect aeronautical and maritime

⁴ International Mobile Telecommunications: the ITU term that encompasses 3G, 4G and 5G (IMT 2020) wireless broadband systems/services. Identifying a band for IMT is a recognition that the band is acknowledged as one that can be used by IMT technologies as outlined in several ITU Reports and Recommendations. Those IMT identified bands are then used by technical standards bodies for the purposes of defining the technical capabilities of mobile services.

⁵ https://www.ofcom.org.uk/data/assets/pdf_file/0017/232082/mobile-spectrum-demand-discussion-paper.pdf

⁶ Space Weather Sensor systems, using radio spectrum, are used for detection of solar activity and the impact of solar activity on the Earth, its atmosphere and its geospace. See <https://www.itu.int/pub/R-REP-RS.2456>

stations through a documented power flux density requirement. This protection requirement remained unchanged at WRC-19. This issue is now being considered under a substantive agenda item at WRC-23.

1.17 Apart from these four priority issues for the UK, other important issues that will be considered at WRC-23 include:

- **Regulatory conditions for Sub Orbital Vehicles⁷ (SOV):** This topic was discussed at WRC-19, however no formal agreements were made at that time, predominately as more information was becoming available. The main issue being addressed concerns under which internationally recognised radio service, or services, an SOV operates. New and specific frequency allocations for SOV have, so far, not been considered necessary under this item, as the focus has been around the categorisation of these vehicles for further consideration by other bodies and those regulatory regimes (i.e., aviation and space).
- **Use of fixed-satellite service (FSS) networks to control unmanned aircraft:** This item has been a topic at several previous WRCs. Whilst other provisions have been agreed to facilitate unmanned aircraft (UA) operation, within the international aviation framework, this single topic has not seen agreement. This non-agreement stems from the fact that spectrum used by aviation, internationally, has special recognition in the radio regulations and traditionally only shares the spectrum with other internationally recognised aviation services. FSS allocations, in several cases, share spectrum with other services but lack an aviation allocation. However, we hold the view that, whilst a specific aviation reference in an allocation in the Radio Regulations might provide regulatory assurance, technical assurance can also be achieved through a diversity of networks and systems (e.g., redundancy in FSS radio links to unmanned aircraft).
- **Actions to support the modernisation of the Global Maritime Distress and Safety System & e navigation:** This agenda item concerns possible regulatory actions, taking into consideration the activities, information and requirements provided by the International Maritime Organisation (IMO), to provide regulatory recognition for modernisation of the Global Maritime Distress and Safety Service. This item has been discussed at previous conferences, with WRC-19 seeing the accommodation of the technical parameters of the Iridium satellite platform into the GMDSS sections of the Radio Regulations. There does not appear to be a need to update these regulations relating to the e-navigation concept, but we will continue to monitor developments in the period leading up to the WRC.
- **Satellite earth stations on ships and planes:** Two agenda items, to be concluded upon at WRC-23, are looking to provide international regulatory provisions to give recognition for the use of fixed satellite terminals from aircraft and vessels. One looks to recognise use to geo-stationary satellites in the bands 12.75-13.25 GHz (Earth-to-space) and 10.7-12.75 GHz (space-to-Earth); while the other addresses use to non-

⁷ Sub Orbital Flights can be defined as the intentional flight of a vehicle expected to reach the upper atmosphere with a portion of its flight path that may occur in space but without completing a full orbit around the Earth before returning to Earth.

geostationary satellites in the bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space). The primary consideration has been to assess whether this predominately mobile use of terminals requires regulatory provisions to protect the use of the same bands by terrestrial services.

- **Satellite coordination & recording procedures and processes:** The ITU plays a key role in the global management of satellite orbits and facilitates the complex process of assessing a satellite's technical compatibility with other networks. Each WRC considers these processes to consider any proposals for improvements to the coordination mechanisms and provide clarity and certainty for countries and operators. One of the issues that will be discussed at WRC-23 is how the reported deployment of non-geostationary satellite networks will work in practice. This follows on from agreements at WRC-19 concerning the milestones that certain large constellation non-geostationary satellite networks need to meet to retain their status in the satellite filing process.

Next steps

- 1.18 We are keen to hear from all stakeholders with an interest in any of the issues to be discussed at the next WRC. This call for input complements our programme of on-going stakeholder engagement, which includes active discussions with stakeholders in dedicated working groups, roundtables, workshops, and bilateral meetings.
- 1.19 The closing date for responses is 29th September 2022. We will consider these as we refine our thinking, bearing in mind that the final UK positions will only be adopted, a few weeks before the conference. We will, of course, continue to actively engage with all stakeholders over the coming months and in the run-up to the start of the conference.

2. Introduction

Ofcom's WRC engagement strategy

- 2.1 Ofcom is inviting comments from industry and interested stakeholders to ensure that the development of UK positions for the next WRC consider the views and concerns of all UK stakeholders. We engage regularly with industry and others, both bilaterally and on a multilateral basis. We have set up five separate working groups that are open to all UK stakeholders⁸ having a relevant interest in international spectrum matters. These Working Groups allow for an open debate to help inform the development of UK positions on individual issues which can then be taken forward into the European (CEPT) and international (ITU) discussions.
- 2.2 It is worth reflecting that the progression of discussions and issues at both a European and International level have been affected by the restrictions imposed due to the pandemic. However there remains a desire to continue to consider all the agreed agenda items at WRC-23.
- 2.3 For each of the WRC-23 Agenda Items, we have appointed a UK coordinator and have assigned each agenda item to one of the five UK working groups. Each co-ordinator is responsible for reviewing the technical work and for seeking stakeholder input through a combination of face-to-face meetings, correspondence and participation in the relevant working group. UK coordinators will seek to develop draft UK positions for each of the agenda items for which they are responsible. In doing this, they will endeavour to communicate openly and clearly to stakeholders the rationale for the UK position and explain how we have considered and balanced the various concerns that have been raised. An Ofcom contact point, for each of the five UK Working Groups, is shown at Annex 6.

The Radio Regulations and why they matter

- 2.4 The international framework for the management of the radio frequency spectrum is documented in the International Radio Regulations (RR)⁹ as published and maintained by the International Telecommunication Union (a specialised agency of the United Nations). These are part of an international treaty and determine the rights and obligations placed upon national administrations around the use of spectrum in their country relative to spectrum use in all other countries. Alongside this the RR also recognise the sovereign right of countries to manage and use spectrum, within their borders, the way they wish, subject to not causing interference to other countries' use. The RR are produced and updated by the World Radiocommunication Conference (WRC), which is held approximately every four years, consisting of participants from up to 193 countries.

⁸ To reflect an overall considered UK position, for WRC-23, a UK stakeholder is one considered to have a significant and relevant UK presence.

⁹ <http://www.itu.int/pub/R-REG-RR/en>

- 2.5 The RR have, for many years, determined the pattern of spectrum use internationally. In many cases, it is necessary to do this at international level in order to;
- avoid or keep international interference to a minimum;
 - facilitate mobility and harmonisation through the identification of global bands (especially important for terminal equipment such as mobile phones);
 - derive benefits from international markets for equipment with resulting economies of scale for operators and users; and
 - recognise the international nature and interference management aspects of some radio services (for example, aeronautical, maritime and satellite services all require spectrum to be available seamlessly across national boundaries).
- 2.6 The RR contain a table of frequency allocations which subdivides the radio spectrum from 8.3 kHz to 275 GHz into a large number of frequency bands, each being allocated to one or more defined radiocommunication services (such as broadcasting, mobile, fixed and various space services). The RR also contain regulatory procedures for coordinating frequency use between countries at the level of individual assignments, i.e., individual stations or networks. Such procedures establish rights and obligations, giving the regulatory certainty necessary for investment in radiocommunication systems. For example, the right to operate frequencies on a satellite cannot be defined simply on the basis of the operation from the territory of one country and a complex set of procedures is in place for notification and co-ordination of frequency assignments to ensure equitable access to this valuable spectrum/orbital resource. Other provisions may be specific to certain radio services, including predetermined frequency assignment plans in some cases, and detailed operational procedures (particularly for maritime and aeronautical services).
- 2.7 For the purposes of spectrum allocations, the RR divide the world into three broad geographical Regions: Region 1 covers Africa, Europe (including Russia, former Soviet states and Turkey) and the Middle East; Region 2 covers the Americas; and Region 3 covers the Asia-Pacific countries. Although there is a good degree of alignment in the allocations across these three Regions, there are also distinct differences in many important parts of the spectrum.

UK preparation for WRC-23

- 2.8 There has not been a comprehensive revision of the RR since 1979. All subsequent WRCs have undertaken a partial revision of the Regulations based on a fixed, pre-determined agenda prepared at the previous WRC and subsequently formally endorsed by the Council of the ITU.
- 2.9 The initial version of the agenda for WRC-23 was drafted and provisionally agreed at WRC-15. However, the majority of agenda items and their detailed scope were subsequently agreed at WRC-19. This is normal practice and allows for changes between WRCs as some items may no longer be valid and may be removed from the provisional agenda of a later WRC. The organisation of work between WRCs, including the attribution of the work to the

appropriate ITU-R Study Groups, is decided at the first Conference Preparatory Meeting (CPM) held during the week immediately following the previous WRC.

- 2.10 Proposals to WRCs are usually co-ordinated by countries through the relevant regional group. For the UK, this is the European Conference of Postal and Telecommunications Administrations (CEPT, which currently has 46 member countries). CEPT submits European Common Proposals (ECPs) to the WRC. Each CEPT member country is free to formally sign each ECP and, unless there is a good reason not to do so, the UK would usually anticipate supporting ECPs developed through this process.
- 2.11 Ofcom is responsible for the development of the UK positions taken into both the CEPT process and then on to the WRC itself. Ofcom chairs the International Frequency Policy Group (IFPG) which provides a forum for Ofcom, Government, stakeholders and other interested parties to meet and discuss the developing positions across the WRC Agenda. As mentioned above Ofcom has, under the IFPG, established 5 Working Groups to facilitate discussion with stakeholders and interested parties in specific sectors and to develop UK positions in respect of each of the individual Agenda Items. Before the start of the WRC, Ofcom confirms the positions and negotiating lines that we will take into the WRC with Government.
- 2.12 As well as leading for the UK in the European process, Ofcom also monitors developments at the global level and, where justified, is able to participate in other relevant regional groups outside Europe as appropriate.

Purpose of this call for input

- 2.13 This document aims to inform interested spectrum stakeholders and individuals of the issues that will be discussed at WRC-23, along with either the current UK position or our preliminary views. We invite interested parties to identify and share views they may have relating to individual agenda items and comment on our overall strategy and process of engagement. We are particularly interested in the views of those stakeholders that are not active in the formal preparatory process. For details of how to respond to this call or input see Annex 1.

3. The WRC-23 agenda

Brief description of WRC-23 agenda items

- 3.1 The agenda for WRC-23 contains around 30 agenda items and subtopics covering many frequency bands and radio services and includes “standing” agenda items which address general regulatory and procedural matters. Some items are very specific and tightly defined while others cover a wide range of issues. All of them have the potential to create new opportunities for the use of the radio spectrum and may therefore present a potential threat to existing users.
- 3.2 There will be varying levels of interest across the agenda items. Internationally, the level of interest will be predominantly driven by differing national policies, regional agreements and industrial interests related to the nature of the issue and the frequency band, or bands, under consideration.
- 3.3 For the purposes for this call for input, we have grouped the various agenda items into the following broad subject categories (these do not have any formal international recognition and are merely used to aid the reader who may not be so familiar with the WRC process):

- **Wireless Broadband Connectivity:** this covers spectrum allocations and regulatory provisions around communications systems that would predominantly deliver services to end users. This includes high profile issues that have a significant citizen and consumer interest such as future spectrum for wireless broadband to support devices such as smartphones, tablet computers and associated consumer devices (including the Internet of Things – IoT).

There are several agenda items and frequency bands being considered in the context of consumer wireless broadband services, although none of these were UK or European proposals. One band proposed for consideration in Region 1 (Europe, Africa and the Middle East) that has seen particular interest is the range 6425 – 7025 MHz (“*the upper 6 GHz band*¹⁰”). This band has seen strong and recent interest from two wireless broadband industry sectors; “Wi-Fi” (and comparable technologies) and mobile 5G/6G (or IMT – International Mobile Telecommunications). In addition, other bands are under consideration for IMT identification, and this section also reflects upon the proposal for IMT base stations to be deployed on high altitude platforms, or “HIBS” - high-altitude International Mobile Telecommunications base stations. Finally, one topic in the section is addressing whether the International Mobile Telecommunications (IMT) identification, in the Radio Regulations, is required in bands allocated to the fixed service.

Relevant agenda items: 1.1, 1.2, 1.3, 1.4 and 9.1 topic c

¹⁰ At a global level the band 7025 – 7125 MHz is also being considered for IMT identification which, when considered alongside the band 6425 – 7025 MHz in Region 1, would extend the range being considered for IMT identification in Europe, Middle East, and Africa to 6425 – 7125 MHz.

- **Broadcast TV & Support Applications:** this covers the agenda item reviewing use in the 470 – 960 MHz band. Currently this band is a mix of mobile broadband services, broadcasting television services and the use of services in support of programme production and news reporting (e.g., in ear monitors and wireless microphones). Following changes at preceding WRCs, Region 1 (Europe, Africa, and the Middle East) currently retains a broadcasting allocation in the band 470-694 MHz without a co-primary mobile allocation. WRC-23 will decide whether changes to the allocation are necessary or appropriate.

Relevant agenda item: 1.5

- **Satellite Services:** this covers spectrum allocations and regulatory provisions around satellite services. Satellite services are inherently international in nature and therefore are a matter of extensive discussion at every WRC. Two items in this section address the use of terminals on platforms such as ships and planes, in several bands, working with either geo-stationary or non-geostationary satellites. We expect some actions at WRC-23 related to regulatory provisions covering military use of spectrum and there are several other issues covered in this section that will be particularly important for the satellite industry as they impact the process for the international management of satellite networks, which is maintained by the ITU.

Relevant agenda items: 1.15, 1.16, 1.17, 1.18, 1.19, 7 and Article 48

- **Transport:** this covers spectrum use by transport related applications. Many of these agenda items are of particular interest to the aviation and maritime sectors and the associated regulatory bodies in the UK (i.e., the Civil Aviation Authority, the Maritime and Coastguard Agency and the Department of Transport). These bodies have overarching responsibility for the regulation of the aviation and maritime sectors in the UK, and they will consider any outputs of WRC-23 within this broader regulatory context. This could for example lead to new, or amended, regulatory measures which place certain requirements on aviation or maritime, whether UK based or for those coming into UK airspace or UK waters. Moreover, these UK authorities are active in international bodies (such as ICAO and IMO) that have wider responsibility for aviation and maritime measures and these links play an important part in the formulation of UK positions. Also included in this section is the consideration of compatibility between radio amateur users and radionavigation services in the same band.

Relevant agenda items: 1.6, 1.7, 1.8, 1.9, 1.10, 1.11 and 9.1.b

- **Scientific use of spectrum:** issues considered within this section reflect upon areas where the UK has two interests. First is the use of parts of the radio spectrum by Earth Exploration Satellites, to produce maps and images of the earth's surface. Second is the use of spectrum by space weather sensors. Data derived from such uses is used to assess the impact of environmental change on the earth, both geographical and climate related. One specific item concerns how to accommodate protection requirements for earth exploration satellites from satellites offering mainly commercial service, which operate in bands adjacent to the exploration satellites. A final issue

covered in this section relates to the dissemination of Universal Coordinated Time (UTC), via radiocommunications systems. This mainly administrative action has been discussed at previous WRCs and will be addressed in light of decisions taken in other international bodies outside the ITU mechanism.

Relevant agenda items: 1.12, 1.13, 1.14, 9.1a, 9.1.d and Resolution 655(WRC-15)

- **Standing Agenda Items & Ad Hoc Issues:** these are agenda items discussed at each Conference to make general regulatory changes to the Radio Regulations. One of these is the consideration of the Director's Report (Director of the ITU Radiocommunication Bureau) to WRC-23 which will evaluate developments in the Radiocommunication Sector since WRC-19. In addition, one of the standing items is a consideration of items for the next WRC and the conference subsequent to that. These proposals can appear right up to and during the WRC itself.

Relevant agenda items: 2, 3, 4, 5, 6, 8, 9.2, 9.3 and 10

- One additional item included in this section relates to Article 21.5 of the RR which deals with the limits applied to terrestrial stations to protect satellites that share the same bands. It addresses the use of active antenna systems and how they might impact the process of providing technical detail to the ITU Bureau for the purposes of frequency assignment recording. Although it is not formally an agenda item for WRC-23, it was identified as an issue following the conclusion of discussions related to the IMT identification in the 26 GHz band made by WRC-19.

3.4 Each section provides a summary overview of the individual agenda items in a format suitable for those who are not already familiar with the WRC process. We also set out the UK objectives as understood at this stage which are based on existing Ofcom policies, previous consultations, and discussions with UK stakeholders. Finally, we have sought to identify any linkages between issues which may not be immediately obvious from the WRC agenda itself.

3.5 Given the lead time to the conference, we expect to continually review our objectives and positions, not least as the technical preparatory work progresses. We see this call for input as an important step in this process.

3.6 In this document we also identify what we consider to be the relative UK priorities of the various agenda items. We have prioritised these as follows:

- **High:** key policy issues for the UK, either because of their strategic importance or because of the potential threat they may pose to UK interests. This will usually apply where there are significantly conflicting interests between different services or between differing UK interests, and especially where the agenda item is so wide-ranging that it presents potentially multiple, as yet undefined, threats (e.g., where additional spectrum is sought without any indication as to the target band). We anticipate these issues to be controversial with diverging views between countries, including within Europe. We will aim to actively engage at all stages.

- **Medium:** important for the UK and/or likely to present some difficulties, at least in detail. This will generally apply to agenda items mainly confined to a single radio service, rather than where this is a major conflict between services. We expect some degree of consensus at least in Europe but will ensure UK participation in all relevant meetings.
- **Low:** either relatively unimportant for the UK or sufficiently straightforward and uncontroversial that we can expect others to lead with minimum risk to the UK. We will however continue to monitor developments.

3.7 We will generally devote more resources to our high priorities but will keep this prioritisation under review. Even for low priority items, proposals could be made that require a more proactive involvement and hence result in the elevation of the priority of that individual agenda items.

3.8 A list of all the agenda items and the priority we have provisionally assigned to them is set out in Annex 5 and we would welcome views as to whether we have identified the priorities correctly. We will take account of responses to this call for input in prioritising the work going forward.

Question 1:

Do you agree with the prioritisation of the agenda items, as shown in Annex 5, and if not why?

4. Wireless Broadband Connectivity

This section addresses the following WRC-23 agenda items:

- 1.1 Protection of the aeronautical and maritime mobile services in 4.8 – 4.99 GHz
- 1.2 potential identification for IMT of frequency bands; 3.3-3.4, 3.6—3.8, 6.425-7.025, 7.025-7.125 & 10.0-10.5 GHz
- 1.3 primary allocation for mobile in the band 3600-3800 MHz, in Region 1
- 1.4 high altitude IMT base stations in IMT bands below 2.7 GHz
- 9.1.c Broadband Fixed Wireless Access applications that use IMT technology, in fixed bands

4.1 Agenda Item 1.1 - Protection of the aeronautical and maritime mobile services in 4.8 – 4.99 GHz

- 4.1.1. The Conference in 2015 agreed two regulatory footnotes that identified all or parts of this band for IMT in four non-European countries. WRC-19 expanded the number of countries in these two footnotes to over 40, including some in Europe. During the consideration of this band at the two earlier WRCs, our priority was to ensure that the maritime and aeronautical use, which can operate globally, was sufficiently protected in certain geographical areas. Aeronautical and maritime use is recognised via the Radio Regulations and the UK, at both WRC-15 and WRC-19, was keen to maintain the global operation of both aeronautical and maritime services in this band.
- 4.1.2. We do, however, recognise that there is interest in several countries for IMT operation in the band. Some of those countries have a large internal market, and an eco-system of mobile equipment for use in this band has developed. This band, as a sub band of the wider band 4400-5000 MHz, was formally incorporated into the published standards of the 3GPP¹¹ in 2018. The availability of published technical standards will support the market for mobile devices incorporating this band, while formal recognition in the Radio Regulations for this band would also help to build market confidence.
- 4.1.3. At this stage, we believe that the most proportionate approach is to ensure the continued protection of the aeronautical and maritime services, especially those with an international context and in which the UK has an operational interest. Given the previous two WRCs have seen countries add their names to the footnote, we may expect this trend to continue at WRC-23. The UK will monitor any such requests carefully, especially from European countries, although we

¹¹ The 3rd Generation Partnership Project (3GPP) is an umbrella term for a number of standards organizations which develop protocols for mobile telecommunications. www.3gpp.org

would also note that any decisions the UK might take around domestic or national plans for this band are not wholly predicated upon WRC decisions.

Question 2:

What are your views on the continued need to protect global aeronautical and maritime services, in the 4.8 – 4.99 GHz band, under this agenda item?

4.2 Agenda Item 1.2 - potential IMT identification in frequency bands; 3.3-3.4, 3.6-3.8, 6.425-7.025, 7.025-7.125 & 10.0-10.5 GHz

- 4.2.1. Following discussions at WRC-19 and the views from several countries and regional groups outside Europe, several frequency bands were proposed for technical study with the potential for IMT identification and mobile allocation. Whilst European countries, including the UK, did not propose an IMT agenda item for WRC-23 these proposals were agreed by the Conference in 2019.
- 4.2.2. The bands under consideration, under the scope of the supporting WRC Resolution¹², make a distinction between different ITU Regions as the focus of studies;
- 3600-3800 MHz and 3300-3400 MHz in Region 2 (Americas);
 - 3300-3400 MHz amending footnote in Region 1 (Europe, Africa, Middle East);
 - 7025-7125 MHz (globally);
 - 6425-7025 MHz in Region 1 (Europe, Africa, Middle East);
 - 10.0-10.5 GHz in Region 2 (Americas);
- 4.2.3. **3600-3800 MHz and 3300-3400 MHz (in Region 2)**, In consideration of these bands Ofcom's view is primarily framed around the fact that these bands would be identified for areas outside the UK mainland. Part of Ofcom's duties, as reflected in the MoU agreed between Government and Ofcom, is to provide representation for the Channel Islands, Isle of Man and British Overseas Territories in the ITU. Some of Britain's Overseas Territories (BOTs) lie within Region 2. Ofcom will engage with these BOTs, each of which has a local regulatory authority responsible for addressing domestic spectrum needs, regarding any international spectrum issues that need to be addressed at ITU level.
- 4.2.4. At this stage we do not see a need for the UK to provide a position on this element of the agenda item unless wider UK interests¹³ in spectrum usage outside the UK, Europe and Region 1, are deemed to be directly impacted. Ofcom is aware that

¹² Resolution 245 (WRC-19) https://www.itu.int/dms_pub/itu-r/oth/0c/0a/ROCOA00000D0002PDFE.pdf

¹³ e.g., investment in commercial or scientific satellite systems that have coverage outside the UK, obligations to NATO activities and issues related to territories for which the UK is responsible for in the context of ITU activities.

some global satellite operators have operational interests in the band 3600 – 3800 MHz, and those satellite operators have market presence in both the UK and in countries in Region 2. However, as the proposals for IMT in 3600-3800 MHz are similar to the usage already seen in UK and Europe, we would be minded not to oppose any plans Region 2 countries might make for IMT identification in the band.

- 4.2.5. **3300-3400 MHz amending footnotes in Region 1 (Europe, Africa, Middle East) and footnotes in Region 2 (Americas)**, The consideration of this band, for potential IMT identification, was extensively addressed in the preparations for WRC-15. That Conference saw several RR footnotes agreed which identified the band, in some countries, for IMT. For countries in Region 1, the RR footnote limited the countries to those located south of the 30° parallel north. This was mainly because many European countries, including the UK, use the band for radar, both on the ground and airborne.
- 4.2.6. Therefore, the UK does not support amendments to these related footnotes which could extend them to countries north of the 30° parallel north. Neither does the UK support an IMT identification for the entirety of Region 1. The UK does support maintaining the regulatory provisions in the Region 2 footnotes as applicable to IMT stations in this band. This retains the protection requirements for the radiolocation service for various international operational environments
- 4.2.7. **6425-7025 MHz in Region 1 (Europe, Africa, Middle East) and 7025-7125 MHz (globally)**, Presently Ofcom has an open mind as to whether to support, or oppose, an IMT identification for either of the bands referenced. As mentioned earlier in this section, CEPT did not make a proposal for IMT identification in these bands at WRC-19, and the main supporters were other Region 1 countries.
- 4.2.8. Both spectrum bands, and those adjacent to 6425 MHz, are shared at an international level with satellite services. Over the past few years, work has been undertaken in several countries and in some international groups to assess the sharing potential between satellite services and relatively low powered WAS/RLAN¹⁴ devices. In the UK, Ofcom opened the adjacent band (5925-6425 MHz) for WAS/RLAN services in 2020 and Europe has recently adopted similar measures to make this band available. Some other countries, such as the United States, have gone further opening the wider band from 5925 – 7125 MHz for WAS/RLAN services. In all cases this is on the basis that WAS/RLANs can share with incumbent services, including international satellite services, in the band.
- 4.2.9. On the other hand, the current ITU studies in these bands, which are being undertaken in support of the WRC agenda item preparations, are mainly addressing relatively high-powered licensed IMT services. Ofcom is currently of the

¹⁴ WAS/RLAN – Wireless Access Systems/Radio Local Area Network: is a term used to describe predominately relatively low power broadband radio local area networks used for fixed, semi-fixed (transportable) and portable computer equipment for a variety of broadband applications. This encompasses technologies such as Wi-Fi™ and 5G NR-U (New Radio – Unlicensed) which is being developed in 3GPP to be used in licence-exempt spectrum.

view that, based on current technologies, it seems unlikely that IMT services, at relatively high power, could operate in the band with incumbent satellite services. In addition, there are a number of other terrestrial uses in this band, where the protection from IMT would predominantly need to be addressed at a national level.

- 4.2.10. We note that only Region 1 is being considered for most of the spectrum in the 6425-7125 MHz range. We do recognise, however, that other countries outside Region 1 could request to be added to any IMT identification if agreed at WRC-23 (subject to geographically bordering countries agreeing). Also, an entire Region could in theory ask to be added to any IMT identification although this seems unlikely as one would have assumed that Region 2 and 3 would have been added to the Agenda Item as originally scoped if they had so wished. At this stage we believe that a limited number of Region 2 and Region 3 countries might request to be added to any IMT identification in Region 1 if such an identification were agreed.
- 4.2.11. We also note that discussions have already commenced within 3GPP on some technical considerations for use in this band, however the band itself has not yet been added to the formally recognised 3GPP bands.
- 4.2.12. In February this year Ofcom consulted on our proposals for indoor shared access licensing in the upper 6 GHz band¹⁵ (6425-7070 MHz) which would be an addition to Ofcom's shared access licence framework. We are currently assessing responses to that consultation. Ofcom also published a discussion paper in February 2022 which considered how mobile networks may need to evolve in the UK to meet future demand for mobile data in the UK.
- 4.2.13. Ofcom anticipates that existing mobile spectrum holdings and spectrum already planned for release are likely to be broadly sufficient to meet future demand to 2030, if MNOs pursue a number of strategies including network densification. Additional new mobile spectrum beyond the existing pipeline of spectrum could help facilitate the provision of additional capacity, but would not on its own be expected to be sufficient to meet future mobile data traffic growth in all areas.
- 4.2.14. In summary, Ofcom, at present, has an open mind on whether to support, or oppose, an IMT identification for either of the these two bands ; 6425-7025 MHz in Region 1 (Europe, Africa, Middle East) and 7025-7125 MHz (globally). We also note that the agenda item for the band 6425-7025 MHz is for Region 1 only, thereby limiting potential economies of scale, and are aware that a number of countries around the world have made the band available for WAS/RLANs. Finally, Ofcom is currently analysing ITU-R studies to determine whether IMT services at relatively high power could effectively operate in the band with incumbent satellite services.

¹⁵ "Consultation: Enabling spectrum sharing in the upper 6 GHz band" <https://www.ofcom.org.uk/consultations-and-statements/category-2/spectrum-sharing-upper-6-ghz-band>

- 4.2.15. **10.0-10.5 GHz (in Region 2, North & South Americas)**, Ofcom is currently of the view that the result of a possible IMT identification of the frequency band 10-10.5 GHz in Region 2 has a global impact on EESS (active) in the band 10.0-10.4 GHz and may have a global impact on EESS (passive) in the band 10.6-10.7 GHz due to the required protection of these services on a global basis. We also note that IMT identification in this band may have an impact on airborne and naval radars operated by some countries across all Regions. Therefore, Ofcom is of the view that IMT should not be identified in Region 2 in the band 10-10.5 GHz in order to ensure the protection of the globally operating EESS (active) systems and airborne and naval radars.

Question 3a:

Do you agree that the UK interest in the bands 3 600-3 800 MHz and 3 300-3 400 MHz in Region 2 (North & South Americas) should be limited to any impacts on UK operational use in those areas?

Question 3b:

Do you agree that the UK should maintain its objections to changes to the regulatory environment for the band 3300-3400 MHz (in Region 1, Europe, Africa, Middle East), noting UK has interests in use of radar for both ground and airborne operations?

Question 3c:

What is your view on the use of 6425-7025 & 7025-7125 MHz, and what evidence do you have to support this view? How does that inform your views on a IMT identification in these bands?

Question 3d:

What are your thoughts on the current UK view that IMT should not be identified in Region 2 in the band 10-10.5 GHz in order to ensure the protection of the globally operating EESS (active) systems and airborne & vessel mounted radars?

4.3 Agenda Item 1.3 - primary allocation for mobile in the band 3600-3800 MHz, in Region 1

- 4.3.1. In the UK and Europe, the band 3600-3800 MHz is already harmonised within CEPT for mobile broadband services (including IMT). Moreover, the UK and many other countries in Europe have awarded this spectrum and it is being used to deploy 5G services to European consumers and businesses. It is therefore clear that usage of this band in the UK and Europe for 5G services is not reliant upon action at an international level. We also note that the wider 3.3-4.2 GHz band is already accommodated within the current 3GPP technical specifications.
- 4.3.2. We are aware that some countries outside Europe, but within Region 1, see benefit in exploring the potential for upgrading the mobile allocation in this band from

secondary to primary. They believe this will provide greater regulatory certainty to support mobile services to be developed in the band, and that it might assist in cross border coordination for those Region 1 countries that share a border with Region 3 countries. An upgrading of the allocation in Region 1 would mirror the allocation status in the band in Regions 2 and 3. The scope of the agenda item does not extend to making an IMT identification, although some are of the view that this could potentially also be considered at the conference.

- 4.3.3. It is evident that the UK does not need an allocation change as the band is already nationally authorised in a technology neutral manner, meaning that it can be used for 5G services. Consequently, we are relatively indifferent as to whether an upgrading of the allocation is agreed at WRC-23. The CEPT's preliminary position is to support an upgrading of the allocation, and the UK has no reason to counter this. If the UK were to oppose an upgrading of the allocation, it would send a contradictory message internationally, as this would be viewed as UK wanting to impose limitations on use in other non-European countries in Region 1, while the UK itself has already permitted mobile wireless services under a national provision.
- 4.3.4. However, we would not support an upgrading of the allocation if the technical limitations imposed upon mobile use in the band, were more constraining than already documented in the 3.4-3.6 GHz band. Predominantly, the services that share the bands 3.4-3.6 and 3.6-3.8 GHz are common to both, so there are no justifiable reasons to have greater technical limitations in the 3.6-3.8 GHz band.

Question 4:

Do you agree that, where no additional technical limitations are placed on mobile services, the UK can support an upgrading of the mobile allocation, in 3600 - 3800 MHz, from secondary to primary?

4.4 Agenda Item 1.4 - high altitude IMT base stations in IMT bands below 2.7 GHz

- 4.4.1. Whilst WRC-19 defined operational characteristics and spectrum bands for High Altitude Platforms (HAPs), a number of countries proposed similar regulatory visibility for platforms referred to as "HIBs", high-altitude International Mobile Telecommunications base stations.
- 4.4.2. The proposal is for use of an airborne physical platform, similar to a HAP (i.e., at altitudes of between 20 and 50 km), but which would make use of IMT frequencies below 2.7 GHz. This would therefore enhance IMT coverage, predominately for areas where IMT services are challenging to deliver. This is because use of an IMT base station at those altitudes would enable wide coverage and because the platform itself could be flown into remote areas where infrastructure is currently lacking. Presently the scope of the agenda item covers technical studies in the frequency bands; 694-960 MHz; 1 710-1 885 MHz and 2 500-2 690 MHz.

- 4.4.3. We believe that the application of these types of platforms might have some limited opportunities in the UK. The primary reason for technical study is to assess the impact on cross border issues between countries who may wish to deploy these systems, noting the wide coverage potential would equally increase the potential interference risk between countries using the same frequencies. Internal coordination issues within the territorial limits of a country would not need to be captured within any international regulatory changes.
- 4.4.4. At this stage, we wish to continue to monitor the technical studies being undertaken within ITU to ensure that the increase in interference risk between countries is not disproportionately increased where these systems are used. However, we also recognise that these types of systems may be more applicable in areas that have far more challenges related to IMT coverage than the UK. As a result, we are keen to ensure that the necessity for regulatory changes take those countries views into account.

Question 5:

What are your views on the development of regulatory conditions to facilitate deployment of high altitude IMT base stations in IMT identified bands below 2.7 GHz?

4.5 Agenda Item 9.1 topic c –Broadband Fixed Wireless Access applications that use IMT technology, in fixed service bands

- 4.5.1. International Mobile Telecommunications (IMT) and International Mobile Telecommunications-Advanced (IMT-Advanced Standard)¹⁶ are the specifications issued by the ITU-R for mobile telephone and internet access services. In addition, the 3GPP standards body draft and finalise the suite of technical standards that might be used to provide IMT services by predominately mobile devices.
- 4.5.2. As the acronym implies, IMT addresses mobility functionality and operation. The technical standards produced and maintained by 3GPP will therefore have at their forefront the need to have the technologies optimised for mobile use. However, those same technologies can be used when devices do not move (i.e., when devices are static or ‘fixed’).
- 4.5.3. At a regulatory level the Radio Regulations make a distinction between different radio services where the usage model of a service is a guide to its interference potential. What the Radio Regulations do not generally do is specify the technologies that will be used under a particular radio service. This IMT identification can help to further the development of certain mobile applications, that benefit from roaming between countries thereby enabling global or regional economies of scale.

¹⁶ <https://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5d/imt-2020/Pages/default.aspx>

- 4.5.4. When considering fixed service¹⁷ bands, there is no ITU Radio Regulation identification for the technologies that can be used in those bands. Whilst we recognise the benefit of an ecosystem for mobile use, for enabling global or regional economies of scale, roaming and interoperability of equipment, fixed service applications do not need the same ubiquitous and roaming frameworks. Furthermore, and noting the inherently technology neutral considerations of the Radio Regulation allocations, there is no need to have the same technology steer for fixed service applications in the RR. In fact, we believe there are strong arguments against identifying bands in the RRs for IMT technologies in fixed service bands as it might infer a technology limitation in those bands as well as implying that those are the only fixed service bands that could be used by IMT technologies.
- 4.5.5. Nonetheless, at WRC-19, a proposal was made by a few countries for a future agenda item to consider studying the use of IMT for Fixed Wireless Broadband, and after some discussion and revision this topic was agreed. The topic will consider what actions, outside a modification to the Radio Regulations, might be available to assist those administrations who wish to deploy fixed service applications that use IMT technologies.
- 4.5.6. We only see a need for a modification of the Radio Regulations, where justified. Also, we do not see that there are any limitations on technologies that can be used under a fixed service allocation, either nationally or internationally. We are aware that some administrations have indicated a view that only an allocation that has an IMT identification can be used by IMT technologies regardless of the radio service allocation. We do not share that view as, even in mobile bands, IMT identification does not infer exclusivity to that technology type.
- 4.5.7. Therefore, we view a modification to the Radio Regulations, identifying bands for fixed service applications that use IMT technology, as unnecessary and potentially limiting. However, UK is supportive of providing information and guidance in the form of revisions to, or updates of, appropriate existing ITU-R Recommendations/Reports/Handbooks (if necessary). This might help to highlight the existing flexibility in the Radio Regulations and focus on the above ITU-R deliverables to achieve the objectives being sought by the proponents of this topic. If some administrations have placed national limitations on the use of IMT technologies, then it would seem prudent to amend those national regulations, rather than using international regulatory instruments.
- 4.5.8. The European group, CEPT, has agreed upon a No Change proposal under this topic which would see CEPT opposing proposals for changes to the RR at WRC-23. Whilst still to be formally adopted within the CEPT mechanism, the UK is currently planning to support the adoption of such a European Common Position (ECP).

¹⁷ Radio Regulations 2020 Edition Vol 1, Section III – Radio services 1.20 fixed service: *A radiocommunication service between specified fixed points.*

Question 6:

Do you agree that a formal modification to the Radio Regulations is not needed for fixed service applications that use IMT technologies?

5. Broadcast TV & Support Applications

This section addresses the following WRC-23 agenda item:

- 1.5 Review of the frequency band 470-960 MHz with potential IMT identification

5.1 Agenda Item 1.5 - Review of the frequency band 470-960 MHz with potential IMT identification

- 5.1.1. The World Radio Conference in 2015 (WRC-15) confirmed a provisional decision taken at WRC-12 to make a mobile allocation and IMT identification in the 700 MHz band (694-790 MHz). At the same time, it was agreed that the frequency band 470-694 MHz should be reviewed at WRC-23. This was confirmed at WRC-19 when an agenda item for WRC-23 was agreed:

to review the spectrum use and spectrum needs of existing services in the frequency band 470-960 MHz in Region 1 and consider possible regulatory actions in the frequency band 470-694 MHz in Region 1

- 5.1.2. In the UK, both the 700 and 800 MHz band (790-862 MHz) are now used to provide mobile broadband and telephone services, the 700 MHz band having been awarded most recently in 2021. In both cases the broadcast television and PMSE applications that had previously been operational in the bands, have been moved out and now concentrate their continued usage in the frequency band 470-694 MHz. The 470-694 MHz band is currently allocated in Region 1, on a primary basis, to the broadcasting service with footnote recognition for Programme Making and Special Events (PMSE) applications. Ofcom also has an authorisation framework for the use of Television White Space (TVWS) devices to facilitate broadband access, in the 470 - 694 MHz band.
- 5.1.3. The UK has direct involvement in the ‘square kilometre’ radio astronomy array¹⁸, which is under development in Australia and South Africa. The South African component of that array (SKA1-mid) has receiving capabilities in the range 350 MHz to 15.3 GHz¹⁹. Radio Astronomy use is acknowledged in various bands through an ITU Radio Regulations footnote and protection is addressed nationally by the countries concerned.
- 5.1.4. At a speech in March 2018, entitled “British TV can collaborate to compete in the digital age”, Ofcom’s then CEO noted “*We expect public service broadcasters will have unchallenged access to these digital airwaves [470 – 694 MHz] for the next decade or longer*”²⁰. More recently Government consulted on the renewal of Digital

¹⁸ <https://www.skatelescope.org/>

¹⁹ <https://www.skatelescope.org/wp-content/uploads/2018/08/16231-factsheet-telescopes-v71.pdf>

²⁰ <https://www.ofcom.org.uk/about-ofcom/latest/media/speeches/2018/british-tv-digital-age>

Terrestrial Television (DTT) multiplex licences expiring in 2022 and 2026²¹, following which the Government decided to allow five national multiplex licences on the DTT platform that are due to expire in 2022 and 2026 to be renewed for a further period until 2034. The Government also granted Ofcom the ability to reissue the licences to the relevant multiplexes accordingly. The first two of these licenses have now been renewed until 31 December 2034²².

- 5.1.5. The digitalisation of television broadcasting has realised efficiencies in spectrum usage, in terms of capacity and spectrum reuse, where compared with dated analogue technologies. However, the use of PMSE in the band retains the use, in some cases, of analogue technologies as the use of digital technologies can introduce an audio delay that effects the production of live events. This has meant that the loss of access to spectrum due to the reallocation of bands to mobile broadband has had implications for low power audio PMSE (such as wireless microphones and in-ear monitors). To supplement this reduction in spectrum for wireless microphones and in ear monitors (IEM), Ofcom made spectrum available in the 960 – 1164 MHz band for these applications in March 2016²³. This is in addition to PMSE coordinated access to the 470-694 MHz band, which remains a core band for wireless microphone PMSE use.
- 5.1.6. The recent developments in mobile technologies has seen a trend towards bands above 3 GHz, including those above 20 GHz. This includes decisions at WRC-19 which agreed various spectrum bands between 24 and 71 GHz for IMT identification. WRC-23 is also expected to conclude on other spectrum bands below 20 GHz, for IMT identification, as discussed elsewhere in this document. Where Government have agreed to an extension of the Broadcasting licenses, which Ofcom is in the process of completing, this extension will see a parallel extension to the Wireless Telegraphy Act licences for DTT use in the 470-694 MHz band. This, it is clear, would inhibit national sharing of the band with ubiquitous mobile broadband services, where DTT services continue.
- 5.1.7. Internationally discussions appear relatively polarised at this stage and we note that some non-European Region 1 countries are strongly supporting a mobile allocation along with a possible IMT identification in the band. Within the CEPT, discussions are still at a relatively early stage, but we anticipate that several European countries will be in a similar position to the UK on both the question related to wanting to further understand national spectrum needs for mobile below 1 GHz, as well as the need for continued access to the band by Digital Terrestrial Television for periods predominately set by the term of the Broadcasting and Wireless Telegraphy Act, licenses. Nonetheless we are also aware

²¹ <https://www.gov.uk/government/consultations/consultation-on-the-renewal-of-digital-terrestrial-television-dtt-multiplex-licences-expiring-in-2022-and-2026> (18 December 2020 to 5pm on 26 February 2021)

²² This extension comes alongside both; a review period to report in 2025, and the notice of revocation of the associated Wireless Telegraphy Act licence, will not be able to happen before the end of 2030, and Ofcom would need to consult prior to giving the five years' notice

²³ https://www.ofcom.org.uk/_data/assets/pdf_file/0021/62481/New-Spectrum-for-Audio-PMSE-statement.pdf

of a limited number of European countries, within CEPT, who are expressing an interest in having mobile services in the 470-694 MHz band.

- 5.1.8. In summary and noting the points raised above, our preliminary view is that “No Change” would meet the UKs interests recognising our national usage of the band today. On this basis Ofcom has supported that a “No Change” position is fully considered in the CEPT discussions. This would retain the primary broadcasting allocation and footnote recognition for PMSE, as the identified harmonisation for the band.
- 5.1.9. That said we recognise that others will likely argue for greater flexibility through the addition of a mobile allocation and possibly IMT identification in the band. Ofcom will listen carefully to such arguments and will need to consider whether any such proposals for greater flexibility can be accommodated in a way that does not significantly undermine the viability of the DTT platform in the UK. Our priority will be to ensure that, following the outcome of WRC-23, DTT services can continue to operate in the 470-694 MHz and that any decision on the future use of this band in the UK rests with the UK authorities.
- 5.1.10. We also note that, recognising the types of technologies currently used in domestic television and mobile broadband wireless services, sharing of the band between these services is not feasible in the same frequencies in the same geographical area (i.e., both the 700 MHz and 800 MHz bands were cleared of broadcasting to make the widest and most rapid possible deployment of mobile broadband services). Nor do we feel that a reequipping of domestic TV to facilitate sharing between broadcast and mobile services is either feasible or practical at this stage.
- 5.1.11. Finally, we reflect that should a mobile allocation and possibly an IMT identification in the 470-694 MHz band be made at WRC-23, the UKs continued use of DTT in the band would be in full compliance with the Radio Regulations. This is because we would strongly support a retention of the primary broadcasting allocation in the band. Whilst not a matter for the WRC, the UK would also still retain its television broadcasting channel allotments agreed at the Regional Radiocommunication Conference “Geneva 2006”²⁴. We do however recognise that the UK’s continued use of DTT in the band could limit the potential of several geographically close European countries from being able to deploy mobile broadband in the band because of the interfering levels from high power broadcasting assignments. We do not consider that the UKs use of PMSE in the 470-694 MHz band, would be materially affected by any potential European use of the band for mobile broadband whilst our use of the band for DTT is retained.

²⁴ The Final Acts of RRC-06 contain the Regional Agreement GE06, adopted by RRC-06, which governs the use of frequencies by the broadcasting service and other primary terrestrial services in the frequency bands 174-230 MHz and 470-862 MHz. They also contain frequency assignment and frequency allotment plans for the digital broadcasting service (television and sound). <http://handle.itu.int/11.1002/pub/801af205-en>

5.1.12. Recently the European group, CEPT, have agreed to start work on options for a coordinated approach to a European position. Those two options would be 1) No Changes to the international regulatory environment or 2) placing a co-primary mobile allocation in the band 470 – 694 MHz. Whether one of these positions can be agreed by the majority of CEPT countries will be further discussed within CEPT.

Question 7:

What are your views on the proposed approach for 470-694 MHz, recognising the national decisions already in place and taken for DTT multiplex licensing in the band, and the additional and supplementary spectrum made available for UK PMSE usage?

6. Satellites and Earth Station Connectivity

This section addresses the following WRC-23 agenda items:

- 1.15 Use of satellite terminal stations on aircraft, operating in bands around 13 GHz
 - 1.16 Satellite Earth Stations in motion working to non-geostationary satellites in bands around 18 & 28 GHz
 - 1.17 Inter satellite network links in satellite bands around 12, 18 & 28 GHz
 - 1.18 Narrowband mobile satellite systems in bands between 1.6 & 3.4 GHz for data gathering
 - 1.19 Fixed-satellite service in 17.3-17.7 GHz, for space to earth direction, in Region 2
- 7 Satellite coordination procedures

Article 48 of the ITU constitution

6.1 Agenda Item 1.15 - Use of satellite earth station terminals in motion on aircraft & vessels, operating in bands around 13 GHz

- 6.1.1. The use of satellite terminal stations, installed on aircraft, is not new. For several years aircraft have carried terminals for the communication of both safety and non-safety messages by flight crew. As those terminals operated in L band (1.5/1.6 GHz) antennas were relatively easy to install on aircraft. However, as antenna technologies have improved the opportunity to use other frequency bands, that will allow for higher bandwidth wireless communications, has emerged. These communications are for mainly non-safety or payload communications and some of those payload communications are satellite provisioned broadband access to support on board passenger services.
- 6.1.2. The frequency bands 12.75-13.25 GHz (Earth-to-space) and 10.7-12.75 GHz (space-to-Earth) have been allocated to the Fixed Satellite Service (as well as other services) for many years. The technical studies under this agenda item are not about making a new spectrum allocation, rather the studies are to assess whether aircraft mounted satellite terminals increase the potential for interference, over the more traditionally static ground satellite earth station terminals. The ability for these new antennas to avoid interfering with other geostationary satellites, non-geostationary satellites, and terrestrial use, plays an important part in this assessment. Finally, many countries wish to ensure that their planned satellite allotments, that are underpinned via Radio Regulations provisions²⁵, are taken into

²⁵ APPENDIX 30B (REV.WRC-19) "Provisions and associated Plan for the fixed-satellite service in the frequency bands 4 500-4 800 MHz, 6 725-7 025 MHz, 10.70-10.95 GHz, 11.20-11.45 GHz and 12.75-13.25 GHz" – available in Volume II of the ITU Radio Regulations at <http://handle.itu.int/11.1002/pub/814b0c44-en>

account when addressing this new potential flexibility of use by terminals working to fixed satellite service networks.

- 6.1.3. At a CEPT level, ECC Decision (19)04 provides for the harmonised use of spectrum, free circulation and use of earth stations on-board aircraft operating with GSO FSS networks and NGSO FSS systems in the frequency bands 12.75-13.25 GHz (Earth-to-space) and 10.7-12.75 GHz (space-to-Earth).
- 6.1.4. Whilst this Decision has been adopted by CEPT, it has not been implemented in the UK and we do not currently have an authorisation regime for UK registered aircraft. This because we have some questions as to whether the protection limits in the Decision, along with the harmonisation regime proposed for CEPT, provide adequate protection of UK fixed links that have very high reliability and availability requirements in the 12.75 – 13.25 GHz band.
- 6.1.5. At this stage we are monitoring the development of the international regulatory framework and technical conditions for the operation of these aircraft mounted earth stations (in the 12.75-13.25 GHz band). We will review these international developments to judge whether they will ensure adequate protection of existing services and are practicable from an enforcement/implementation point of view.

Question 8:

What are your views on the need to establish an international regulatory environment that provides adequate protection of UK fixed links from earth stations in motion, in the band 12.75 – 13.25 GHz, which is also practicable from an enforcement/implementation perspective?

6.2 Agenda Item 1.16 - Satellite Earth Stations in Motion working to non-geostationary satellites in bands around 18 & 28 GHz

- 6.2.1. As noted in the item at Section 6.1, the use of satellite terminal stations installed on moving platforms is an ongoing development, taking advantage among other things of improvements in antenna technologies. WRC-19 saw international provisions agreed that would recognise mobile platforms, on ships, aircraft, and other mobile platforms in the 18 and 28 GHz bands operating to geostationary satellites.
- 6.2.2. This agenda item is similar to that which was concluded at WRC-19, however on this occasion it will look to provide a similar regulatory regime for satellite earth stations in motion (ESIM), that communicate with non-geostationary satellites.
- 6.2.3. Going into WRC-19, the UK supported several coordination requirements for ESIMs that are used on aircraft, ship and on land vehicles. Broadly these were:
 - **Land ESIM** –no specific international regulatory action as coordination issues are predominately national

- **Aircraft ESIM** – a pfd limit on the earth’s surface, based on the pfd levels for the aircraft ESIM given in ECC Decision (13)01.
 - **Maritime ESIM** – minimum separation distance of 70km from the low water marks officially recognised by coastal states.
- 6.2.4. The conclusions of WRC-19 saw these frameworks adopted with some minor adjustments²⁶. At an international level, maritime ESIMs operation requires the coastal state to declare the distance it adopts for the protection of its terrestrial services. Therefore, the UK has adopted the 70km figure (subject to countries exercising their rights within its territorial waters). We retain the 70km figure, in absence of any bilateral agreements with our geographical neighbours. We currently hold the view that it is not practical to expect that a ship’s captain be able to fulfil their requirements to meet a pfd figure (can only be controlled by the satellite network operator), whereas they will be able to judge a physical distance from the coastline of a country, through their normal navigational operations.
- 6.2.5. In CEPT, ECC decision (15)04 harmonises use of Land, and Maritime ESOMPs (Earth Stations on Moving Platforms – a reference interchangeable with ESIM) operating with non-geostationary satellite systems in the frequency bands 17.3-20.2 GHz, 27.5-29.1 GHz and 29.5-30.0 GHz. This Decision is currently, within CEPT, being updated to include a regulatory framework and technical conditions for operation of Aeronautical ESOMPs.
- 6.2.6. Currently the UK view is to ensure that the international regulatory framework and supporting technical conditions protect existing UK services adequately and are practicable from an enforcement/implementation point of view. We expect that any regulatory framework that is developed will be like that agreed for ESIMs that communicate to geostationary satellites. We can support such an outcome provided it is supported by appropriate technical evidence – in other words the agreement reached at WRC-19 for geostationary satellites is not itself sufficient to confirm that a similar approach can be agreed at WRC-23 for ESIMs operating to non-geostationary satellites.

²⁶ WRC Resolution 169 (WRC-19) https://www.itu.int/dms_pub/itu-r/oth/0C/0A/ROCOA00000F0056PDFE.pdf

Question 9:

Do you agree that the UK continues to support the maritime distance figure for ESIMs that work to non-geostationary satellites and to test the other conditions agreed at WRC-19 for ESIMs working to geostationary satellites to ascertain whether these remain appropriate for non-geostationary satellites?

6.3 Agenda Item 1.17 - Inter satellite network links in satellite bands around 12, 18 & 28 GHz

- 6.3.1. Through the development of both geostationary and non-geostationary satellites, the ability for satellites to communicate directly (space to space, inter satellite links) is seen as a useful flexibility. As a result, there is an attraction of some in the satellite sector to have that use regularised internationally so it can be accepted when satellite operators discuss technical coordination. This international recognition would require a change to the Radio Regulations.
- 6.3.2. The scope of this agenda item covers the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz, or parts thereof. At this stage, we are reviewing different types of operations envisaged for satellite-satellite links and the associated technical characteristics in the bands in order to ensure adequate protection of existing services in these bands. We support the creation of a stable yet flexible regulatory environment for this use.
- 6.3.3. We would not expect to support the creation of new allocations to inter satellite links in satellite bands, through this agenda item, if such allocations would introduce additional constraints on the other services allocated in those bands. Satellite-to-satellite transmissions must ensure the same level of protection for GSO networks, non-GSO systems and terrestrial services as currently provided in the RR and must not impose new constraints on them. Currently the technical work, in support of this agenda item, is progressing.

Question 10:

What are your views on whether an allocation to inter satellite links is necessary for existing satellite allocated bands and whether this would provide benefits internationally?

6.4 Agenda Item 1.18 – Narrowband mobile satellite systems in bands between 1.6 & 3.4 GHz for data gathering

- 6.4.1. There has been increasing and developing interest in the use of both geostationary and non-geostationary satellites for the monitoring of ground-based systems. These systems would be used for data gathering e.g. machine to machine (M2M) operations and IoT (Internet of Things) type systems. These data gathering type systems would have predominately periodical or low duty cycle transmissions as,

based on the nature of the data being gathered, they would not require continual transmission. This is reflected in the supporting WRC Resolution (Resolution 248 - WRC-19²⁷) where it is stated that these data gathering earth stations would individually communicate, with a satellite or satellites, no more than once every 15 minutes. One of the reasons to limit the transmission duration is to potentially lower the interference impact to other users of the spectrum. Whilst this would limit the impact from these systems, including with respect to other systems that also have such limited transmission duration, part of the sharing analysis would have to consider incumbent services that may not use this limited transmission duration or not be able to work with a limited transmission model.

- 6.4.2. The frequency bands that have been highlighted in the supporting Resolution (as referenced) have some regional limitations.
- 1 695-1 710 MHz in Region 2 (The Americas)
 - 2 010-2 025 MHz in Region 1 (Europe, Africa and Middle East)
 - 3 300-3 315 MHz and 3 385-3 400 MHz in Region 2 (The Americas)

As can be seen, no global common frequency has been proposed for consideration under this agenda item. Also, in its submitted contribution at WRC-19, CEPT had initially only supported the band 2010 – 2025 MHz (which was rejected by some Regions). For those bands identified for Region 2, the UK feels that administrations in that region are more informed as to whether those bands can be supported for regulatory action at WRC-23. The UK would only take a view on the proposals in another region where it can be shown it would have a material impact on UK operations or interests. At this stage, for those bands identified for use in Region 2, no impact to UK operations or interests have been identified. We are aware that international activities on this issue have thus far appeared to progress slowly.

- 6.4.3. Thus far the technical work has focused on assessing the compatibility issues related to the different national uses already deployed in these bands, as reflected in the different geographical regions. From a UK perspective we make use of the band 2010 – 2025 MHz for wireless cameras which are used at news and sporting events on an ad hoc, national basis. We understand that this is also the case in several other European countries. Notwithstanding the limited duty cycle of these narrowband Internet of Things (IoT) type satellite systems, we would need to assess carefully whether these systems can share with PMSE operation.
- 6.4.4. More recently, we have become aware that some of the commercial interests that had been interested in developing their own platforms in bands that might be allocated at an international level, have instead decided to put their offerings onto other companies' satellites²⁸. This indicates to us that there could well be scope for these low power and low duration data services to be operated on existing

²⁷ WRC Resolution 248 (WRC-19) https://www.itu.int/dms_pub/itu-r/oth/0c/0a/ROCOA00000D0018PDFE.pdf

²⁸ "Hiber partners with Inmarsat for IoT satellite network" - <https://spacenews.com/hiber-partners-with-inmarsat-for-iot-satellite-network/>

platforms that use currently allocated satellite bands. We are monitoring these recent commercial shifts to better understand the current market trends in this area and whether this is an indication of more effective use of current spectrum capacity for satellite based narrowband IoT data gathering.

Question 11:

What are your views on the need for additional satellite allocations in support of narrowband IoT “M2M” type applications, noting that there remains the continued use of PMSE for wireless cameras in the band 2010 – 2025 MHz?

6.5 Agenda Item 1.19 – Fixed-satellite service in 17.3-17.7 GHz, for space to earth direction, in Region 2

- 6.5.1 The use of the band 17.3-17.7 (and up to 18.1) GHz by geostationary satellites in the earth to space direction, is limited to feeder links for broadcasting satellite services. This qualification is recognition of the fact that feeder links to broadcasting satellites (where ‘feeder link’ describes transmission of the primary content for the more general broadcast from the satellite) are assumed to be limited in number.
- 6.5.2 This item is limited in scope to the consideration of Region 2 only. The UK would only expect to take a view on the proposals, in this region, where it can be shown it would have a material impact on UK operations or interests. At this stage no impacts to UK operations or interests have been identified. Whilst the UK is the filing administration for a number of international satellite operators with interests outside of the UK, we do not feel inclined to take an overtly positive or negative position on this item, noting the focus on ITU region 2.

Question 12:

What are your views on the proposed approach to this agenda item concerning the fixed satellite service in 17.3-17.7 GHz in Region 2?

6.6 Agenda Item 7 – satellite coordination procedures.

- 6.6.1. Resolution 86²⁹ is a standing item to deal with “deficiencies and improvements” to the satellite filing procedures. There is potential for significant issues to be raised under this agenda item which may impact satellite users and operators, noting the complexity of these procedures and the impact that regulatory changes might have on the deployment plans for satellite operators.

²⁹ RESOLUTION 86 (Rev.WRC-07) Implementation of Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference https://www.itu.int/dms_pub/itu-r/oth/14/02/R14020000010001PDFE.pdf

- 6.6.2. There is a relationship between this agenda item and ITU initiatives to improve implementation of the satellite filing procedures, as seen through ITU Radiocommunication Bureau (BR) Circular Letters and Workshops, on the efficient use of satellite resources.
- 6.6.3. Issues under this agenda item tend to increase in number as the preparatory process for each WRC advances. At this stage several issues have been identified on different aspects of the satellite procedures. They address modifications to several WRC Resolutions that are referenced in the provisions of the Radio Regulations related to the satellite filing process. More information on these topics is listed at <https://www.itu.int/en/ITU-R/study-groups/rcpm/Pages/wrc-23-studies.aspx>.
- 6.6.4. Although there are a number of topics that will be addressed under this agenda item, there are two that have generated particular discussion in the UK;

Topic B: Post milestone reporting:

We support development of a post milestone procedure to ensure that non-GSO systems maintain their deployment as per the notified parameters. We understand that some temporary flexibility in the number of satellites deployed may be necessary compared to the number of satellites recorded in the Master International Frequency Register (MIFR).

Topic L: Telemetry, Tracking and Command (TT&C) for NGSO in-orbit servicing:

We support a clarification on the regulatory status for satellite links where these are used for in-orbit servicing of non-geo-stationary satellites. Whilst we acknowledge there are coordination issues around access to spectrum for satellite use in general, we do not at this stage see a need for additional spectrum allocations or a need for a different class of station for in orbit servicing.

Question 13a:

On Topic B, what are your views on the post milestone procedures for non-geostationary satellite systems?

Question 13b:

On Topic L, what are your views on regulatory conditions for Telemetry, Tracking and Command (TT&C) for NGSO in-orbit servicing?

Question 13c:

What are your views on the remaining topics currently listed for Agenda Item 7?

6.7 Article 48 of the ITU constitution.

- 6.7.1. Article 48 of the ITU constitution recognises that; “Member States retain their entire freedom with regard to military radio installations”.
- 6.7.2. Whilst this provision applies to any radio service, in the context of satellite use, certain provisions relating to the notification of satellite systems can be abrogated where the administration declares that use is by military radio installations. The Radio Regulations Board (RRB)³⁰ have, over the past few years, received concerns from some administrations regarding inappropriate use of Article 48 of the ITU constitution. In particular, concerns have been raised about this Article being used to avoid investigations into recorded frequency assignments for satellite systems which have not been brought into use, which are no longer in use, or which continue to be in use but not in accordance with the notified characteristics. In these circumstances administrations have, in the opinion of the cases brought to the attention of the RRB, invoked Article 48 for frequency assignments which do not seem to be used for military purposes.
- 6.7.3. Changes to the ITU Constitution are discussed in committees outside the WRC. Any changes to Article 48 would be undertaken at the ITU Plenipotentiary Conference (due to take place in September/October 2022) and comments regarding that conference are not being sought as part of this consultation.
- 6.7.4. However, any resulting changes to Article 48 might impact elements of the satellite coordination processes, the maintenance of which might require changes to the Radio Regulations which is done at a World Radiocommunication Conference (WRC). Ofcom and Government are engaged on this issue, although UK is not one of the countries that had brought concerns to the RRB.
- 6.7.5. We understand the concerns that some in the satellite industry have identified with the alleged abuse and inappropriate use of Article 48. However, we must also ensure that administrations retain their freedom regarding military installations.

³⁰ Radio Regulations Board <https://www.itu.int/en/ITU-R/conferences/RRB/Pages/default.aspx>

We are aware that some proposals could require publication of invocation (or intention of invocation) of Article 48 before the notification of a satellite network, which could potentially limit Administrations' ability to invoke the Article in some circumstances. We are therefore working closely with Government to ensure that UKs defence interests are safeguarded.

- 6.7.6. Decisions taken at the ITU Plenipotentiary Conference 2022 (PP-22), and the Governments objectives on this issue, will frame whether and what changes might be needed to the ITU Radio Regulations at WRC-23. As a result, any UK position on this issue will be developed at a later stage, taking into account the results from PP-22.

Question 14:

Noting that any UK position will be developed only after the ITU Plenipotentiary Conference, do you have any comments relating to the use of Article 48 that may be addressed at WRC-23?

7. Transportation Matters

This section addresses the following WRC-23 agenda items:

- 1.6 International regulatory provisions for Sub Orbital Vehicles
- 1.7 Aeronautical VHF communications via satellite
- 1.8 Unmanned aircraft systems use of fixed-satellite service (FSS) networks for control and non-payload communications
- 1.9 Use of digital technologies for commercial aviation safety-of-life applications in existing HF bands
- 1.10 Non-safety (“payload”) aeronautical mobile applications, in the 15 & 22 GHz bands
- 1.11 Modernization of the Global Maritime Distress and Safety System (GMDSS), and implementation of e navigation
- 9.1.b Review of 1240-1300 MHz, where allocated to the Amateur and Radionavigation Satellite services

7.1 Agenda Item 1.6 – International regulatory provisions for Sub Orbital Vehicles (SOV)

- 7.1.1. WRC-19 considered the existing regulatory provisions and procedures related to the international recognition of the use of relevant frequency assignments by stations on board sub-orbital vehicles. That work did not lead to any regulatory changes at that time, possibly because information on sub-orbital vehicles was still developing.
- 7.1.2. In ITU discussions sub-orbital vehicles are vehicles which are intended to operate at higher altitudes than conventional aircraft and which have a sub-orbital trajectory. Where sub-orbital vehicles fly through the lower levels of the atmosphere they are expected to operate in the same airspace as conventional aircraft. These vehicles may perform various missions (e.g., conducting scientific research or providing transportation) and then return to the Earth’s surface without completing a full orbital flight around the Earth. There are also some discussions that sub-orbital flights might be used to launch satellites (i.e., predominately non-geostationary satellites). Within CEPT the currently agreed definition of an SOV is that which is documented in ITU-R³¹ “to be an intentional flight of a vehicle expected to reach the upper atmosphere with a portion of its flight path that may occur in space without completing a full orbit around the Earth before returning back to the surface of the Earth.”

³¹ Radiocommunications for suborbital vehicles Report ITU-R M.2477
<https://www.itu.int/pub/publications.aspx?lang=en&parent=R-REP-M.2477-2019>

- 7.1.3. Communication with sub-orbital vehicles will include voice/data communications, navigation, surveillance, and telemetry-tracking and control, with an obvious acknowledgment that some of the communications will be concerned with safety communications. During certain phases of flight, a sub-orbital vehicle will be considered as a conventional aircraft meaning there will be a need to ensure that equipment installed on the vehicle can communicate with air traffic management systems and relevant ground control facilities. It is often reflected that, from a regulatory perspective, sub-orbital flights might be viewed as a rocket in the initial stages of flight, then an aircraft and even as a satellite at certain altitudes (returning as an aircraft during decent and landing).
- 7.1.4. The UK Government has recently announced its plans to develop space launch capabilities at several UK locations³². These sites might additionally be suitable for the launch of sub-orbital vehicles. Whilst a vertical launch of a rocket, or vehicle, from the territory of a country remains a national consideration for the initial stages, once it moves outside the segregated airspace of a country, or where it moves into outer space, international frameworks come into consideration. Those international frameworks include the use of spectrum.
- 7.1.5. Therefore, the launch and use of sub-orbital vehicles have both an aviation and space regulations consideration. As a result, Ofcom is working closely with both the UK's Civil Aviation Authority (CAA) and the UK's Space Agency (UK SA) on this agenda item, noting also that the use of spectrum, by SOVs, has both a national and international context. Recognising these linkages, Ofcom is currently supportive of the creation of an international spectrum regulatory environment, which facilitates communications, navigation, and surveillance related to the movement of SOVs, whilst ensuring that existing radiocommunications services are also sufficiently protected.
- 7.1.6. SOVs will contribute only a small increase to total aviation traffic and the existing frameworks for aviation and satellite spectrum use will continue to apply. The main consideration under this agenda item is to ensure that there is clarity for SOV spectrum use within these current frameworks. We would also like to ensure a flexible approach to the use of different services that can already operate with aircraft and satellites, whether for safety applications or for non-safety communications related to services on board the SOV. The current international work has not identified a need for any additional internationally designated safety spectrum for SOV and the UK has equally not identified any need for additional spectrum for SOVs.

³² British spaceflight to become reality as government provides launchpad for spaceports
<https://www.gov.uk/government/news/british-spaceflight-to-become-reality-as-government-provides-launchpad-for-spaceports>

Question 15:

What are your views on the need to establish an international regulatory environment for sub-orbital vehicles, which at the same time does not limit flexibility of spectrum options, and retains international safety considerations?

7.2 Agenda Item 1.7 - Aeronautical VHF communications via satellite

- 7.2.1. As is reflected elsewhere in this document, the speed of development and falling cost of launching non-geostationary satellites has realised additional potential for their use for traditional terrestrial based communications. One of the potential uses of non-geostationary satellites is to allow for the use of VHF aeronautical communications in areas where ground-based transmitters are out of range and cannot be located (e.g. coverage when aircraft are over large oceanic areas, polar or vast rural areas).
- 7.2.2. It should be stressed that communications with aircraft, over these large remote areas, has always been possible via High Frequency (HF) radio and via satellite terminals (i.e. Inmarsat and Iridium). The proposal here would be to create a recognised and robust regulatory environment to allow for the movement of these VHF aeronautical communications via satellite. Consequently, this should be viewed as an enhancement to aeronautical communications, to those existing communications platforms already in place and used operationally.
- 7.2.3. The agenda item will not identify additional VHF allocations for aeronautical use, but is looking at the compatibility issues between existing ground-based VHF systems and satellite carried VHF aeronautical use. To this end, within ITU, interested parties are working on a Report to address these technical issues (i.e. Working document related to WRC-23 agenda item 1.7 - Space-based aeronautical VHF communications in 117.975 - 137 MHz frequency band, ITU-R Working Party 5B).
- 7.2.4. These activities in ITU are looking to assess this compatibility between the intra aeronautical use (i.e., terrestrial based and satellite based) and those services adjacent to the VHF aeronautical band (117.975 – 137 MHz). Where such compatibility can be shown to be met, there does not seem to be any regulatory impediment that would prevent this satellite delivered VHF aeronautical service from being recognised.

- 7.2.5. However, we do acknowledge that this might require a reappraisal of the individual frequency assignments made in accordance with ITU-R provisions³³ in both the Earth-to-space and space-to-Earth directions of aeronautical VHF communications. The International Civil Aviation Organisation (ICAO) have provisions (Standards and Recommended Practices SARPS) which detail the frequency assignment planning mechanisms.
- 7.2.6. Internationally, CEPT currently supports a new primary allocation to the Aeronautical Mobile Satellite - Route - Service (AMS(R)S³⁴) in the Earth-to-space and space-to-Earth directions in all or part of the frequency band 117.975-137 MHz. This would be for internationally standardised aeronautical systems. That CEPT support is predicated on ensuring protection of services in adjacent bands and not constraining these adjacent services.

Question 16:

Do you agree that where the adjacent band compatibility issues are addressed and ICAO coordination processes are not compromised, that the addition of an aeronautical satellite (AMS(R)S) allocation to the band can be supported?

7.3 Agenda Item 1.8 - Unmanned aircraft systems use of fixed-satellite service (FSS) networks for control and non-payload communications

- 7.3.1. WRCs in 2012 and 2015 looked to address the potential for Unmanned Aircraft (UA) to make use of Fixed Satellite Service (FSS) allocations and FSS satellite networks. As UA are aircraft that will fly and communicate in the same way as manned aircraft, the assumption is that the same international regulatory environment would apply to both.
- 7.3.2. As before, the scope of this agenda item is addressing the safe operation of the UA only. Additional spectrum requirements, not directly related to the safe operation of UA, are not being considered under this agenda item (i.e., spectrum requirements for applications carried by the UA but not used to control it, known as 'payload'). This safe radio operation of UA is referred to as control and non-payload communications (CNPC).
- 7.3.3. The main issue that has been discussed for several WRC cycles is whether spectrum allocations, that are not considered as safety allocations, can be used for the control of unmanned aircraft. This has been a controversial topic as, to allow safety

³³ RESOLUTION 428 (WRC-19) Studies on a possible new allocation to the aeronautical mobile-satellite (R) service within the frequency band 117.975-137 MHz in order to support aeronautical VHF communications in the Earth-to-space and space-to-Earth directions; https://www.itu.int/dms_pub/itu-r/oth/0c/0a/ROCOA00000D0006PDFE.pdf

³⁴ Aeronautical Mobile Satellite (Route) Service: an aeronautical mobile-satellite service reserved for communications relating to safety and regularity of flights, primarily along national or international civil air routes

messages/UA control in bands that are not formally internationally recognised as safety bands, might be taken to imply a reduction of safety. One view is that it is important to only permit safety aeronautical communications (be it for manned, or in this case, unmanned aircraft) in bands that have this safety recognition articulated in the Radio Regulations. Another view is that, for individual cases, the use of bands that do not have safety recognition in the Radio Regulations may be permitted as the mere identification of a band in a regulation is only part of the overall safety considerations of a radio link or links. Here arguments are that the resilience of communications can be ensured through redundancy (i.e., more than one link for the same traffic).

- 7.3.4. It is on this point that discussions in ICAO (International Civil Aviation Organisation) have a bearing. ICAO produce Standards and Recommended Practices (SARPs³⁵) for aviation systems and processes. SARPs are intended to assist States in managing aviation safety risks, in coordination with their Service Providers (e.g. for UK - Air Navigation Service Providers - ANSP³⁶).
- 7.3.5. As we have reflected in publications for previous WRCs (where this issue has been discussed), whether FSS spectrum allocations meet the technical requirements required for UA systems is a matter for technical study and these studies are being conducted in ITU and CEPT. In addition, ICAO would need to supply detailed technical information into the process for a full assessment to be undertaken. ICAO would also need to provide a final endorsement, following their assessment, before any new arrangement could be implemented via ICAO SARPs.
- 7.3.6. Ofcom has no role in aviation regulation but does have a role to promote the optimal and efficient use of spectrum. This is one of our statutory duties and, outside the consideration of aviation regulatory requirements, Ofcom can see the benefits delivered through the more efficient use of fixed satellite spectrum. In this situation, from an efficient spectrum use perspective, Ofcom considers that ITU should not be the international body that limits the potential use of FSS allocations and/or networks for UA that fly internationally. The ultimate safety considerations would rightly be for ICAO to decide upon, and ITU should not take decisions based upon aviation safety considerations, for which it is not the competent body.
- 7.3.7. One final point is that Ofcom would not propose or support designating all FSS allocations for safety (i.e., overlay an AMS(R)S allocation into FSS bands). This is because this would then limit the future potential for sharing these bands with other applications and potentially limit the flexibilities already enjoyed by satellite systems today

³⁵ "SARPs - Standards and Recommended Practices" <https://www.icao.int/safety/safetymanagement/pages/sarps.aspx>

³⁶ "Guidance for Air Navigation Service Providers (ANSPs)" <https://www.caa.co.uk/commercial-industry/airspace/air-traffic-control/air-navigation-services/certification-and-designation/certification-and-designation/>

Question 17:

Do you agree that functions related to international aviation safety are a matter for ICAO? On this basis, and absent any contrary information from ICAO, should the UK support the development of an international spectrum regulatory framework for UA use of FSS that would support efficient use of spectrum?

7.4 Agenda Item 1.9 - Use of digital technologies for commercial aviation safety-of-life applications in existing HF bands

- 7.4.1. For some years aviation use of some frequencies in the High Frequency (HF) range 2.85 and 22 MHz has provided long range communications for aircraft. An Appendix of the Radio Regulations (Appendix 27³⁷) provides a plan for assignments for audio voice communications and slow speed data communications in the frequency range noted. This form of communication was the original long range communication mechanism for aircraft, whereas today this is complemented with satellite communications.
- 7.4.2. Following discussions with the UK's CAA, the UK supported a proposal from CEPT for an Agenda Item for WRC-23 that would look to make changes to the Appendix 27 plan, in support of a modification of the aeronautical HF assignment plan.
- 7.4.3. The scope of the agenda item recognises the availability of advanced digital technologies and the demonstrated capabilities of aeronautical wideband HF. These capabilities might require contiguous or non-contiguous channel aggregation to deliver faster data rates and better voice communications. However, any digital modernisation would have to technically coexist with existing aeronautical analogue voice and data HF systems.
- 7.4.4. There has been, up to this point, little progress on this agenda item. Part of this lack of progress appears to be a diminishing industry interest in the subject. Also, any transitional plan to facilitate this digital modernisation would still require extensive discussion and agreement before global agreements could be finalised. Therefore, recognising these two points, UK is considering moving towards a No Change position under this agenda item.

³⁷ APPENDIX 27 (REV.WRC-19) Frequency allotment Plan for the aeronautical mobile (R) service and related information (available within the document pack <https://www.itu.int/pub/R-REG-RR-2020>)

Question 18:

Recognising the recent diminishing industry interest in this item relating to possible modification of the aeronautical HF assignment plan, and the general lack of global interest, do you agree that UK move towards a No Change proposal under this agenda item?

7.5 Agenda Item 1.10 – Non-safety (“payload”) aeronautical mobile applications, in the 15 & 22 GHz bands

- 7.5.1. This item is to look at the potential for new non-safety “payload” aeronautical mobile applications for air-air, ground-air, and air-ground communications of aircraft. Two bands are currently in focus; 22-22.21 GHz and 15.4-15.7 GHz. The spectrum would be in support of applications such as fire surveillance, border video surveillance, air quality and environment monitoring, traffic monitoring, disaster monitoring, terrain modelling, and imagery (visible, infrared, radar, meteorological).
- 7.5.2. As is common practise, the technical compatibility issues are being discussed at both a European and International level. The UK has specific interest in both bands: we have existing Government interest in the 15 GHz band (and Radio Astronomy in the band adjacent) and fixed point to point interest in the 22 GHz band.
- 7.5.3. At a European level, there is seen to be a need for additional spectrum to fulfil the increasing demand for non-safety aeronautical applications. One way to satisfy this need would be through potential new allocations to the aeronautical mobile service (AMS) for non-safety applications in the whole range, or a part of, the frequency bands as noted. Any regulatory changes would need to recognise the appropriate protection for internationally allocated services such as the earth exploration satellite service (EESS), space research service (SRS) and the radio astronomy service (RAS) in the band adjacent to the 15 GHz range.

Question 19:

What are your views on the need for additional spectrum, specifically in the 15 and 22 GHz bands, for non-safety aeronautical use?

7.6 Agenda Item 1.11 – Modernisation of the Global Maritime Distress and Safety System (GMDSS), and implementation of e navigation

- 7.6.1. This agenda item continues the work of previous conferences to modernise the GMDSS, develop e-navigation and broaden the pool of satellite systems in the GMDSS, consistent with the updating of the SOLAS Convention in IMO.

- 7.6.2. This item has a number of sub issues
- **Issue A:** Modernisation of GMDSS
There is general European support for possible regulatory actions needed to implement GMDSS modernisation in the Radio Regulation. This is in preparation for decisions that may be taken in the International Maritime Organisation (IMO).
 - **Issue B:** e-navigation
There is general European support, where reliant upon decisions in IMO, for possible regulatory actions needed to implement e-navigation in the Radio Regulations, as appropriate.
 - **Issue C:** Introduction of additional satellite systems into the GMDSS by IMO
There is general European support to introduce an additional satellite system into the GMDSS, based on decisions to be taken in the IMO.
- 7.6.3. Historically, most changes to the Radio Regulations for maritime services tend to be detailed modifications to the existing radio allocations for maritime mobile. This is where some more traditional applications (e.g., morse code) are replaced with more automated and improved applications. More recently this has seen changes to existing maritime allocations in the Medium Frequency (MF) and High Frequency (HF³⁸) ranges and in maritime allocations in the Very High Frequency Band (VHF³⁹).
- 7.6.4. E-navigation is a concept that has been under study by IMO for more than 10 years. If confirmed by IMO, the VHF Data Exchange System⁴⁰ (VDES) and the Digital Navigational Data System⁴¹ (NAVDAT) platform will become part of the e-navigation systems and the WRC can then react accordingly.
- 7.6.5. Regarding the introduction of additional satellite systems, WRC-19 introduced the IRIDIUM satellite network into the GMDSS. For this study cycle the Chinese satellite network BEIDOU is an additional candidate to be introduced into the GMDSS. The IMO has started the process for the validation of BEIDOU, and the results are expected to be known in time for decisions to be taken at WRC-23. The BEIDOU network is a geostationary mobile satellite system using the internationally recognised allocations in 1 610-1 626.5 MHz (Earth-to-space) and 2 483.5-2 500 MHz (space-to-Earth) bands
- 7.6.6. Presently proposals have been addressing elements of regulations that are no longer needed in support of the GMDSS. To this end it is proposed to remove the regulatory limitation of exclusive usage of Emergency Position Indicating Radio

³⁸ The frequency band 495-505 kHz is used for the international NAVDAT (Navigational data) system as described in the most recent version of Recommendation ITU-R M.2010 <https://www.itu.int/rec/R-REC-M.2010/>

³⁹ WRC-12, WRC-15 and WRC-19 reviewed Appendix 18 for the maritime VHF Data Exchange System (VDES) - <https://www.itu.int/rec/R-REC-M.2092/>

⁴⁰ VHF Data Exchange System (VDES) is a two-way VHF ship communications system using a global standard designed to support the digital evolution of the maritime community

⁴¹ NAVDAT is intended for the broadcast of data from shore-to-ship and is capable of high data throughput allowing broadcasts to carry images and other data as well as plain text.

Beacons (EPIRBs) in the frequency band 1 645.5 - 1 646.5 MHz to allow use for general maritime radiocommunication.

- 7.6.7. In summary and recognising the important link to the IMO (for which the UK lead is conducted by the Department for Transport and the Maritime and Coastguard Agency), the UK supports the ongoing work towards the modernisation of GMDSS.

Question 20:

What are your views on Agenda Item 1.11 and the proposed UK position to support modernisation of GMDSS?

7.7 Agenda Item 9.1 topic b – Review of 1240-1300 MHz, where allocated to the Amateur and Radionavigation Satellite Services

- 7.7.1 This agenda item topic was proposed and created in response to a small number of cases of harmful interference into certain radionavigation satellite service (RNSS) ground receivers in Europe. Those cases of interference were attributed to transmissions from the amateur service. Both the RNSS and the Amateur Service are internationally allocated to the 1240 – 1300 MHz band (in addition to other services). The RNSS use operates under a primary allocation and is for transmitting signals from satellites to ground based receivers for the purposes of positioning reporting. The Amateur use operates under a secondary allocation⁴² and is mainly used for hobby-based use by, typically, distance transmission tests, satellite communications and video beacon transmissions. In the UK an additional 25 MHz is made available for amateur users⁴³, where this additional 25 MHz is not shared with RNSS ground based receivers (i.e., the RNSS allocation in 1300-1350 MHz is Earth to space).
- 7.7.2 While the more familiar GPS (Global Positioning System) primarily uses the 1.5 GHz band, other platforms and systems such as GLONASS (Russian Federation), BeiDou (China) and Galileo (EU) also use or have plans to use, spectrum in the range considered by this agenda item. Notwithstanding this, the number of RNSS receivers that currently receive in the frequency band 1 240-1 300 MHz is limited in certain regions. However, RNSS proponents indicate this is expected to increase in the near future with the ubiquitous deployment of receivers used in mass-market applications. The EU Galileo satellite positioning and navigational platform currently makes use of frequencies⁴⁴ in the 1240-1300 MHz range, which would be receivable by services and devices in general usage in both Europe and beyond.

⁴² Stations of a secondary service: shall not cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date (Radio Regulation, Article 5.29)

⁴³ https://www.legislation.gov.uk/uksi/2014/774/pdfs/uksi_20140774_en.pdf

⁴⁴ Galileo E6 Band: 1260 MHz to 1300 MHz with a centre frequency of 1278.75 MHz

- 7.7.3 As the band 1240-1300 MHz is internationally allocated, on a primary basis, to RNSS (in the space to Earth direction) it could also prove to be a potential candidate band for any UK maintained application. However, any system design or suitable frequency bands will be a decision for Government.
- 7.7.4 In European discussions there is common acknowledgement that there is a need to support the protection of the RNSS. In support of that work the CEPT process is supporting the development of a new ITU-R Report or Recommendation to provide guidance for administrations on the shared use, between RNSS and Amateur, for the use of the frequency band 1240-1300 MHz.
- 7.7.5 As the UK has now left the European Union, the UK is no longer directly linked into the development of the Galileo satellite system and will not have access to the full suite of services available on it (although consumer and some industrial devices, that will receive the Galileo signal, are likely to be available in the UK). The UK Government is currently assessing its approach to satellite navigational requirements that are UK maintained. Noting this, the current UK view on this Agenda Item is that we understand the importance attached to ensuring the continuing coexistence between RNSS and Amateur services operating in the band. We would wish to see that any outcome proposed, from the internationally conducted technical studies, is proportionate and based on appropriate consideration of the operational and technical usage characteristics for both services.

Question 21:

What are your views on the approach to the review of 1240-1300 MHz, recognising that discussions concerning future satellite navigational needs for the UK are a matter for Government?

8. Science

This section addresses the following WRC-23 agenda items:

- 1.12 Spaceborne radars around 40-50 MHz
 - 1.13 Possible allocation upgrade, in 15 GHz, for the Space Research Service
 - 1.14 Potential remote-sensing observation needs in the band 231.5-252 GHz
 - 9.1.a Space Weather Sensors
 - 9.1.d Protection of EESS (passive) in the frequency band 36-37 GHz from non -GSO FSS space stations
- Resolution 655 Dissemination of time scales by radiocommunications services

8.1 Agenda Item 1.12 – Spaceborne radars around 40-50 MHz

- 8.1.1 There is an interest among climate researchers in spaceborne radars (i.e., active, transmitting earth exploration satellite service - EESS) operating within the band 40-50 MHz. These radars would be used to understand the global thickness, inner structure, and the thermal stability of the Earth's ice sheets and as such form an active part in monitoring any changes to this part of our environment.
- 8.1.2 Currently the technical work is looking at the compatibility between this new potential secondary status use with, fixed, mobile, space research, broadcasting, and radiolocation (i.e., radar) in the band and amateur radio use in the adjacent band. Making a secondary allocation for spaceborne radar will provide an element of regulatory certainty for this climate research activity, including for projects implemented by the European Space Agency that are part funded by the UK Space Agency.
- 8.1.3 The UK does have some defence interest in these bands. Ofcom will continue to liaise with relevant Government departments to understand these interests and to assess whether use by spaceborne radars would have any material impact upon them.

Question 22:

What are your views on a new spectrum allocation in the 40-50 MHz range to support and enhance climate monitoring, such as, environmental shifts in ice sheets?

8.2 Agenda Item 1.13 - Possible allocation upgrade, in 15 GHz, for the Space Research Service

- 8.2.1 The space research service (SRS) is an allocation that is used for space missions for communications predominately between objects located in space, such as for

inter-satellite links to relay data from space science missions in non-geostationary (non GSO) orbits, via geostationary orbiting (GSO) data relay satellites (DRS) that have a link to earth stations. SRS use would include crewed space vehicles and stations, however the increasing interest in use of robotic science missions has led to moves to provide greater regulatory certainty for this use. The frequency band 14.8-15.35 GHz is currently allocated on a primary basis to the fixed and mobile services, and on a secondary basis to the space research service (SRS).

- 8.2.2 The purpose of this agenda item is to explore the feasibility of establishing a regulatory framework to provide for the operation of SRS systems in this band on a primary basis, consistent with not causing harmful interference to, nor constraining, the operation of systems operating under other primary services in the band.
- 8.2.3 In the UK we have fixed links in operation in the band 14.5 - 15.35 GHz. While the studies are still ongoing⁴⁵, results so far appear to indicate that the inter satellite component of this operation of SRS will only cause interference in a very limited number of theoretical cases. The earth station component of this use would require coordination with fixed links, and we would consider this under our normal processes should we receive such requests. The band under consideration is also adjacent to a passive band 15.35-15.4 GHz.
- 8.2.4 Within CEPT there is currently support for this upgrade of the SRS allocation (i.e., from secondary to primary).

Question 23:

What are your views on upgrading the Space Research Service allocation, from secondary to primary, in the 14.8-15.35 GHz band?

8.3 Agenda Item 1.14 – Potential remote-sensing observation needs in the band 231.5-252 GHz

- 8.3.1 With the latest scientific and technology developments in passive microwave sensor measurements, internationally there is seen to be a need to review the frequency allocations to EESS (passive) in the 231.5-252 GHz frequency range that were agreed at the WRC in 2000.
- 8.3.2 One such development is the use of ice cloud imaging (ICI), an instrument designed and manufactured under the responsibility of ESA (European Space Agency) and which will be operated by EUMETSAT⁴⁶. This is in the context of the EPS-SG, the EUMETSAT Polar System – Second Generation programme. EPS-SG is a partnership programme also involving DLR (Deutsches Zentrum für Luft- und Raumfahrt –

⁴⁵ Current technical studies suggest that the worst-case scenario for this interference occurs when the GSO SRS satellite is located at 5 degrees elevation, and the fixed link stations are co-located with the SRS earth station.

⁴⁶ European Organisation for the Exploitation of Meteorological Satellites

which is Germany's national aeronautics and space research centre⁴⁷), CNES (Centre national d'études spatiales - the French government space agency⁴⁸) and the European space industry who are building and maintaining the satellites, instruments, Earth stations and ground based infrastructure. EPS-SG follows on from the current EUMETSAT Polar System (EPS) programme with its operational Metop satellites⁴⁹. It will secure the continuation of meteorological observations from the polar orbit in the 2022-2043 timeframe.

- 8.3.3 EPS-SG is Europe's contribution to the Joint Polar System to be shared with the US National Oceanic and Atmospheric Administration (NOAA).
- 8.3.4 The following weather and climate monitoring products will be provided by the ice cloud imaging instrument:
- Cloud-ice content (total column and gross profile)
 - Snowfall detection
 - Precipitation content (frozen; total column and gross profile)
 - Snowfall rate near the surface
 - Water-vapour profiles
- 8.3.5 This agenda item was proposed by CEPT to WRC-19 and is supported by the UK. The scope of the agenda item is a review of the existing allocations with a consideration of possible adjustments to the existing allocation or possible new primary frequency allocations to EESS (passive) in the frequency range 231.5-252 GHz. Part of that consideration is to ensure that the allocations to EESS (passive), within the considered range, correspond to the current observation requirements for satellite passive microwave sensing.
- 8.3.6 One potential option being discussed, as a way to satisfy the overall aims of this agenda item, is a proposal that would see a shift of the allocations to the Fixed and Mobile services that are also in the range to remove the already calculated incompatibility between this use with a possible new allocation to the EESS (passive). This would effectively defragment the allocations in the band providing more contiguous blocks for both fixed/mobile use and EESS (passive).
- 8.3.7 In Ofcom's Spectrum Roadmap document⁵⁰, we mentioned the likely emerging interest in frequency ranges above 100 GHz. The defragmentation of these bands, as proposed by some proponents, would potentially help to provide for greater contiguous spectrum block sizes and could provide greater regulatory certainty for users over the longer term.

⁴⁷ https://www.dlr.de/DE/Home/home_node.html

⁴⁸ <https://cnes.fr/en/>

⁴⁹ EUMETSAT operated Metop-B and -C satellites, circle the globe (via the poles) at an altitude of 817 km continuously collecting data via the satellite's payload of eight main instruments. This provides data essential for weather forecasting for up to 10 days ahead, in addition to climate monitoring.

⁵⁰ https://www.ofcom.org.uk/_data/assets/pdf_file/0021/234633/spectrum-roadmap.pdf

Question 24:

What are your views on the potential for defragmentation in this band to facilitate both EESS (passive) use and provide for larger contiguous blocks for fixed & mobile allocations?

8.4 Agenda Item 9.1 topic a – Space Weather Sensors

- 8.4.1 The UK's Metrological Office has significant interests in space weather and operates one of three space weather prediction centres around the globe (with the others in the USA and Australia). This programme is centrally funded by the UK Government through the Department for Business, Energy & Industrial Strategy (BEIS). Space weather is recognised as a significant potential threat by the UK Government and was added to the National Risk Register (NRR) of Civil Emergencies in 2011.
- 8.4.2 Severe space weather events can have potentially significant impacts on the UK's critical national infrastructure and the UK Met Office provides 24/7 forecasts and warnings of space weather for Government and responder communities, critical national infrastructure providers and the public.
- 8.4.3 At an International Radio Regulatory level, we consider that recognition of the use of these space weather sensors is an important requirement which needs to be protected by appropriate international regulation. Currently space weather sensors and the frequencies used vary between countries and this Agenda Item is looking to provide some commonality and status to this important environmental monitoring activity.
- 8.4.4 Although a wide range of space weather sensors currently operate relatively free of harmful interference, the wider radio interference environment could change as a result of changes made to the Radio Regulations at future WRCs (i.e., new allocations to other services). This could put space weather sensors effective operation at risk.
- 8.4.5 The UK and the CEPT supported the establishment of this Agenda Item at WRC-19. At the present time, the European and international work is focusing on how best to describe these space weather sensors within the international regulatory environment to provide greater regulatory certainty. At the same time, it is important that recognition does not unduly limit (via any subsequent definition) the use of these sensors. International recognition of space weather sensors would be provided by a formal description in the Radio Regulations ("Volume I, Articles 1⁵¹ and 4⁵²").
- 8.4.6 It is expected that the discussion and formalisation of the appropriate and internationally recognised spectrum bands for Space Weather Sensors may be

⁵¹ "Terms and definitions"

⁵² "Assignment and use of frequencies"

considered at a future WRC, Any such future consideration will not affect the continued use of nationally supported space weather sensors.

Question 25:

Do you agree that formal international recognition for Space Weather Sensors should be implemented in the Radio Regulations?

8.5 Agenda Item 9.1 topic d – Protection of EESS (passive) in the frequency band 36-37 GHz from non-GSO FSS space stations

- 8.5.1 This agenda item is considering the follow up activities to an agenda item concluded at WRC-19⁵³. That item was working on the development of a regulatory framework for non-GSO FSS satellite systems that may operate in a variety of bands between 37.5 – 51.4 GHz. However, EESS (passive) services are also allocated and operate in the 36-37 GHz band and this part of the agenda item was not fully concluded upon in 2019.
- 8.5.2 As a result, there has been further study in ITU on this matter to look at how to best accommodate the protection limits for EESS (passive) from FSS satellites operating in the adjacent band. That work has established two protection limits that would be applied to non-GSO satellites to protect EESS (passive) services.
- an unwanted emission e.i.r.p. limit of -34 dBW/100 MHz in the band 36-37 GHz, for all angles greater than 71.4 degrees from nadir, from FSS non-GSO space stations operating in the frequency band 37.5-38 GHz with constellations of more than 1000 satellites at altitudes below 970 km for the protection of EESS (passive) measurement channels, or
 - an unwanted emission power limit of -29.2 dBW/100 MHz in the band 36-37 GHz from FSS non-GSO space stations operating in the frequency band 37.5-38 GHz with constellations of more than 1000 satellites at altitudes above 400 km for the protection of EESS (passive) cold calibration channels.
- 8.5.3 In CEPT there is support for such protection limits to be established and documented, and the group is discussing which of these two limits is appropriate and proportionate, recognising the needs of both EESS (passive) and non-GEO satellite systems. Additionally, CEPT is assessing the most appropriate way to accommodate the selected limit at an international regulatory level.

⁵³ WRC-19 Agenda Item 1.6 : to consider the development of a regulatory framework for non-GSO FSS satellite systems that may operate in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space), in accordance with Resolution 159 (WRC-15)

Question 26:

What are your views on the limits proposed to protect EESS (passive) under Agenda Item 9.1 topic d) and do you have any views on which of these limits might be accommodated in the Radio Regulations and how?

8.6 Resolution 655 (WRC-15) – Dissemination of time scales by radiocommunications systems

- 8.6.1 The World Radiocommunications Conference in 2015 (WRC-15) considered an agenda item to look at what would be the appropriate time scale to be disseminated by radio communications systems. This agenda item was agreed following the non-agreement, in other ITU-R committees, on the modification of a historical ITU Recommendation that states the time scale to be disseminated. This Recommendation effectively addresses whether the Universal Standard Time (UTC) reference should include the leap second. WRC-15 could not conclude on the matter, which arguably runs wider than just radiocommunications services, but a Resolution was agreed. This outcome and associated Resolution acknowledge that radiocommunications systems are just one element relevant to the dissemination of time and that other factors, which are outside the remit of ITU-R, also need to be considered.
- 8.6.2 By way of background, the leap second has been inserted into UTC as the rotation of the earth does not follow the standardised time reference as maintained by the International Bureau of Weights and Measures (BIPM⁵⁴), and national scientific bodies⁵⁵. That committee defines how long a ‘second’ lasts which is documented as a quantifiable number of cycles of a particular nuclear isotope⁵⁶. In common parlance this is described as atomic time. As atomic time does not allow for the variation in the earth’s rotation, the common practise has been to insert, or on occasions remove, a second from the disseminated time scale. Historically this has typically been done about once every 3-4 years.
- 8.6.3 The above Resolution provided for a review of activities at WRC-23 but no new agenda item was proposed or agreed. Currently in ITU there are technical discussions on the issues related to the insertion/removal of a leap second from the disseminated time scale. Some operators of global navigational systems (such as; Galileo and the Global Positioning System - GPS etc.) have argued that the insertion of leap seconds is difficult and burdensome to accommodate. They assert this is because it introduces uncertainty into those systems which have a critical

⁵⁴ <https://www.bipm.org/>

⁵⁵ The current UK atomic clock system is maintained by the National Physical Laboratory (NPL) - <https://www.npl.co.uk/products-services/time-frequency>

⁵⁶ <https://www.bipm.org/en/si-base-units/second>

reliance upon time. Outside the radiocommunications sector, the financial industry has previously made similar observations.

- 8.6.4 WRC-15 did not conclude on this matter and WRC-19 did not agree a new agenda item. The length of a second and the use, or not, of leap seconds in UTC is not a matter of spectrum regulation and recent CEPT and ITU discussions recognise this fact. Moreover, these discussions have acknowledged that the decisions of other committees will define whether a leap second should, or should not, be used in global time. That evaluation process is undertaken by the International Bureau of Weights and Measures (BIPM) and its quadrennial conference, the General Conference on Weights and Measures (CGPM⁵⁷).
- 8.6.5 The next meeting of the CGPM is due to take place in the Autumn of 2022, and we expect that any consequential decisions taken at WRC-23, on the time standard to be disseminated by radiocommunications systems, will be wholly directly by any outcomes of that conference. This is in part because the time scale agreed there would be one adopted by organisations who do not obtain their time reference from radiocommunications systems (e.g., the internet) and it would therefore be inconsistent to have conflicting time scales in global use. The UK Government lead activities in the CGPM.

Question 27:

Do you agree that the formalised time reference in common global use, is not a matter of spectrum regulation?

⁵⁷ <https://www.bipm.org/en/committees/cg/cgpm>

9. Standing Agenda Items & Ad Hoc Issues

- 9.1.1 This section addresses some of the standing Agenda Items which cover a range of recurring, reporting and housekeeping issues. It also addresses one ad hoc issue that might be addressed at WRC-23, but which is not a formal WRC agenda item. Some of the more significant of these issues are discussed below while others are dealt with in other parts of this document. The UK view on many of these Agenda Items will be developed much closer to the start of WRC-23.
- 9.1.2 The listed Agenda items below cover activities viewed as Radio Regulations housekeeping tasks. For example, when a Recommendation which is referenced in the Radio Regulations is updated, should the reference be to the old or new version; WRC Resolutions that need to be suppressed or updated; and countries who wish to remove their name from a footnote frequency allocation. The purpose of these agenda items is to cover the areas where action may be needed but is not addressed in other areas. This is an important but not usually a controversial exercise.
- Agenda Item 2 - ITU-R Recommendations incorporated by reference;
 - Agenda Item 3 - Consequential changes to the Radio Regulations;
 - Agenda Item 4 - Review of WRC Resolutions and Recommendations;
 - Agenda Item 5 - Report from the Radiocommunication Assembly;
 - Agenda Item 6 - Items requiring urgent action by the study groups.
 - Agenda Item 8 – Deletion of, or removal of names from, country footnotes

Question 28:

Do you have any comments concerning the Standing Agenda Items, where not covered elsewhere in this document?

This section addresses the following WRC-23 agenda items:

- 8 Deletion of, or removal of names from, country footnotes
- 9.2 Difficulties or inconsistencies encountered in the application of the Radio Regulations
- 9.3 Action in response to Resolution 80
- 10 Future WRC Agenda Items

WRC-19 Doc 550 IMT stations that use an antenna that consists of an array of active elements

9.2 Agenda Item 8 Deletion of, or removal of names from, country footnotes

- 9.2.1. This item concerns the deletion of, or removal of names from, country footnotes. These footnotes, to the table of frequency allocations in the Radio Regulations, provide alternative arrangements for named countries. The removal of names from country footnotes, under this agenda item, presents a relatively straightforward exercise in checking the need for the various footnotes in which the UK appears and as such is a low priority.
- 9.2.2. However, it should be noted that there is also a need to check proposals from other countries to ensure that there is no adverse impact to the UK, e.g., if a country withdraws from a footnote which was giving a more favourable co-ordination situation than the table allocation. This can normally only be done relatively late in the process and sometimes only during the conference itself.

Question 29:

Do you have a view on any of the footnotes to which UK is a party?

9.3 Agenda Item 9.2 – Difficulties or inconsistencies encountered in the application of the Radio Regulations

- 9.3.1. Agenda Item 9 concerns the Report from the Director of the Radiocommunication Bureau which is submitted to each WRC. One aspect of this is Agenda Item 9.2 which deals with the part of the Director's Report which summarises the experiences of the Radiocommunication Bureau in administering the Radio Regulations. This includes any difficulties and inconsistencies encountered in the application of the relevant provisions.
- 9.3.2. An initial version of this part of the Director's Report is normally made available shortly before the second session of the Conference Preparatory Meeting (CPM), to be held in the first half of 2023. A final version is then made available between the CPM and the WRC. The Report can cover a wide range of issues and contains the Bureau's suggestions for how these might be addressed. The Bureau cannot make formal proposals to the WRC, and so any suggestions made in this part of the Report need to be supported by a proposal from at least one administration to be considered by the WRC.
- 9.3.3. One issue that the Director may cover in his Report concerns discussions related to Resolution 655 (WRC-15), "Definition of time scale and dissemination of time signals via radiocommunication systems" in ITU. We reflect in more detail on this matter in Section 8.6.

Question 30:

Are you aware of any specific issues, not covered elsewhere in this document, which are likely to be raised in this part of the Director's Report and of which you think Ofcom should be aware?

9.4 Agenda Item 9.3 - Action in response to Resolution 80

- 9.4.1. Resolution 80, which links certain general provisions of the ITU Constitution and the Preamble with the coordination and notification procedures in the Radio Regulations, can prove highly controversial. However, any such issues are likely to arise later in the preparatory process and possibly only at the Conference itself. There has been little activity on this topic to date in the preparations for WRC-23 and no firm CEPT or UK positions have so far emerged.

Question 31:

Do you have any comments on Agenda Item 9.3 considering Resolution 80?

9.5 Agenda Item 10 - Future WRC Agenda Items

- 9.5.1 This is a standing item that prepares the provisional agendas for future WRCs. Given the continuing pressure on the finite spectrum resource and the constant pace of development, discussion around future agendas can be contentious and time consuming. Whilst the focus of this agenda item is on the preparation of the agenda for the next WRC (in this case WRC-27), the agenda item also looks at potential proposals for the conference 8 years ahead.
- 9.5.2 Discussions within CEPT on this topic started recently and initially focused upon the items CEPT had proposed into WRC-19, for the WRC-23 agenda, but which were deferred to the preliminary agenda for WRC-27. No decisions have yet been made, either in the UK or CEPT, on what items of the provisional WRC-27 agenda should continue to be supported or what new items should be considered. The UK will be taking an active role in discussions under this Agenda Item and will expect to work closely with UK industry and other stakeholders, as well as with colleagues in CEPT.
- 9.5.3 In very preliminary discussions, suggestions have been made to assess the potential for a future agenda item for IMT identification in additional frequency bands, possibly in support of 6G. The exact frequency bands that might be studied and considered for IMT identification are only now being raised in international discussions and Ofcom will expect to play an active role in assessing any bands and their suitability for consideration. In particular, we expect two proposals to emerge in these European and International discussions. Firstly, we expect one proposal to be for ranges above 100 GHz and secondly for ranges between approximately 7

GHz and 20 to 24 GHz. Ofcom is yet to establish a view on either of these potential proposals at this stage.

- 9.5.4 As was noted in the introduction to this document, a WRC amends the Radio Regulations to facilitate global or regional spectrum use for services where it is considered that such harmonisation is necessary. In addition, the Radio Regulations provide for countries to divert from these provisions and to exercise national decisions, where they do not impact other countries use. Therefore, any changes to the Radio Regulations need to be taken in that context and any proposals for changes, to this treaty level document, should be appropriately justified and demonstrated to be necessary.

Question 32:

What changes to the Radio Regulations have you identified that would benefit from action at a WRC and why? Do you have any proposals regarding UK positions for future WRC agenda items or suggestions for other agenda items, needing changes to the Radio Regulations, that you would wish to see addressed by a future WRC?

9.6 WRC-19 Doc 550 - IMT stations that use an antenna that consists of an array of active elements

- 9.6.1 In the latter discussions at WRC-19, on IMT identification in the 26 GHz band (i.e., 24.45 - 27.5 GHz), some administrations questioned the technical detail that is provided when administrations wish to notify their 26 GHz IMT assignments to the ITU for inclusion in the Master International Frequency Register. This notification process is a relatively routine and voluntary activity where administrations wish to have their usage of a particular service formally recognised in this regularly published register of assignments.
- 9.6.2 The questions raised at WRC-19 related to the use of active array antennas where such newer types of antennas are not limited in the way traditional physical antennas are. Active Array Antennas, which are now becoming common in mobile networks, can direct high gain antennas at individual users dynamically, which cannot be done with static passive antennas. The ITU term for these is Advanced Antenna Systems (AAS)
- 9.6.3 As the Radio Regulations were drafted when static antennas were the norm, meaning that the maximum gain of such would be in one direction (or in the case of omni directional antennas, no gain in all directions), the dynamic nature of these AAS do not fit the requirements currently used for assignment notification.
- 9.6.4 As a result of this concern raised by some administrations, an output (document 550) from WRC-19 was agreed that stated;

“ITU-R is invited to study, as a matter of urgency, the applicability of the limit

specified in No. 21.5 of the Radio Regulations to IMT stations, that use an antenna that consists of an array of active elements, with a view to recommend ways for its possible replacement or revision for such stations, as well as any necessary updates to Table 21-2 related to terrestrial and space services sharing frequency bands. Furthermore, the ITU-R is invited to study, as a matter of urgency, verification of No. 21.5 regarding the notification of IMT stations that use an antenna that consists of an array of active elements, as appropriate."

It is worth noting that this output does not place a specific requirement on WRC-23 to conclude on this matter.

- 9.6.5 Article 21.5 of the Radio Regulations documents the limits that terrestrial stations, predominantly fixed and mobile (which includes maritime mobile and aeronautical mobile) can radiate to offer an expected level to be received at space borne services (fixed and mobile satellite, earth exploration etc.)
- 9.6.6 CEPT has identified the following 3 Issues:
- **Issue A:** This will encompass the following elements, set out in WRC-19 document 550:
the applicability of the limit specified in No. 21.5 of the Radio Regulations to IMT stations that use an antenna that consists of an array of active elements to recommend ways for the possible replacement or revision of No. 21.5 for such stations
 - **Issue B:** Furthermore, the ITU-R is invited to study, as a matter of urgency, verification of No. 21.5 regarding the notification, under the provision of RR 2020 Edition, of IMT stations that use an antenna that consists of an array of active elements, as appropriate.
 - **Issue C:** Any necessary updates to Table 21-2 related to terrestrial and space services sharing frequency bands
- 9.6.7 On the specific items listed above, we currently hold the view that;
- **For Issue A:** (General application of RR 21.5 to IMT AAS for all frequency bands)
Consider whether the same approach as for Issue B or alternative metrics to TRP, could be applied in other frequency bands agreed under Issue C. The limit/reference bandwidth agreed under Issue B needs to be analysed to see if it is suitable or needs to be adapted for other bands. It should not impact the protection of satellite reception or introduce unnecessary constraints on the deployment of IMT stations or other Fixed and Mobile services
 - **For Issue B:** (verification of No. 21.5: Notification of IMT AAS with RR 21.5 for 26 GHz frequency band)
For the purpose of verification of RR No. 21.5 in the notification of IMT stations that use an array of active elements under the provision of RR 2020 Edition (i.e. in the frequency band 24.45-27.5 GHz), the UK is of the view

that the "power delivered to the antenna of a station" in RR No. 21.5 can be considered as the "total radiated power" (TRP). An adjustment factor to the TRP needs to be applied depending on the reference bandwidth being considered for the RR No 21.5 limit. TRP is defined as the integral of the power transmitted from all antenna elements in different directions over the entire radiation sphere.

The reference bandwidth should be reflective of the studies carried out when the RR No. 21.5 limit was introduced in 1963 and 1970 (e.g. 28 MHz/56 MHz). 200 MHz was used in sharing and compatibility studies during WRC-19 and we do not consider that this should be used as a reference for RR No.21.5. We are concerned that the use of 200 MHz may unnecessarily impact the deployment of IMT systems.

- **For Issue C:** (Potential updates to Table 21-2)

A proper justification and analysis is required for any proposals to add additional bands as potential updates to Table 21-2. At this stage, the UK does not consider any bands other than 24.45 – 27.5 GHz should be introduced into Table 21-2. It should not be automatically assumed that the current limits would apply to any new bands (see Issue A).

- 9.6.8 Currently there is no overall agreement in CEPT on how this issue should be resolved. We are also aware that there appears to be varying views in other regional groups. From a UK perspective, we would note that discussions under this item are ongoing and wide-ranging, in part because the scope of the issue is not well defined. We are also aware that this issue has the potential to limit the effective use of AAS, which is a useful addition to mobile service deployment. We see a need to carefully consider this issue, over a time not necessarily set by WRC-23.

Question 33:

What are your views on the use of IMT stations that use antennas that consists of an array of active elements, in bands shared with satellite services?

A1. Responding to this call for input

How to respond

- A1.1 Ofcom would like to receive views and comments on the issues raised in this document, by 5pm on 29th September 2022.
- A1.2 You can download a response form from <https://www.ofcom.org.uk/consultations-and-statements/category-1/call-for-input-uk-preparations-for-wrc23>. You can return this by email or post to the address provided in the response form.
- A1.3 If your response is a large file, or has supporting charts, tables or other data, please email it to wrc-23.respond@ofcom.org.uk, as an attachment in Microsoft Word format, together with the [cover sheet](#). This email address is for this call for input only and will not be valid after 31st August 2023.
- A1.4 Responses may alternatively be posted to the address below, marked with the title of the consultation:
- International Spectrum
3rd Floor West
Ofcom
Riverside House
2A Southwark Bridge Road
London SE1 9HA
- A1.5 We welcome responses in formats other than print, for example an audio recording or a British Sign Language video. To respond in BSL:
- send us a recording of you signing your response. This should be no longer than 5 minutes. Suitable file formats are DVDs, wmv or QuickTime files; or
 - upload a video of you signing your response directly to YouTube (or another hosting site) and send us the link.
- A1.6 We will publish a transcript of any audio or video responses we receive (unless your response is confidential)
- A1.7 We do not need a paper copy of your response as well as an electronic version. We will acknowledge receipt of a response submitted to us by email.
- A1.8 You do not have to answer all the questions in the consultation if you do not have a view; a short response on just one point is fine. We also welcome joint responses.
- A1.9 It would be helpful if your response could include direct answers to the questions asked in the consultation document. The questions are listed at Annex 4 It would also help if you could explain why you hold your views, and what you think the effect of Ofcom's proposals would be.

A1.10 If you want to discuss the issues and questions raised in this consultation, please contact 020 7783 4383 or by email to wrc-23.respond@ofcom.org.uk.

Confidentiality

- A1.11 Consultations are more effective if we publish the responses before the consultation period closes. In particular, this can help people and organisations with limited resources or familiarity with the issues to respond in a more informed way. So, in the interests of transparency and good regulatory practice, and because we believe it is important that everyone who is interested in an issue can see other respondents' views, we usually publish responses on [the Ofcom website](#) at regular intervals during and after the consultation period.
- A1.12 If you think your response should be kept confidential, please specify which part(s) this applies to and explain why. Please send any confidential sections as a separate annex. If you want your name, address, other contact details or job title to remain confidential, please provide them only in the cover sheet, so that we don't have to edit your response.
- A1.13 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and try to respect it. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.
- A1.14 To fulfil our pre-disclosure duty, we may share a copy of your response with the relevant government department before we publish it on our website. This is the Department for Business, Energy and Industrial Strategy (BEIS) for postal matters, and the Department for Culture, Media and Sport (DCMS) for all other matters.
- A1.15 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's intellectual property rights are explained further in our [Terms of Use](#).

Next steps

- A1.16 Following this consultation period, Ofcom will review responses and consider in the light of both the CEPT and ITU WRC-23 preparatory processes. In addition, we will assess how responses may influence our thinking on the other related spectrum projects mentioned in this document.
- A1.17 If you wish, you can <https://www.ofcom.org.uk/about-ofcom/latest/email-updates> alerting you to new Ofcom publications.

Ofcom's consultation processes

- A1.18 Ofcom aims to make responding to a consultation as easy as possible. For more information, please see our consultation principles in Annex 2.
- A1.19 If you have any comments or suggestions on how we manage our consultations, please email us at consult@ofcom.org.uk. We particularly welcome ideas on how Ofcom could more effectively seek the views of groups or individuals, such as small businesses and residential consumers, who are less likely to give their opinions through a formal consultation.
- A1.20 If you wish, you can [register to receive mail updates](#) alerting you to new Ofcom publications:
- A1.21 If you would like to discuss these issues, or Ofcom's consultation processes more generally, please contact the corporation secretary:

Corporation Secretary
Ofcom
Riverside House
2a Southwark Bridge Road
London SE1 9HA
Email: corporationsecretary@ofcom.org.uk

A2. Ofcom's consultation principles

Ofcom has seven principles that it follows for every public written consultation:

Before the consultation

- A2.1 Wherever possible, we will hold informal talks with people and organisations before announcing a big consultation, to find out whether we are thinking along the right lines. If we do not have enough time to do this, we will hold an open meeting to explain our proposals, shortly after announcing the consultation.

During the consultation

- A2.2 We will be clear about whom we are consulting, why, on what questions and for how long.
- A2.3 We will make the consultation document as short and simple as possible, with an overview of no more than two pages. We will try to make it as easy as possible for people to give us a written response.
- A2.4 We will consult for up to ten weeks, depending on the potential impact of our proposals.
- A2.5 A person within Ofcom will be in charge of making sure we follow our own guidelines and aim to reach the largest possible number of people and organisations who may be interested in the outcome of our decisions. Ofcom's Consultation Champion is the main person to contact if you have views on the way we run our consultations.
- A2.6 If we are not able to follow any of these seven principles, we will explain why.

After the consultation

- A2.7 We think it is important that everyone who is interested in an issue can see other people's views, so we usually publish the responses on our website at regular intervals during and after the consultation period. After the consultation we will make our decisions and publish a statement explaining what we are going to do, and why, showing how respondents' views helped to shape these decisions.

A3. Consultation coversheet

BASIC DETAILS

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

CONFIDENTIALITY

Please tick below what part of your response you consider is confidential, giving your reasons why

Nothing

Name/contact details/job title

Whole response

Organisation

Part of the response

If there is no separate annex, which parts? _____

If you want part of your response, your name or your organisation not to be published, can Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?

DECLARATION

I confirm that the correspondence supplied with this cover sheet is a formal consultation response that Ofcom can publish. However, in supplying this response, I understand that Ofcom may need to publish all responses, including those which are marked as confidential, in order to meet legal obligations. If I have sent my response by email, Ofcom can disregard any standard e-mail text about not disclosing email contents and attachments.

Ofcom aims to publish responses at regular intervals during and after the consultation period. If your response is non-confidential (in whole or in part), and you would prefer us to publish your response only once the consultation has ended, please tick here.

Name

Signed (if hard copy)

A4. Questions

UK preparations for the World Radiocommunication Conference 2023 (WRC-23)

A4.1 These are the questions we are requesting views on, regarding Ofcom's preparatory work for the World Radiocommunication Conference 2023.

Question 1: Do you agree with the prioritisation of the agenda items, as shown in Annex 5, and if not why?

Question 2: What are your views on the continued need to protect global aeronautical and maritime services, in the 4.8 – 4.99 GHz band, under this agenda item?

Question 3a: Do you agree that the UK interest in the bands 3 600-3 800 MHz and 3 300-3 400 MHz in Region 2 (North & South Americas) should be limited to any impacts on UK operational use in those areas?

Question 3b: Do you agree that the UK should maintain its objections to changes to the regulatory environment for the band 3300-3400 MHz (in Region 1, Europe, Africa, Middle East), noting UK has interests in use of radar for both ground and airborne operations?

Question 3c: What is your view on the use of 6425-7025 & 7025-7125 MHz, and what evidence do you have to support this view? How does that inform your views on a IMT identification in these bands?

Question 3d: What are your thoughts on the current UK view that IMT should not be identified in Region 2 in the band 10-10.5 GHz in order to ensure the protection of the globally operating EESS (active) systems and airborne & vessel mounted radars?

Question 4: Do you agree that, where no additional technical limitations are placed on mobile services, the UK can support an upgrading of the mobile allocation, in 3600 - 3800 MHz, from secondary to primary?

Question 5: What are your views on the development of regulatory conditions to facilitate deployment of high altitude IMT base stations in IMT identified bands below 2.7 GHz?

Question 6: Do you agree that a formal modification to the Radio Regulations is not needed for fixed service applications that use IMT technologies?

Question 7: What are your views on the proposed approach for 470-694 MHz, recognising the national decisions already in place and taken for DTT multiplex licensing in the band, and the additional and supplementary spectrum made available for UK PMSE usage?

Question 8: What are your views on the need to establish an international regulatory environment that provides adequate protection of UK fixed links from earth stations in motion, in the band 12.75 – 13.25 GHz, which is also practicable from an enforcement/implementation perspective?

Question 9: Do you agree that the UK continues to support the maritime distance figure for ESIMs that work to non-geostationary satellites and to test the other conditions agreed at WRC-19 for ESIMs working to geostationary satellites to ascertain whether these remain appropriate for non-geostationary satellites?

Question 10: What are your views on whether an allocation to inter satellite links is necessary for existing satellite allocated bands and whether this would provide benefits internationally?

Question 11: What are your views on the need for additional satellite allocations in support of narrowband IoT “M2M” type applications, noting that there remains the continued use of PMSE for wireless cameras in the band 2010 – 2025 MHz?

Question 12: What are your views on the proposed approach to this agenda item concerning the fixed satellite service in 17.3-17.7 GHz in Region 2?

Question 13a: On Topic B, what are your views on the post milestone procedures for non-geostationary satellite systems?

Question 13b: On Topic L, what are your views on regulatory conditions for Telemetry, Tracking and Command (TT&C) for NGSO in-orbit servicing?

Question 13c: What are your views on the remaining topics currently listed for Agenda Item 7?

Question 14: Noting that any UK position will be developed only after the ITU Plenipotentiary Conference, do you have any comments relating to the use of Article 48 that may be addressed at WRC-23?

Question 15: What are your views on the need to establish an international regulatory environment for sub-orbital vehicles, which at the same time does not limit flexibility of spectrum options, and retains international safety considerations?

Question 16: Do agree that where the adjacent band compatibility issues are addressed and ICAO coordination processes are not compromised, that the addition of an aeronautical satellite (AMS(R)S) allocation to the band can be supported?

Question 17: Do agree that functions related to international aviation safety are a matter for ICAO? On this basis, and absent any contrary information from ICAO, should the UK support the development of an international spectrum regulatory framework for UA use of FSS that would support efficient use of spectrum?

Question 18: Recognising the recent diminishing industry interest in this item relating to possible modification of the aeronautical HF assignment plan, and the general lack of global interest, do you agree that UK move towards a No Change proposal under this agenda item?

Question 19: What are your views on the need for additional spectrum, specifically in the 15 and 22 GHz bands, for non-safety aeronautical use?

Question 20: What are your views on Agenda Item 1.11 and the proposed UK position to support modernisation of GMDSS?

Question 21: What are your views on the approach to the review of 1240-1300 MHz, recognising that discussions concerning future satellite navigational needs for the UK are a matter for Government?

Question 22: What are your views on a new spectrum allocation in the 40-50 MHz range to support and enhance climate monitoring, such as, environmental shifts in ice sheets?

Question 23: What are your views on upgrading the Space Research Service allocation, from secondary to primary, in the 14.8-15.35 GHz band?

Question 24: What are your views on the potential for defragmentation in this band to facilitate both EESS (passive) use and provide for larger contiguous blocks for fixed & mobile allocations?

Question 25: Do you agree that formal international recognition for Space Weather Sensors should be implemented in the Radio Regulations?

Question 26: What are your views on the limits proposed to protect EESS (passive) under Agenda Item 9.1 topic d) and do you have any views on which of these limits might be accommodated in the Radio Regulations and how?

Question 27: Do you agree that the formalised time reference in common global use, is not a matter of spectrum regulation?

Question 28: Do you have any comments concerning the Standing Agenda Items, where not covered elsewhere in this document?

Question 29: Do you have a view on any of the footnotes to which UK is a party?

Question 30: Are you aware of any specific issues, not covered elsewhere in this document, which are likely to be raised in this part of the Director's Report and of which you think Ofcom should be aware?

Question 31: Do you have any comments on Agenda Item 9.3 considering Resolution 80?

Question 32: What changes to the Radio Regulations have you identified that would benefit from action at a WRC and why? Do you have any proposals regarding UK positions for future WRC agenda items or suggestions for other agenda items, needing changes to the Radio Regulations, that you would wish to see addressed by a future WRC?

Question 33: What are your views on the use of IMT stations that use antennas that consists of an array of active elements, in bands shared with satellite services?

A5. WRC-23 Agenda and UK priorities

Full Agenda for WRC-23 with current UK priorities

A5.1 The full Agenda for WRC-19 is shown below. In addition, we have indicated in the final column the current priority that we have assigned to each Agenda Item. The definitions of high, medium and low, are given in Section 3.

Number	Agenda Item Title	UK Priority
1	on the basis of proposals from administrations, taking account of the results of WRC-19 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the frequency bands under consideration, to consider and take appropriate action in respect of the following items:	
1.1	to consider, based on the results of the ITU R studies, possible measures to address, in the frequency band 4 800-4 990 MHz, protection of stations of the aeronautical and maritime mobile services located in international airspace and waters from other stations located within national territories, and to review the pfd criteria in No. 5.441B in accordance with Resolution 223 (Rev WRC 19) ;	HIGH
1.2	to consider identification of the frequency bands 3 300-3 400 MHz (R1-FN, R2), 3 600-3 800 MHz (R2), 6 425-7 025 MHz (R1), 7 025-7 125 (ALL) MHz and 10.0-10.5 GHz (R2) for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution 245 (WRC-19) ;	HIGH
1.3	to consider primary allocation of the band 3 600-3 800 MHz to mobile service within Region 1 and take appropriate regulatory actions, in accordance with Resolution 246 (WRC-19) ;	MEDIUM
1.4	to consider, in accordance with Resolution 247 (WRC-19) , the use of high-altitude platform stations as IMT base stations (HIBS) in the mobile service in certain frequency bands below 2.7 GHz already identified for IMT, on a global or regional level;	MEDIUM
1.5	to review the spectrum use and spectrum needs of existing services in the frequency band 470-960 MHz in Region 1 and consider possible regulatory actions in the frequency band 470-694 MHz in Region 1 on the basis of the review in accordance with Resolution 235 (WRC-15) ;	HIGH
1.6	to consider, in accordance with Resolution 772 (WRC-19) , regulatory provisions to facilitate radiocommunications for sub-orbital vehicles;	MEDIUM
1.7	to consider a new aeronautical mobile-satellite (R) service (AMS(R)S) allocation in accordance with Resolution 428 (WRC-19) for both the Earth-to-space and space-to-Earth directions of aeronautical VHF communications	LOW

Number	Agenda Item Title	UK Priority
	in all or part of the frequency band 117.975-137 MHz, while preventing any undue constraints on existing VHF systems operating in the AM(R)S, the ARNS, and in adjacent frequency bands;	
1.8	to consider, on the basis of ITU R studies in accordance with Resolution 171 (WRC-19), appropriate regulatory actions, with a view to reviewing and, if necessary, revising Resolution 155 (Rev.WRC-19) and No. 5.484B to accommodate the use of fixed-satellite service (FSS) networks by control and non-payload communications of unmanned aircraft systems;	MEDIUM
1.9	to review Appendix 27 of the Radio Regulations and consider appropriate regulatory actions and updates based on ITU R studies, in order to accommodate digital technologies for commercial aviation safety-of-life applications in existing HF bands allocated to the aeronautical mobile (route) service and ensure coexistence of current HF systems alongside modernized HF systems, in accordance with Resolution 429 (WRC-19) ;	MEDIUM
1.10	to conduct studies on spectrum needs, coexistence with radiocommunication services and regulatory measures for possible new allocations for the aeronautical mobile service for the use of non-safety aeronautical mobile applications, in accordance with Resolution 430 (WRC-19) ;	MEDIUM
1.11	to consider possible regulatory actions to support the modernization of the Global Maritime Distress and Safety System and the implementation of e navigation, in accordance with Resolution 361 (Rev.WRC-19) ;	MEDIUM
1.12	to conduct, and complete in time for WRC-23, studies for a possible new secondary allocation to the Earth exploration-satellite (active) service for spaceborne radar sounders within the range of frequencies around 45 MHz, taking into account the protection of incumbent services, including in adjacent bands, in accordance with Resolution 656 (Rev.WRC-19) ;	MEDIUM
1.13	to consider a possible upgrade of the allocation of the frequency band 14.8-15.35 GHz to the space research service, in accordance with Resolution 661 (WRC-19) ;	MEDIUM
1.14	to review and consider possible adjustments of the existing or possible new primary frequency allocations to EESS (passive) in the frequency range 231.5-252 GHz, to ensure alignment with more up-to-date remote-sensing observation requirements, in accordance with Resolution 662 (WRC-19) ;	LOW
1.15	to harmonize the use of the frequency band 12.75-13.25 GHz (Earth-to-space) by earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service globally, in accordance with Resolution 172 (WRC-19) ;	MEDIUM

Number	Agenda Item Title	UK Priority
1.16	to study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 17.7-18.6 GHz and 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by non-GSO FSS earth stations in motion, while ensuring due protection of existing services in those frequency bands, in accordance with Resolution 173 (WRC-19) ;	MEDIUM
1.17	to determine and carry out, on the basis of the ITU R studies in accordance with Resolution 773 (WRC-19) , the appropriate regulatory actions for the provision of inter-satellite links in specific frequency bands, or portions thereof, by adding an inter-satellite service allocation where appropriate;	MEDIUM
1.18	to consider studies relating to spectrum needs and potential new allocations to the mobile-satellite service for future development of narrowband mobile-satellite systems, in accordance with Resolution 248 (WRC-19) ;	LOW
1.19	to consider a new primary allocation to the fixed-satellite service in the space-to-Earth direction in the frequency band 17.3-17.7 GHz in Region 2, while protecting existing primary services in the band, in accordance with Resolution 174 (WRC-19) ;	LOW
2	to examine the revised ITU R Recommendations incorporated by reference in the Radio Regulations communicated by the Radiocommunication Assembly, in accordance with further resolves of Resolution 27 (Rev.WRC-19) , and to decide whether or not to update the corresponding references in the Radio Regulations, in accordance with the principles contained in resolves of that Resolution;	[routine]
3	to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the conference;	[routine]
4	in accordance with Resolution 95 (Rev.WRC-19) , to review the Resolutions and Recommendations of previous conferences with a view to their possible revision, replacement or abrogation;	[routine]
5	to review, and take appropriate action on, the Report from the Radiocommunication Assembly submitted in accordance with Nos. 135 and 136 of the Convention;	[routine]
6	to identify those items requiring urgent action by the radiocommunication study groups in preparation for the next world radiocommunication conference;	[routine]
7	to consider possible changes, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, on advance publication, coordination, notification and recording procedures for frequency	MEDIUM

Number	Agenda Item Title	UK Priority
	assignments pertaining to satellite networks, in accordance with Resolution 86 (Rev.WRC-07) , in order to facilitate the rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit;	
8	to consider and take appropriate action on requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, taking into account Resolution 26 (Rev.WRC-19) ;	LOW
9	to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention:	
9.1	on the activities of the Radiocommunication Sector since WRC-19:	
9.1a	In accordance with Resolution 657 (Rev.WRC-19) , review the results of studies relating to the technical and operational characteristics, spectrum requirements and appropriate radio service designations for space weather sensors with a view to describing appropriate recognition and protection in the Radio Regulations without placing additional constraints on incumbent services;	HIGH
9.1b	Review of the amateur service and the amateur-satellite service allocations in the frequency band 1 240 1 300 MHz to determine if additional measures are required to ensure protection of the radionavigation-satellite (space-to-Earth) service operating in the same band in accordance with Resolution 774 (WRC-19) ;	LOW
9.1c	Study the use of International Mobile Telecommunication system for fixed wireless broadband in the frequency bands allocated to the fixed services on primary basis, in accordance with Resolution 175 (WRC-19) ;	MEDIUM
9.1d	Protection of EESS (passive) in the frequency band 36-37 GHz from non-GSO FSS space stations; WRC-19 Doc. 573 (Minutes of the twelfth plenary meeting) , Section 35.2, sub-section "Protection of EESS in the frequency band 36-37 GHz";	LOW
9.2	on any difficulties or inconsistencies encountered in the application of the Radio Regulations; and	LOW
9.3	on action in response to Resolution 80 (Rev.WRC-07) ;	LOW
10	Preliminary agenda for the 2027 World Radiocommunication Conference* The World Radiocommunication Conference (Sharm el-Sheikh, 2019),; * The appearance of square brackets around certain frequency bands in this Resolution is understood to mean that WRC-23 will consider and review the	LOW

Number	Agenda Item Title	UK Priority
	inclusion of these frequency bands with square brackets and decide, as appropriate.	
2	on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, and taking account of the results of WRC-23, to consider and take appropriate action in respect of the following items:	<p>These items are wholly provisional at this stage.</p> <p>The substance for these items is not worked on during the WRC-23 study period</p> <p>These items still require support at WRC-23 for inclusion in the WRC-27 agenda</p> <p>If not supported, they are removed from the WRC-27 agenda.</p> <p>Note. Item 2.4 was proposed by the UK and included in the European Common Proposal (ECP) to WRC-19.</p>
2.1	to consider, in accordance with Resolution 663 (WRC-19) , additional spectrum allocations to the radiolocation service on a co-primary basis in the frequency band 231.5-275 GHz and an identification for radiolocation applications in frequency bands in the frequency range 275-700 GHz for millimetre and sub-millimetre wave imaging systems;	
2.2	to study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary space stations in the fixed-satellite service, in accordance with Resolution 176 (WRC-19) ;	
2.3	to consider the allocation of all or part of the frequency band [43.5-45.5 GHz] to the fixed-satellite service, in accordance with Resolution 177 (WRC-19) ;	
2.4	the introduction of power flux-density (pfd) and equivalent isotropically radiated power (e.i.r.p.) limits in Article 21 for the frequency bands 71-76 GHz and 81-86 GHz in accordance with Resolution 775 (WRC-19) ;	
2.5	the conditions for the use of the frequency bands 71-76 GHz and 81-86 GHz by stations in the satellite services to ensure compatibility with passive services in accordance with Resolution 776 (WRC-19) ;	
2.6	to consider regulatory provisions for appropriate recognition of space weather sensors and their protection in the Radio Regulations, taking into account the results of ITU Radiocommunication Sector studies reported to WRC-23 under agenda item 9.1 and its corresponding Resolution 657 (Rev.WRC-19) ;	
2.7	to consider the development of regulatory provisions for non-geostationary fixed-satellite system feeder links in the frequency bands 71-76 GHz (space-to-Earth and proposed new Earth-to-space) and 81-86 GHz (Earth-to-space), in accordance with Resolution 178 (WRC-19) ;	
2.8	to study the technical and operational matters, and regulatory provisions, for space-to-space links in the frequency bands [1 525-1 544 MHz], [1 545-1 559 MHz], [1 610-1 645.5 MHz], [1 646.5-1 660.5 MHz] and [2 483.5-2 500	

Number	Agenda Item Title	UK Priority
	MHz] among non-geostationary and geostationary satellites operating in the mobile-satellite service, in accordance with Resolution 249 (WRC-19) ;	
2.9	to consider possible additional spectrum allocations to the mobile service in the frequency band 1 300-1 350 MHz to facilitate the future development of mobile-service applications, in accordance with Resolution 250 (WRC-19) ;	
2.10	to consider improving the utilization of the VHF maritime frequencies in Appendix 18, in accordance with Resolution 363 (WRC-19) ;	
2.11	to consider a new Earth exploration-satellite service (Earth-to-space) allocation in the frequency band 22.55-23.15 GHz, in accordance with Resolution 664 (WRC-19) ;	
2.12	to consider the use of existing International Mobile Telecommunications (IMT) identifications in the frequency range 694-960 MHz, by consideration of the possible removal of the limitation regarding aeronautical mobile in IMT for the use of IMT user equipment by non-safety applications, where appropriate, in accordance with Resolution 251 (WRC-19) ;	
2.13	to consider a possible worldwide allocation to the mobile-satellite service for the future development of narrowband mobile-satellite systems in frequency bands within the frequency range [1.5-5 GHz], in accordance with Resolution 248 (WRC-19) .	
Resolution 655 (WRC-15)	Dissemination of UTC by radiocommunications	MEDIUM
Article 48 of the ITU Constitution	WRC activities related to any changes at PP-22 ⁵⁸	MEDIUM
Verification of Article 21.5 limits	Note to the Chairman of Plenary - Verification of No. 21.5 for the notification of IMT stations operating within the 26 GHz frequency Range which use an antenna that consists of an array of active elements (WRC-19 Document 550)	MEDIUM

Detailed information is available from;

<https://www.itu.int/en/ITU-R/study-groups/rcpm/Pages/wrc-23-studies.aspx>

⁵⁸ The Plenipotentiary Conference is the highest policy-making body of the International Telecommunication Union (ITU). Held every four years, it is the key event at which ITU Member States decide on the future role of the organization, thereby determining the organization's ability to influence and affect the development of information and communication technologies (ICTs) worldwide. <https://www.itu.int/pp22/en/>

A6. Ofcom Contacts for WRC-23 Agenda Items

Robert Cooper (robert.cooper@ofcom.org.uk)

- 1.2 (IMT between 3.3 – 10.5 GHz)
- 1.3 (Possible mobile in 3.6-3.8 GHz R1)
- 1.4 (HIBs via HAPs < 2.7 GHz)

Art21.5 Limits (AAS limits in 26 GHz)

Bharat Dudhia (bharat.dudhia@ofcom.org.uk)

- 1.12 (Spaceborne Radar around 45 MHz)
- 1.13 (Secondary to Primary SRS in 14/15 GHz)
- 1.14 (EESS (passive) 231.5-252 GHz remote sensing)
- 1.18 (narrowband MSS in 1.7/2/3.3 GHz bands)
- 2 (Review of incorporated ITU-R Recs)
- 4 (Review of WRC Resolutions)
- 8 (Footnotes: deletion)
- 9.1a (Space weather sensors)
- 9.1b (RNSS protection in 1240-1300 MHz)
- 9.1c (IMT use in FS bands)
- 9.1d (Protection EESS (passive) in 36-37 GHz ~ FSS)
- 10 (Agendas for WRC-27/WRC-30)
- RES 655 (Time Dissemination)

Jesus ArnauYanez

(Jesus.ArnauYanez@ofcom.org.uk)

- 1.15 (GSO ESIMs in 13 GHz)
- 1.16 (non-GSO ESIMs in the Ka bands)
- 1.17 (Inter-Satellite Links in Ka Bands)
- 1.19 (Primary FSS s>E in 17 GHz)
- 7 (Satellite coordination procedures)
- 9.2 (Inconsistencies in the RR via ITU Dir. Rpt)⁵⁹
- 9.3 (Check satellite processes are equitable)

Article 48 of the constitution

Wesley Milton (Wesley.Milton@ofcom.org.uk)

- 1.1 (AMS and IMT sharing in 4 800-4 990 MHz)
- 1.6 (Sub Orbital Vehicles)
- 1.7 (AMS(R)S in 117.975-137 MHz)
- 1.8 (UAS in FSS - Res 155/5.484B)
- 1.9 (Review of App 27 - HF aeronautical)
- 1.10 (Aero non-safety allocations 15/22 GHz)
- 1.11 (eNavigation and GMDSS)

Steve Ripley (steve.ripley@ofcom.org.uk)

- 1.5 (Review of 470 – 960 MHz)

⁵⁹ Whilst 9.2, historically and predominantly, covers satellite issues 9.2 might have to address non satellite issues as well.

A7. Timeline of key events

A7.1 The following table shows some of the key meetings and important dates from May 2022 related to WRC-23 where Ofcom, in its role as UK representative, plans to participate and contribute.

Date	Event	Description
21st October 2022	Conference Preparatory Meeting CPM23-2 deadline	Deadline for text to be incorporated into the CPM Report to WRC-23
7th – 11 November 2022	Conference Preparatory Group (CPG) Meeting 6	European: CEPT preparations
Jan/Feb 2023	Conference Preparatory Group (CPG) Meeting 7	European: CEPT preparations
27th Mar – 6th Apr 2022⁶⁰	Second Session of the Conference Preparatory Meeting (CPM23-2) for WRC-23	International: exchange of views on methods to satisfy WRC-23 agenda items
May/June 2023	Conference Preparatory Group (CPG) Meeting 8 (penultimate meeting in the CPG23 process)	European: CEPT preparations Approval and agreement on 1st set of ECPs
September 2023	Conference Preparatory Group (CPG) Meeting 9 (Final)	European: CEPT preparations Approval and agreement on 2nd set of ECPs
13th – 17th Nov 2023	Radiocommunication Assembly 2023 (RA-23)	International: ITU-R activities predominately non-WRC related.
20th Nov – 15th Dec 2023	World Radiocommunication Conference 2023 (WRC-23)	International: Concludes on methods to satisfy the WRC-23 agenda items and agree WRC-27 agenda.
18th – 19th December 2023	First Session of the Conference Preparatory Meeting (CPM27-1) for WRC-27	International: Assignment of agenda item activities to relevant ITU-R Working Parties and Task Groups

⁶⁰ This date is provisional

A8. Glossary of terms

Acronym	Description
3GPP	The 3rd Generation Partnership Project (3GPP) is an umbrella term for a number of standards organizations which develop protocols for mobile telecommunications. www.3gpp.org
5G	5th generation wireless systems: the next generation of mobile technologies, designed to provide greater capacity for wireless networks, offer greater reliability, and deliver extremely fast data speeds, enabling innovative new services across different industry sectors. This is also addressed in the ITU work around IMT 2020
AAS	Advanced Antenna Systems, are antenna systems which have the ability to concentrate transmissions, dynamically, in specific directions where traditionally transmissions could only be concentrated in specific individual directions by single static antennas
Administration(s)	term used to indicate the body or organisation representative that is able discharge a countries obligations/activities, in the International Telecommunications Union (ITU) and in the CEPT
AMS(R)S	Aeronautical Mobile Satellite, Route, Service, is a definition within the Radio Regulations which is for uses reserved for communications relating to safety and regularity of flights, primarily along national or international civil air routes
ANSP	Air Navigation Service Provider, is a national public or a private legal entity for Air Navigation Services providing air traffic management on behalf of a company, region or country. The services managed by the ANSP will be addressed in the specific mandate placed on an ANSP. These services would include, for example; Air Traffic Management (ATM) Communication navigation and surveillance systems (CNS), Meteorological service for air navigation (MET), Search and rescue (SAR) and Aeronautical information services/aeronautical information management (AIS/AIM)
BIPM	The International Bureau of Weights and Measures (French: Bureau international des poids et mesures, BIPM) is an intergovernmental organisation, through which its 59 member-states act together on measurement standards in four areas: chemistry, ionising radiation, physical metrology, and coordinated universal time
BR	Radiocommunication Bureau of the ITU is the executive arm of the Radiocommunication Sector which provides administrative and technical

Acronym	Description
	support to Radiocommunication Conferences, Radiocommunication Assemblies and Study Groups, including Working Parties and Task Groups. It also provides advice to Member States on the equitable, effective and economical use of the radio-frequency spectrum and satellite orbits and assists in the reporting of harmful interference
BSS	Broadcasting Satellite Service, a radiocommunication service in which signals transmitted or retransmitted by space stations are intended for direct reception by the general public
CAA	Civil Aviation Authority, is the UK's public corporation, established by Parliament in 1972, as the UK's independent specialist aviation regulator. Most aviation regulation and policy is harmonised across the world to ensure consistent levels of safety and consumer protection. Worldwide safety regulations are set by the International Civil Aviation Organisation, in which, the CAA and the UK more widely are represented
CEPT	European Conference of Postal and Telecommunications Administrations
CGPM	General Conference on Weights and Measures (French: Conférence Générale des Poids et Mesures, CGPM) is a quadrennial conference of the International Bureau of Weights and Measures (BIPM). Established in 1875 under the terms of the Metre Convention, it is the intergovernmental organization through which member states act together on matters related to measurement science and measurement standards. The CGPM executes exclusive direction and supervision of the BIPM
CPG	Conference Preparatory Group is the CEPT process that works to agree common positions for all WRC agenda items
CPM	Conference Preparatory Meeting is a two sessions meeting. The first session meets directly after the conclusion of the preceding WRC and organises the workings of the ITU-R Study Groups and Working Parties who will work on individual agenda items. The second session, which meets around 6-9 months before a WRC, considers the CPM Report which is a compendium of options to satisfy the aims of the agenda items as produced by the relevant Working Parties and Study Groups
CPM23	The second session of the Conference Preparatory Meeting for the WRC-23 process is currently scheduled for 27 March – 06 April 2023 in Geneva, Switzerland. The first session was held between 25 November - 26 November 2019 in Sharm el-Sheikh, Egypt
DRS	Data Relay Satellites is a collective term referring to satellites used in support of space research projects and programmes. This is where data

Acronym	Description
	collected by space missions is relayed both between satellites and on to the ground receiving stations for collection and analysis.
DTT	Digital Terrestrial Television: broadcasting delivered by digital means. In the UK and Europe, DTT transmissions use the DVB-T and DVB-T2 technical standards
ECC	Electronic Communications Committee: the highest-level spectrum policy body in the CEPT
ECP	European Common Proposal: a proposed position for CEPT on an agenda item which is submitted to a WRC. Each ECP needs to be supported by a qualified number of CEPT countries
EESS	Earth Exploration Satellite Service: a radiocommunication service between earth stations and one or more space stations, used for collecting information relating to the characteristics of the Earth, its natural phenomena, and data related to environmental issues. This information is obtained from active or passive sensors on Earth orbiting satellites
e-navigation	An IMO strategic vision to integrate existing and new maritime navigational tools, in particular electronic tools, in an all-embracing system that will contribute to enhanced navigational safety for the maritime sector
EPIRB	Emergency Position Indicating Radio Beacons are small, portable, battery powered radio transmitters that are both watertight and buoyant and currently transmit in the 406.0 – 406.1 MHz band. The signal is receivable by the worldwide satellite service, Cospas-Sarsat, the international satellite system for search and rescue (SAR). EPIRBs are carried aboard merchant ships, some private vessels, commercial and military aircraft. They also transmit a audio tone signal on 121.5 MHz for localised homing purposes by individual search and rescue aircraft
ESIM	Earth Station in Motion: Satellite Earth Stations, that operate in spectrum allocations made to the fixed satellite service, but which can be in motion
ESOMP	Earth Station on-board a Moving Platform: this is now more commonly referred to as an ESIM
FSS	Fixed-Satellite Service: a radiocommunication service between earth stations at given positions, where one or more satellites are used; the given position may be a specified fixed point or any number of fixed points within specified areas
GHz	Gigahertz, a unit of frequency of one billion (10 ⁹) cycles per second

Acronym	Description
GMDSS	Global Maritime Distress & Safety Service: an international system which uses terrestrial and satellite technology and ship-board radio-systems to ensure rapid, automated, alerting of shore-based communication and rescue authorities, in addition to ships in the immediate vicinity, in the event of a marine distress situation
GSO	Geostationary-Satellite Orbit is an orbit in the plane of the Equator at an altitude of 35786km. A satellite placed in this orbit revolves around the same axis about which the earth rotates, and its orbital period is 24 hours and thus it appears stationary in the sky to an observer on the earth
HAP	High Altitude Platform, which is an airborne platform used for the purposes of radio transmission, located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth
HF	High Frequency, a term used to describe frequencies in the range of 3 megahertz (MHz) to 30 megahertz (MHz)
HIBS	High Altitude Platform Station operating an IMT base station where the base station is located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth
ICAO	International Civil Aviation Organisation: a specialised agency of the United Nations dealing with operational civil aviation matters
ICI	Ice Cloud Imaging is the imaging of ice clouds via a satellite platform which conically scans clouds with a millimetre/sub-millimetre wave radiometer
IFPG	International Frequency Planning Group: Ofcom chaired committee which discusses UK positions for the WRC: membership is open to government, relevant regulatory bodies and industry stakeholders with a UK presence
IMO	International Maritime Organisation: a specialised agency of the United Nations dealing with operational maritime matters
IMT	International Mobile Telecommunications: the ITU term that encompasses 3G, 4G and 5G (IMT 2020), IMT2030, wireless broadband systems/services/technologies
IoT	Internet of Things: the interconnection via the Internet of computing devices embedded in everyday objects, enabling them to send and receive data
ITU	International Telecommunication Union: a specialised agency of the United Nations for information and communication technologies – ICTs, consisting

Acronym	Description
	of 193 Member States and over 700 private-sector entities and academic institutions, headquartered in Geneva
ITU-R	The Radiocommunication Sector of the ITU
Ka Band	A term used to describe frequencies approximately in the range 26 to 40 GHz
LF	Low Frequency, a term used to describe frequencies in the range of 30 kilohertz (kHz) to 300 kilohertz (kHz)
M2M	Machine to Machine: a broad description for both wired and wireless technologies which, as part of a common network, are able to communicate with each other independent of human intervention
MetSat	Meteorological-Satellite Service
MF	Medium Frequency, a term used to describe frequencies in the range of 300 kilohertz (kHz) to 3 megahertz (MHz)
MHz	Megahertz, a unit of frequency of one million (10 ⁶) cycles per second
MIFR	Master International Frequency Register, or the Master Register, contains frequency assignments together with their particulars as notified to the ITU in accordance with provisions of the ITU Radio Regulations
MMSS	Maritime Mobile-Satellite Service
MSS	Mobile-Satellite Service: a radiocommunication service between mobile earth stations and one or more space stations, or between space stations (used by this service) or between mobile earth stations by means of one or more space stations
NAVDAT	Digital Navigational Data System, is a digital broadcasting system designed to operate in the 500 kHz and HF frequency bands, making it possible to broadcast digital files from shore to ships. These digital files can be texts, images, graphs, data, etc. Graphical information can be provided to navigators to facilitate the interpretation and the further integration of digital information into other navigational systems
NOAA	National Oceanic and Atmospheric Administration, is an American scientific and regulatory agency within the United States Department of Commerce that forecasts weather, monitors oceanic and atmospheric conditions, charts the seas, conducts deep sea exploration, and manages fishing and protection of marine mammals and endangered species in the U.S. exclusive economic zone

Acronym	Description
NRR	National Risk Register, an updated government assessment of the likelihood and potential impact of a range of different malicious and non-malicious national security risks (including natural hazards, industrial accidents, malicious attacks, and others) that may directly affect the UK and its interests
non-GSO/NGSO	Non-Geostationary Orbit: an orbit around the earth in which the object does not appear stationary in the sky to an observer on the earth (i.e., object would be in motion with respect to a point on the ground). Non-GSO satellite systems, that make use of this orbit, are normally made up of numerous individual satellites with orbits at heights lower the GSO systems (i.e., from several 100 to several 1000 kms above the ground)
PFD	power flux density: radiated power passing through a given area
PMSE	Programme Making and Special Events: radio applications that support a wide range of activities in entertainment, broadcasting, news gathering and community events.
PP	The Plenipotentiary Conference (PP), ITU's highest policy-making body, meets once every four years to set the Union's general policies, adopt the four-year strategic and financial plans, and elect the senior management team of the organisation
PP-22	The Plenipotentiary Conference in 2022, (PP), The next Plenipotentiary Conference (PP-22) will be held in Bucharest, Romania, from 26 September to 14 October 2022
Radio Regulations or RRs	International regulations governing the use of radio spectrum and satellite orbits. Together with the Telecommunications Regulations and the Constitution and Convention of the ITU, they form an intergovernmental treaty to which ITU Member States are bound
RA	Radiocommunication Assemblies (RA) are responsible for the structure, programme, and approval of radiocommunication studies within the ITU. The Assembly agrees Chair positions for ITU-R Study Groups, and for the Conference Preparatory Meeting, and aims to revolve outstanding issues related to reports and Recommendations that have already been addressed at Study Group level. They are normally convened every four years and are normally associated in time and place with World Radiocommunication Conferences (WRCs). RA-23 will meet in the week prior to WRC-23.
RAS	Radio Astronomy Service: astronomy based on the reception of radio waves of cosmic origin

Acronym	Description
RLAN	Radio Local Area Network: Wireless Access Systems a term used to describe predominately relatively low power broadband radio local area networks used for fixed, semi-fixed (transportable) and portable computer equipment for a variety of broadband applications. This encompasses technologies such as Wi-Fi™ and 5G NR-U (New Radio – Unlicensed) which is being developed in 3GPP to be used in licence-exempt spectrum
RRB	Radio Regulations Board approves Rules of Procedure, used by the Radiocommunication Bureau in applying the provisions of the Radio Regulations and registering frequency assignments made by the Member States. It also considers reports of unresolved interference investigations and appeals against decisions made by the Radiocommunication Bureau regarding frequency assignments
SARPS	Standards And Recommended Practices (SARPs) are technical specifications adopted by the Council of ICAO to achieve "the highest practicable degree of uniformity in regulations, standards, procedures and organization in relation to aircraft, personnel, airways and auxiliary services in all matters in which such uniformity will facilitate and improve air navigation"
SOS	Space Operations Service: A radiocommunication service concerned exclusively with the operation of spacecraft, in particular space tracking, space telemetry and space telecommand.
SOV	Sub Orbital Vehicles are aircraft that take Sub Orbital Flights which can be defined as the intentional flight of a vehicle expected to reach the upper atmosphere with a portion of its flight path that may occur in space but without completing a full orbit around the Earth before returning to Earth.
SRS	Space Research Service is defined in the ITU Radio Regulations as a radiocommunication service in which spacecraft or other objects in space are used for scientific or technological research purposes
TRP	Total Radiated Power (TRP) is a measure of how much power is radiated by an antenna or antennas, when the antenna is connected to a physical transmitter. TRP is an active measurement, where the total received power is calculated and summed up over all possible angles. Hence, it is a spherical or 3D measurement. The compound result of these measurements is the Total Radiated Power.
TT&C	Telemetry, Tracking and Control: links between an earth station and a satellite through which the orbit and operation of the satellite are controlled

Acronym	Description
TVWS	Television White Space, a broadband wireless technology that makes use of the spectrum spaces between TV broadcast channels (known as white spaces) by accessing an online geo-location database that tells the wireless device which frequency it can use without causing interference to TV reception and other users of the band
UA	Unmanned Aircraft: an aircraft which has no active pilot on-board
UAS	Unmanned Aircraft System: a communications system comprising a unmanned aircraft control station (UACS) on the ground and an unmanned aircraft
UHF	Ultra-High Frequency: the range of frequencies between 300MHz and 3GHz
UK SA	UK SA is the UK's Space Agency which, as an executive agency of the Department for Business, Energy & Industrial Strategy, provides technical advice on the government's space strategy in support of the UK space sector to deliver the government's policy objectives. This includes, but is not limited to, supporting the UK's space sector in the UK through its portfolio of programmes and projects, and investments in space research and development
UTC	Universal Coordinated Time is the primary time standard by which the world regulates clocks and time. It is within about 1 second of mean solar time at 0° longitude
VDES	VHF Data Exchange System: a new maritime concept VHF Data Exchange System (VDES) is a radio communication system that operates between ships, shore stations and satellites on Automatic Identification System (AIS), Application Specific Messages (ASM) and VHF Data Exchange (VDE) frequencies in the Marine Mobile VHF band
VHF	Very High Frequency, a term used to describe the frequency range 30 to 300 MHz
WAS	Wireless Access Systems a term used to describe predominately relatively low power broadband radio local area networks used for fixed, semi-fixed (transportable) and portable computer equipment for a variety of broadband applications. This encompasses technologies such as Wi-Fi® and 5G NR-U (New Radio – Unlicensed) which is being developed in 3GPP to be used in licence-exempt spectrum.
Wi-Fi	Commonly used term to refer to radio local area network (RLAN) technologies, that conform to the IEEE 802.11 family of standards. Such systems typically use one or more access points connected to wired

Acronym	Description
	Ethernet networks and, in turn, the Internet. The term “Wi-Fi®” is a registered trademark of the Wi-Fi Alliance (www.wifi.org).
WRC	World Radiocommunication Conference: a meeting of the ITU-R, held approximately every 4 years, which has the authority to partially, or completely, revise the Radio Regulations according to a predefined agenda
WRC-23	World Radiocommunication Conference 2023 will be held between 20 November – 15 December 2023 in the United Arab Emirates