



UK Report on the outcome of the World Radiocommunication Conference 2015 (WRC-15)

Report

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About this document

This document provides a report of the outcomes, from a UK perspective, of the 2015 World Radiocommunication Conference.

The use of radio spectrum is increasing 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, tablet computers and when we watch television (which receives signals from transmitters on the ground or from satellites that orbit the earth).

But radio spectrum is also used for many other purposes including for aviation, maritime and use by the scientific community for the detection of emissions from space (radio astronomy) or from the earth itself. This assists the safe movement of ships and planes and helps to inform experts of the effects of climate change and to predict major natural disasters.

All these different uses of radio spectrum benefit, to some extent, from international agreements and common arrangements concerning what bands are used by particular services. At a national level, countries have the sovereign right to plan spectrum use within their own territories. However, there are major gains from common frameworks at bilateral, regional or global levels. These common frameworks help to manage potential interference between countries and enable global communications, including for ships and aircraft. International frameworks also support common equipment specifications, which means equipment can be manufactured more cheaply, taking advantage of "economies of scale".

While bilateral and regional discussions are an on-going process, the most important of these global harmonisation processes are World Radiocommunication Conferences (WRCs). These Conferences are held approximately every four years and take key decisions concerning the identification and international harmonisation of spectrum bands.

This report gives an overview of the decisions taken at WRC-15 and what they potentially mean for spectrum use, in the UK, in the coming years.

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Section 1

Executive Summary

- 1.1 The World Radiocommunication Conference 2015 (WRC-15) ended on the 27 November 2015 with the signing of the Final Acts by over 150 member states of the ITU. This represented the culmination of some four years of effort involving member state representatives and various industry participants from around the world. Ofcom, under a Government direction, represents the UK at WRCs.
- 1.2 The results of WRC-15 were closely aligned with UK objectives going into the Conference and, we believe, represent an excellent outcome for the UK. Stakeholders were closely involved throughout the preparatory process and during the Conference itself, which contributed to the successful outcome, and a number of UK stakeholders have since written to Ofcom expressing their pleasure with the outcome of WRC-15 and their gratitude of the role played by Ofcom.
- 1.3 Some of the key results from the Conference are set out in this Executive Summary while complete WRC-15 results are described in the main body of this document. Key achievements from a UK perspective include:
 - Identifying more spectrum at a global (or near-global) level for mobile broadband – this includes spectrum at 700 MHz, 1 427 -1 518 MHz and 3 400 – 3600 MHz all of which were supported by the UK.
 - Confirming that the digital television frequency band between 470 – 694 MHz would be maintained for broadcasting (i.e. it was not identified for wireless broadband). This was a controversial issue at the WRC as some countries, notably the US, pushed hard for a mobile allocation. In the end however we and a number of other countries resisted this and the US, along with some of its neighbouring countries, was only able to secure a footnote allocation. It was agreed that this issue will be looked at again at the WRC in 2023 through an agenda item covering the whole 470 - 960 MHz band.
 - The adoption of a regulatory provision relating to Public Protection and Disaster Relief (PPDR) covering spectrum use by the emergency services. The Resolution encourages administrations to consider parts of the broad frequency range 694 - 894 MHz when considering spectrum for PPDR but does not seek to formally harmonise specific bands or channel plans. The outcome therefore retains the important premise that spectrum planning for PPDR is a national matter and is consistent with the approach being taken forward by the Government in the UK.
 - Addressing spectrum allocations for the control of unmanned aircraft. This was a complex issue on which there were a variety of views from UK stakeholders as well as differing views between administrations. We played a significant role in ensuring that a detailed compromise solution was arrived at which will allow the work to continue to try to meet the requirements of both the national and international aviation regulatory authorities.

- Ensuring that the inclusion of leap seconds in global time and its link with the worldwide use of Coordinated Universal Time (UTC) is retained for at least the next 8 years. This was a potentially difficult issue for the UK given the strength of opposition to the retention of leap seconds. Both the Asia-Pacific and the Americas (North and South) Regional Groups entered the WRC with positions supporting the abolition of leap seconds, and parts of Europe and Africa also supported abolition. We therefore had to work extremely hard to achieve a positive outcome for the UK.
- 1.4 Another responsibility of a WRC is to set the draft agenda for the next Conference, in this case WRC-19. Ofcom led the European co-ordination on this issue and we played a central role in ensuring that UK and European objectives for future Agenda Items were achieved. Two in particular (both of which were promoted by the UK) are worth highlighting:
- To study frequency bands to accommodate anticipated needs for the next evolution of mobile broadband (i.e. 5G). The focus of this Agenda Item is on higher frequency bands and Ofcom successfully steered attention towards a set of bands above 24 GHz that were preferred by the UK and, significantly, excluded others that were not favoured by the UK.
 - To consider additional capacity for Wi-Fi and compatible technologies. Ofcom lobbied successfully to ensure that this item was included on the agenda of WRC-19 and supported the decision to consider a wider frequency range (5 150 – 5 925 MHz).

Overall perspective of the WRC outcomes

- 1.5 The results of WRC-15 are closely aligned with UK objectives going into the Conference and we therefore consider that this represents a good outcome for the UK. In many instances we worked closely with our European colleagues within the CEPT¹ to achieve results in line with European objectives but in some cases (such as on Leap Seconds) specific UK goals were pursued.
- 1.6 Ofcom would also like to acknowledge the role that UK stakeholders, as members of the UK delegation, played in helping us to meet UK objectives. Ofcom has received positive comments from a number of UK stakeholders following the WRC who generally seem very content with the results we achieved. We take this as an endorsement of the preparatory process we undertook and the effective working of the UK delegation at the WRC which included participants from a wide range of industry sectors.
- 1.7 Europe, through CEPT, also achieved good results from WRC-15 with most of the European Common Positions (ECPs) that were agreed prior to the start of the Conference being successfully achieved. CEPT has a well-established and effective preparatory process in which we played an influential part. This process contributed to European success and we know that it is highly regarded and closely followed by a number of other regional groups.

¹ The European Conference of Postal and Telecommunications Administrations – there are currently 48 countries that are members of CEPT.

- 1.8 It is worth noting however that there were a range of perspectives on WRC-15 and some regions and countries appear to be somewhat less satisfied. For example, the United States has criticised some of the outcomes of WRC-15 and has also questioned the effectiveness of ITU processes.
- 1.9 Ofcom is now considering the implications of the outcomes of WRC-15. Over the coming months we will update the UK Frequency Allocation Table and will pick up specific points through individual projects, including our Mobile Data Strategy and policies around spectrum used by the satellite and space science sectors².
- 1.10 We are also reviewing the preparatory process for WRC-15, including engagement with stakeholders, to consider whether any lessons can be learnt or changes should be made in terms of the preparatory process for WRC-19. This issue is not considered in detail in this Report. Furthermore, and as explained above, we consider that the UK WRC-15 preparatory process generally worked well and as a result we are not expecting to make substantial changes to the preparatory process for WRC-19. Nonetheless if stakeholders do have suggestions in terms of how the current process may be improved we would be very pleased to receive inputs. Please address any comments to ofcom.international@ofcom.org.uk.

² Strategic review of satellite and space science use of spectrum - <http://stakeholders.ofcom.org.uk/consultations/space-science-cfi/>

Section 2

Introduction

World Radiocommunication Conferences and why they matter

- 2.1 WRC-15 ran between the 2nd and 27th of November and saw the conclusion of almost four years of regional and global discussion across a number of spectrum related agenda items. It was attended by around 3000 delegates from 160 countries. The UK delegation consisted of 70 persons, of which 20 were from Ofcom, 5 from Government and the remainder from industry.
- 2.2 The outcome of WRC-15 resulted in an updating of the international spectrum framework which is detailed in the Radio Regulations (RRs³), an international treaty published and maintained by the International Telecommunication Union (a specialised agency of the United Nations). The RRs detail the rights and obligations, placed upon national administrations, around the use of spectrum in their country relative to spectrum use in all other countries. This provides guidance as to expected spectrum use in neighbouring countries, thereby assisting countries in managing interference with other countries. However it does not limit spectrum use in the UK, as long as our use does not impact use in other countries where that use is consistent with the RRs.
- 2.3 The RRs 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). This global framework gives a sense of how frequency bands are to be used around the world and helps to provide guidance and clarity for equipment manufacturers and countries looking to make informed decisions about the use and availability of spectrum.
- 2.4 The RRs have for many years determined the pattern of spectrum use for almost the entire radio spectrum and almost all radio services. It is necessary to do this at international level in order to:
 - Avoid or keep cross-border interference to a minimum;
 - Facilitate mobility and interoperability of radio equipment (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 of some radio services (for example, aeronautical, maritime and satellite services all require spectrum to be available seamlessly across national boundaries)

³ <http://www.itu.int/pub/R-REG-RR/en> (Ofcom is not responsible for the content of external websites)

- 2.5 Under a Ministerial Direction, Ofcom leads for the UK at WRCs and in the extensive preparatory work which takes place over the 3-4 years between conferences. We also commit the UK to the output of the Conference by signing the Final Acts⁴ which amend the Radio Regulations.
- 2.6 This document complements the documents Ofcom published in June 2014⁵ (Ofcom consultation on the UK preparations for the World Radiocommunication Conference 2015), January 2015⁶ (Update on the UK preparations for the World Radiocommunication Conference 2015) and in October 2015¹ (Final UK Positions on key issues for the World Radiocommunication Conference 2015). In those documents we provided details of emerging issues and described the development of UK positions. The purpose of this final paper is to set out the main results of WRC-15.

⁴ <http://www.itu.int/pub/R-ACT-WRC.11-2015/en> (this is a time limited web address, Ofcom is not responsible for any changes made)

⁵ <http://stakeholders.ofcom.org.uk/consultations/wrc15/>

⁶ <http://stakeholders.ofcom.org.uk/consultations/wrc15/update-jan-15>

Section 3

The WRC-15 agenda: General Overview

- 3.1 The agenda for WRC-15 contained over 20 agenda items covering many frequency bands and radio services, including “standing” agenda items which address general regulatory and procedural matters. Some items were very specific and tightly defined while others covered a wide range of issues. All had the potential to create new opportunities for the use of the radio spectrum and, conversely, may also present a threat to existing users.
- 3.2 This report explains the outcome for each of the items on the WRC-15 agenda. For convenience in this report we have grouped the various agenda items into the following broad subject categories:
- **Developments in mobile broadband, including Public Protection Disaster Relief (PPDR) and amateur radio use:** this covers spectrum allocations to 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. We have also included agenda items covering Public Protection and Disaster Relief and the amateur service in this section.

It is worth emphasising that although Agenda item 1.1 was focused on wireless broadband, a number of other services could potentially be impacted by any decision to allocate additional spectrum to the mobile service for mobile broadband use.

Relevant agenda items: 1.1, 1.2, 1.3, 1.4, 9.1.7 and part of 10

- **Transport, including radiodetermination (i.e. radar, radionavigation):** this covers spectrum use by transport related applications. Many of these agenda items were 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). Following WRC-15, we expect that these bodies will need to consider developing additional regulatory and implementation measures. These measures might include notices or regulations 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 European⁷ and International⁸ bodies that have wider responsibility for aviation and maritime measures.

Relevant agenda items: 1.5, 1.15, 1.16, 1.17, 1.18, Resolution 185

⁷ The European Organisation for the Safety of Air Navigation (EUROCONTROL) whose objective is the development of a seamless, pan-European Air Traffic Management (ATM) system.

⁸ International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO), which are specialised agencies of the United Nations.

- **Scientific use of spectrum:** issues considered within this section include:
 - radio astronomy, which is the detection of naturally occurring radio emissions in space.
 - Earth Exploration Satellite Service which is the use of radio spectrum for the purposes of mapping and imaging of the earth's surface. This data is for example used to help assess the impact of environmental change on the earth.

Relevant agenda items: 1.11, 1.12, 1.13, 1.14

- **Satellite use of spectrum and regulations:** issues considered within this section include:
 - new allocations for fixed-satellite service applications to address emerging requirements,
 - wider allocations for Earth Exploration Satellite Service to facilitate improvements to earth imaging (i.e. enhanced image resolution).

Relevant agenda items: 1.6, 1.7, 1.8, 1.9, 1.10, 7 and parts of 9,

- **Standing agenda items:** 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 Report of the Director of the ITU Radiocommunication Bureau to WRC-15 (the Director's Report) which evaluated developments in the Radiocommunication Sector since WRC-12.

Relevant agenda items: 2, 3, 4, 5, 6, 8 and parts of 9

- **Future Agenda items:** every WRC considers the agenda for the next conference and the conference subsequent to that. These proposals can appear right up to the start and during the WRC itself. The UK made a specific proposal to consider mobile broadband in frequency bands above 6 GHz, additional spectrum for Wi-Fi around 5 GHz and also for Earth Stations in Motion (ESIMs) to provide broadband connectivity to moving objects such as planes, trains and cars.

Relevant agenda items: 10

3.3 The remaining sections of this document are structured around each of these categories. Each section provides a summary of the outcome of individual agenda items which we have tried to do in a format suitable for those who are not already familiar with the WRC process.

3.4 This document also identifies what we had considered to be the relative priorities of the various agenda items. The prioritisation used was 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 is a major conflict between radio 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 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 do however continue to monitor developments.

3.5 A list of all the WRC-15 agenda items going into the conference is set out in Annex 1.

Section 4

Mobile broadband, Amateur and PPDR

4.1 This section reports on the following WRC-15 agenda items:

- | | |
|-------------|---|
| 1.1 | Additional allocations for Mobile (IMT ⁹) services and applications |
| 1.2 | Mobile allocation in the frequency band; 694 – 790 MHz |
| 1.3 & 9.1.7 | Broadband Public Protection and Disaster Relief |
| 1.4 | Amateur service, on a secondary basis, in the 5 250 – 5 450 kHz band |

Agenda Items 1.1 and 1.2 - Additional allocations for Mobile (IMT) services and broadband applications - Priority Status: High

4.2 It was clear during the preparatory work that these two agenda items were likely to be subject to detailed and difficult discussions. The results were as follows;

- **694-790 MHz:** this is now a global mobile broadband frequency band, with allocation and identification for IMT in Region 1. This effectively confirms the provisional decision taken at WRC-12 and removes any remaining ambiguity that may have remained. The CEPT had a position going into the Conference supporting an allocation for mobile broadband and this was strongly supported by the EU Member States. However, some eastern European members of CEPT did not share this view and sought to resist a formal allocation for mobile broadband. This led to some lengthy discussions with those eastern European countries who wish to continue to use the band for aeronautical Radionavigation services. Ultimately however, the decision was agreed to identify the band for mobile broadband, in Region 1, in line with both CEPT's and UK's requirements.
- Bands **1 427 - 1 452 MHz** and **1 492 - 1 518 MHz** are now global mobile broadband frequency bands. The agreement for **1 452 - 1 492 MHz** is however slightly different with the band globally identified, for mobile broadband, except in CEPT countries. Although CEPT had supported a global identification for all three bands, it became clear in the closing stages of the WRC that any changes in 1 452 - 1 492 MHz would be tied to new coordination obligations. This would have downgraded the status of the existing mobile allocation in favour of aeronautical telemetry in some eastern European countries within CEPT (outside the EU). CEPT concluded that its interests were best served by foregoing changes in 1 452 - 1 492 MHz since the current framework in CEPT and EU was sufficient to give clarity to the industry. Separately, a WRC Resolution for continuing technical studies on the band adjacency (IMT and satellite at 1518 MHz), was agreed and will continue into the next study period. This outcome met both CEPT's and UK's requirements.

⁹ IMT - International Mobile Telecommunications. The ITU term that encompasses 3G, 4G and 5G wireless broadband systems

- The situation for **3 400 - 3 600 MHz** is that it is now more clearly identified for mobile broadband, across Region 1 (Europe, Middle East and Africa) and Region 2 (the Americas) alongside specific technical requirements for the protection of fixed satellite services in neighbouring countries. The band was not identified in the Asia Pacific region (Region 3) although some individual countries from that region are included in a footnote¹⁰ identification.
 - There was sustained and strong opposition from African and some Arab countries, in Region 1, against the identification of the band **3 600 – 3 800 MHz** for mobile broadband. Noting the band is already subject to CEPT and EU harmonisation measures it was not felt prudent or necessary to seek a CEPT-only footnote for mobile broadband.
 - Two additional bands that were not supported by UK or CEPT and which were opposed by a number of other countries did see some limited footnote identification for mobile broadband/IMT. **3 300 - 3 400 MHz** which had been strongly pushed by some Asian countries in the preceding preparatory work, was identified (for wireless broadband) in a number of African and South American countries, as well as in some Asia/Pacific countries. Further the band **4 800 - 4 990 MHz** saw identification for IMT, but in a far more limited way (i.e. only 4 countries in regions 2 and 3).
 - Concerning **470 - 694 MHz**, this band remains exclusively for broadcasting in Region 1 (Europe, Africa and the Middle East). As a result of discussions, and acknowledging that there was strong support for mobile broadband from some countries in the Americas, parts of the band have been identified for IMT in a few countries in Region 2 (the Americas region which includes US, Mexico, Canada). There will be an agenda item at WRC-23 to review the allocations but this will focus upon the balance between mobile and broadcasting usage in the wider band (470 – 960 MHz). This represents a good outcome for the UK and CEPT.
 - As far as additional spectrum for Wi-Fi was concerned (and primarily in the band **5 350 – 5 470 MHz**) there was, as expected, no support to make the band available at WRC-15. However, after much discussion, a compromise was reached to study the wider band (**5150-5925 MHz**) during the next study period (i.e. to be considered at WRC-19).
 - Finally the band **2 700 – 2 900 MHz** was not supported for mobile/wireless broadband. Although the UK had initially expressed some interest in pursuing an identification in the band, it had become clear in the months leading up to WRC-15 that there was little support for such action. As a result, the UK was content with the No Change outcome agreed at WRC-15.
- 4.3 No other bands below 6 GHz, other than those being considered under the 5 GHz RLAN item for Wi-Fi, were agreed for mobile broadband identification at WRC-15 or supported for further consideration at WRC-19.

¹⁰ Footnote identification is sometimes adopted by countries where there is not complete agreement from all the countries in a particular region that an allocation can be regional. CEPT and UK favours working towards regional and global allocations.

- 4.4 The main aim under agenda items 1.1 and 1.2 was to increase the spectrum available to respond to growing demand for mobile broadband, and to ensure that sufficient harmonised spectrum would be available over the next decade. This Agenda Item was necessarily forward looking and considered spectrum that could be suitable for new mobile allocations and/or identification for IMT. Ofcom will consult further on our forward looking plans for potential opportunities for mobile broadband in the UK, primarily through our Mobile Data Strategy work.
- 4.5 Finally, further to mobile broadband and in support of future technological advances, a future WRC agenda item was agreed for studies up to the next WRC in 2019. This was in relation to technical studies in frequency bands above 24 GHz for the future evolution of mobile broadband (ie wideband 5G). This is explained further in Section 9.

Agenda Item 1.3 - Broadband Public Protection and Disaster Relief (BPPDR) - Priority Status: High

- 4.6 This agenda item concerned the review and possible revision of a WRC Resolution which documents the scope and regulatory context of Public Protection and Disaster Relief (PPDR) internationally (Resolution 646 (Rev.WRC-12)¹¹). This Resolution gives a description of PPDR and lists, at a regional level, a number of frequency bands that administrations are encouraged to harmonise for PPDR applications. The use of PPDR systems has been given heightened global prominence over recent years due to a number of global incidents (both man-made and natural) that have required the deployment of PPDR systems. Added to this are the on-going technological developments of mobile systems which are now being sought by the PPDR community, including the integrated provision of high speed data, voice communications and real-time mobile video applications.
- 4.7 Following extensive discussion, a revised Resolution 646 was agreed which encourages administrations to consider parts of the frequency range 694 – 894 MHz for PPDR in all regions. It also confirms the range 380-470 MHz as suitable for PPDR in Region 1 and refers to ITU-R Recommendation M.2015 for further details, including channelling arrangements for both regional and national PPDR bands. In addition, the linked agenda item 9.1.7, which was concerned with the dissemination of information related to PPDR, saw two Resolutions combined (Resolution 647 and Resolution 644) with the existing Resolution 644 suppressed.
- 4.8 The UK supported this outcome and welcomes the agreement of a broad tuning range in the Resolution. In particular we welcome that the Resolution does not focus on a restricted set of frequency bands for emergency service use and acknowledges that spectrum planning for PPDR is a national matter. This is therefore consistent with the approach that the Government in the UK is taking with respect to the use of spectrum by the emergency services.

¹¹ <http://www.itu.int/oth/ROA0600001A/en>

Agenda Item 1.4 – Amateur service, on a secondary basis, within the 5 250-5 450 kHz band - Priority Status: Low

- 4.9 The intent of this agenda item was to investigate compatibility between the amateur and other services around 5 300 kHz, with a view to allocating a portion of the 5 250 – 5 450 kHz band, globally, to the amateur service. The band 5 250 - 5 450 kHz had been allocated to the fixed and mobile services (not aeronautical) but not to the amateur service.
- 4.10 A compromise solution was found consisting of a secondary allocation to the amateur service in the band 5 351.5 - 5366.5 kHz (i.e.15 kHz) with a general power limitation of 15 W e.i.r.p., and special allowances of 20 W in Mexico and 25 W for countries/territories in South and Central America.
- 4.11 The new allocation for the amateur radio service in the frequency band 5351.5 - 5366.5 kHz will facilitate maintaining stable communications over various distances, especially for use when providing communications in disaster situations and for relief operations. The situation in the UK, where MoD grants access to specific sub-bands, will not change as a direct result of this allocation being made. Ofcom will continue to engage with the MoD on this matter as appropriate.

Section 5

Transport, including Radiodetermination

5.1 This section addresses the following agenda items:

- | | |
|---------|---|
| 1.5 | Use of fixed-satellite service bands for the control of unmanned aircraft |
| 1.15 | Spectrum demands for maritime on-board communications |
| 1.16 | Development of the maritime Automatic Identification System (AIS) |
| 1.17 | Potential allocations for wireless avionics intra-communications (WAIC) |
| 1.18 | Radar allocation for automotive applications in 77.5 - 78.0 GHz |
| Res 185 | Global Flight Tracking |

Agenda Item 1.5 - Use of fixed-satellite service bands for the control of unmanned aircraft - Priority Status: High

- 5.2 This agenda item was considered at WRC-15 primarily as a result of WRC-12 not agreeing on one particular element of an agenda item related to unmanned aircraft (UA). Specifically, whilst the WRC-12 Agenda Item identified aeronautical allocations that can be used for the control of UA, the specific issue of addressing the use of frequency bands allocated to the Fixed Satellite Service (FSS) for control links was not agreed.
- 5.3 As at WRC-12, the scope of this agenda item addressed only the safe operation of the UA. This is referred to as control and non-payload communications (CNPC).
- 5.4 The UK took a No Change position into WRC-15 predicated mainly on the view of the UK CAA which had been uncomfortable with any proposed solution which it considered might provide less regulatory certainty for spectrum used by aviation than is currently the case. In addition preparatory discussions focused around placing potential limitations on other services that operate on an equal level to fixed satellite services, so as to provide additional protection to these UA FSS control links. UK had concerns over this proposal as it might place limits on services such as fixed links that share with frequency bands used by fixed satellite services. Views on this agenda item varied within Europe and CEPT could not agree a common position on this agenda item in advance of WRC-15.
- 5.5 During the discussions it became apparent that a number of other European countries had similar concerns. Other regions also expressed concerns and a range of views were presented at the WRC. The UK participated in a number of lengthy drafting sessions to see if a compromise solution could be found. In particular, although the UK had some concerns, we were also keen to ensure that we did not unnecessarily block innovation or emerging technologies. Following extensive discussion we supported agreement of a complex Resolution which sets out a regulatory framework but does not limit our discretion to manage our national spectrum issues as we see fit. In addition, we indicated at the conference that the UK looks forward to ICAO (International Civil Aviation Organisation) producing the relevant SARPs¹² (Standards and Recommended Practices) to safely support the use of Unmanned Aircraft (UA) in fixed satellite bands and networks.

¹² SARPs are intended to assist States in managing aviation safety risks, in coordination with their air traffic management service providers. The production of SARPs is managed by ICAO where both DfT and CAA participate.

Agenda Item 1.15 - Spectrum demands for maritime on-board communications - Priority Status: Low

- 5.6 This agenda item considered the spectrum demands in the UHF band for maritime mobile on-board communications. Whilst the maritime service makes use of a number of frequency bands, mainly for ship to shore communications and maritime safety, UHF¹³ spectrum is identified for use on-board vessels, between vessels under tow and between vessels and life craft. Although not recognised in the same way as those frequencies that are used in support of the Global Maritime Distress & Safety Service (GMDSS), these frequencies are identified in the Radio Regulations (RRs), predominantly for communications within a vessel or those vessels under tow by it. Presently there are 10 frequencies identified for on-board use, with some regional limitations which further reduce availability.
- 5.7 The CEPT position and proposal was;
- that greater clarity should be brought to the actual frequencies available for on-board UHF; and
 - that the use of channels with a 12.5 kHz separation be referenced in the RRs (currently a 25 kHz separation is identified) as this would lead to an increase in the number of channels available.
- 5.8 CEPT and UK did not support an increase in the amount of actual spectrum identified for on-board use as use of narrow channels was viewed as a better way to manage increased usage than allocating additional spectrum, particularly where there has not been any specific spectrum efficiency measures applied to this usage for a number of years. Additionally UK and CEPT did not support the imposition of dates from which only certain bandwidths and/or modulation systems would be permitted.
- 5.9 Since all proposals followed the method described in the CPM Report, this was among the first agenda items to be solved. WRC-15 made no new allocations to the Maritime Mobile service but a relevant footnote was modified to incorporate the current version of a Recommendation (ITU-R M.1174 which is now at version 3) which allows use of narrower channelization along with digital technology in the existing allocations (457.5125 - 457.5875 MHz and 467.5125 - 467.5875 MHz). Two countries outside Europe had specific spectrum allocations added to another footnote, to reflect their more limited spectrum availability for on-board maritime usage. As a whole, this was considered a good outcome for both CEPT and the UK.

Agenda Item 1.16 – Development of the maritime Automatic Identification System (AIS) - Priority Status: Low

- 5.10 The intent under this agenda item was to develop the use of the AIS and to ensure the retention of the main navigational AIS channels; AIS1 and AIS2. This follows changes that were agreed at WRC-12 (review and changes to the VHF band used by Maritime: RR Appendix 18). The agenda item is of importance to the maritime community but had little impact on other services due to the fact that all proposals are addressing spectrum allocations that are already identified for use by maritime services.

¹³ UHF = Ultra High Frequency, relates to a frequency range of between 300 and 3000 MHz, and for this particular case the range 450 – 470 MHz.

- 5.11 CEPT, along with other regions, have been developing VHF Data Exchange System (VDES) concept. This is a proposed system where maritime navigational information can be distributed via a network of land based stations and a complementary satellite network. Additionally the International Association of Lighthouse Authorities (IALA) had also taken an interest in this agenda item and has developed ideas in parallel. The view of the International Maritime Organisation (IMO) is that further development of the VDES concept is to be supported, without compromising the current use of AIS1/AIS2 and the frequencies used by the GMDSS.
- 5.12 UK supports the international developments of VDES and we additionally recognise that any full and wide adoption of such a system would require endorsement and recognition by the IMO for the full benefits to be realised and that at this stage the IMO has yet to come to a final decision on VDES implementation. We also recognised that there needs to be a balance between the development of the VDES concept, alongside the continued need for capacity for services such as port operations and vessel traffic services (VTS) which currently make use of the channels in Appendix 18 of the Radio Regulations.
- 5.13 A consensus was reached, in line with the proposals from CEPT which the UK supported, on the identification of terrestrial based Application Specific Messages (ASM) channels, the protection of the existing AIS, the identification of the terrestrial component of the VDES and the international VDES channels. However no consensus could be reached on the satellite component of the VDES because of objection from some countries over the choice of frequencies. It was therefore agreed to revise the associated Resolution (Resolution 360) and to consider the issue further at WRC-19. Whilst not fully in line with the CEPT and UK position, this is a good way forward and one UK supported.

Agenda Item 1.17 - Potential allocations for wireless avionics intra-communications (WAIC) - Priority Status: Medium

- 5.14 This agenda item, which was supported by both CEPT and the Americas group, considered potential allocations and regulatory provisions that would facilitate the operation of a new aviation application known as WAIC (wireless avionic intra-communications). This application would be used to replace the majority of the wired infrastructure on an aircraft, which is used for control of the aircraft, with a radio system. This system would be used for a variety of control systems on-board an aircraft, but would not be used for communications between aircraft or for non-flight systems (i.e. entertainment systems).
- 5.15 Through the technical compatibility work in the preparatory phase, the band 4 200 – 4 400 MHz was selected as the most suitable band for this usage. As a result the UK supported the CEPT position to place an additional AM(R)S¹⁴ allocation into the 4 200 – 4 400 MHz band.
- 5.16 This agenda item was quickly resolved. The conference made an allocation to the Aeronautical Mobile (Route) Service in 4 200 – 4 400 MHz for WAIC systems that operate in accordance with recognised international aeronautical standards. These technical conditions are laid out in new WRC Resolution 424. This therefore met our objectives in defining a clear regulatory environment for WAIC systems.

¹⁴ Aeronautical Mobile (Route) Service: An aeronautical mobile service reserved for communications relating to safety and regularity of flight, primarily along national or international civil air routes.

Agenda Item 1.18 – Radar for automotive applications in 77.5 - 78.0 GHz - Priority Status: Medium

- 5.17 Under this agenda item, the proposal was to investigate the potential to add an allocation to the radiolocation service for automotive applications in the 77.5 - 78.0 GHz frequency band. There already exists a radiolocation allocation in the bands below (76 - 77.5 GHz) and above (78 - 79 & 79 – 81 GHz). Additionally, European level regulations identify the entire band 77 – 81 GHz for short range automotive radar. These apply at both the CEPT¹⁵ and EU¹⁶ level and the EU regulations are binding upon the member states of the EU.
- 5.18 This Agenda item had been supported by CEPT and Asia-Pacific. The two main issues under this proposal were; (1) compatibility with other services that make use of the band (amateur, amateur satellite and radio astronomy) and (2) whether this proposed allocation needed to be limited to automotive use only.
- 5.19 The CEPT position that the UK supported was to support a primary allocation to the radiolocation service in the 77.5 - 78.0 GHz frequency band alongside a footnote specifying general technical characteristics of radars (i.e. not expressly limiting usage to automotive radars).
- 5.20 The conference agreed on a primary allocation to the radiolocation service in the 77.5 – 78.0 GHz band. This was for ground-based applications, including automotive radars. The associated footnote refers to Recommendation ITU-R M.2057 which contains the technical characteristics of the automotive radars. There is also a new WRC Resolution 759, derived from the CEPT proposal, for ITU to provide information on the compatibility studies to be undertaken by ITU-R during the next study cycle in order to assist administrations in ensuring compatibility between the Radio Astronomy, Amateur and Amateur Satellite services and radiolocation service applications in the 76 – 81 GHz frequency band. This met our objectives and gives greater global visibility to the radar applications, including automotive use, whilst allowing for further consideration of the compatibility with other uses.

Resolution 185 (Plenipotentiary Conference 2014) - Global flight tracking for civil aviation

- 5.21 As explained in our WRC-15 Update document and our final positions document, an additional item on global flight tracking was added to the agenda of WRC-15. This was agreed at the ITU Plenipotentiary Conference held in Korea in October/November 2014 and has its roots in the disappearance of Malaysian Airlines flight MH370 in March 2014 and the loss of Air France flight 447 in 2009.
- 5.22 In the run-up to the conference we were concerned that a single solution was being presented and that the technical studies were not fully mature. These concerns were also shared by a number of other countries. In the CEPT preparation certain provisions were made to allow for technical studies to continue and to highlight that the use of the single proposed solution which uses satellite receiving capabilities for the existing aeronautical system that operates in the frequency band 1 087.7 - 1 092.3 MHz, operates in a way that recognises the other systems currently in use in the band.

¹⁵ <http://www.erodocdb.dk/docs/doc98/official/word/ECCDec0403.doc>.

¹⁶ <http://eur-lex.europa.eu/legal-content/en/NOT/?uri=CELEX:32004D0545> and <http://eur-lex.europa.eu/legal-content/en/NOT/?uri=CELEX:32005D0050>

- 5.23 The UK is keen to support initiatives which have the potential to enhance aviation safety. As a result we aligned ourselves with the CEPT position and the conference took an early decision to give regulatory certainty for this particular system in the Radio Regulations. The work on enhancing the regulatory environment for the suite of aviation safety related services will continue on to WRC-19 under a new agenda item (WRC-19 AI 1.10).

Section 6

Scientific use of spectrum

6.1 This section addresses the following agenda items:

- 1.11 Earth exploration-satellite service (Earth-to-space) in the 7 - 8 GHz range
- 1.12 Earth exploration-satellite (active) service in the 8/9/10 GHz bands
- 1.13 Distance limitation on space vehicles communicating with orbiting manned space vehicles
- 1.14 Reference time-scale and potential modification of coordinated universal time (UTC)

Agenda item 1.11 – Earth exploration-satellite service (Earth-to-space) in the 7-8 GHz range - Priority Status: Medium

- 6.2 This agenda item addressed the potential requirement for a primary allocation to the Earth exploration-satellite service (in the Earth-to-space direction) in the 7-8 GHz range. One of the drivers for this agenda item is congestion in the currently used EESS bands at 2 025 - 2110 MHz and 2 200 – 2 290 MHz which has led to frequency coordination difficulties in these bands. A new allocation in 7 – 8 GHz, along with existing space-to-Earth allocations near 8 GHz, would also allow EESS satellites to employ a single transponder for uplinks and downlinks, reducing design and launch costs, as well as helping to meet future demand. The main UK interest in EESS is through UK Government investment in ESA space missions.
- 6.3 This agenda item was proposed by CEPT and the USA. The CEPT position going into the conference, which the UK supported, was to have a primary allocation in the band 7 190 – 7 250 MHz (Earth-to-space) for the use of Telemetry, Tracking and Command (TT&C) operations of Earth Exploration satellite systems. UK's and CEPT's position also recognised that the Space Operation Service (SOS), which is allocated in the Russian Federation in the band 7 190 – 7 235 MHz, should be protected and that sharing studies between EESS and SOS need to be finalised
- 6.4 WRC-15 agreed to new allocations in the 7-8 GHz frequency band. The compromise reached on this agenda item enabled a primary allocation to be made in the band 7 190 – 7 250 MHz to EESS (Earth-to-space), as proposed by CEPT, with the provisions to protect the fixed service such that EESS satellites shall not claim protection from fixed services and mobile services which are already allocated in the band. This met with our objective to provide extra capacity for EESS services. Our initial view is that EESS uplinks not being able to claim protection from the existing services should not materially impact the EESS usage.

Agenda item 1.12 - Earth exploration-satellite (active) service in the 8/9/10 GHz bands - Priority Status: Medium

- 6.5 This agenda item was proposed by CEPT and USA to provide additional spectrum to meet the growing demand for enhanced image resolution where used for global environmental monitoring and other applications. This better image resolution requires increased transmission bandwidth above that which is already allocated. Scientific and geo-information applications provide high quality measurements in all weather conditions with enhanced applications for disaster relief and humanitarian aid, land use and large-area coastal surveillance.

- 6.6 This agenda item involved conducting sharing studies with services currently in the bands 8 700 – 9 300 MHz and 9 900 - 10 500 MHz, as well as adjacent band compatibility with passive services in the band 10.6 - 10.7 GHz. Going into the conference, CEPT supported the allocation of 600 MHz at 9 200-9 300 MHz and 9.9-10.4 GHz for Earth Exploration Satellite Service EESS (active). While the UK supported the CEPT position, we worked closely with UK stakeholders, in particular to ensure that the proposed allocation did not impose limitations on the operation of other national services above 9.9 GHz.
- 6.7 The WRC agreed new allocations to the EESS (active) in the bands 9.2-9.3 and 9.9-10.4 GHz, as proposed by CEPT and as supported by the UK. Agreement was reached on the technical limits for EESS (through a power flux density mask applied to the EESS operation) in the band 9.9-10.4 GHz for the protection of the incumbent services.
- 6.8 There was however quite a lot of debate at the Conference in relation to this agenda item. In particular, eight countries outside Europe which were still concerned over the protection of radars operating in their territory demanded a specific provision requiring countries operating EESS to obtain prior agreement under a provision of the Radio Regulations.

Agenda item 1.13 - Distance limitation on space vehicles communicating with orbiting manned space vehicles - Priority Status: Low

- 6.9 WARC¹⁷-92 allocated the band 410 – 420 MHz to the Space Research Service (SRS) on a secondary basis to allow for extra-vehicular communications in the vicinity of Earth orbiting manned space vehicles. WRC-97 upgraded the allocation to the SRS in the band 410 - 420 MHz to primary status with the conditions given in RR No. 5.268. The use of the band by SRS is limited to within 5 km of orbiting manned space vehicles.
- 6.10 The band 410 - 420 MHz is used now for communications by astronauts conducting extra-vehicular activities (EVA) in the immediate vicinity of the International Space Station (ISS). Vehicles approaching the ISS, whether manned or robotic, need to communicate over distances somewhat greater than 5km to ensure safe operations and docking manoeuvres. It was therefore desired to modify RR No. 5.268 to remove the 5 km limitation while maintaining the current pfd limits to protect terrestrial services. Similarly, to allow for proximity operations with orbiting vehicles and not solely limit the use of the band for extra-vehicular activities, it was also desired to modify No. 5.268 in such a manner as to remove the EVA limitation.
- 6.11 CEPT and UK supported the removal from the relevant Radio Regulations footnote (i.e. No 5.268) of this distance limitation and the restriction on use of the band for extra vehicular activities, while keeping the power flux density limits to protect terrestrial services. Other regions also supported this approach and the conference was able to take a quick decision on this item since all proposals were consistent with the single method agreed at the WRC Conference Preparatory Meeting held in March 2015.

¹⁷ WARC stands for World Administrative Radio Conference, the forerunner of the WRC

Agenda item 1.14 - Reference time-scale and potential modification of coordinated universal time (UTC) - Priority Status: High

- 6.12 As explained in previous Ofcom documents on this matter this agenda item was created as a result of the outcome of the Radiocommunication Assembly¹⁸ (RA-12 - held immediately prior to WRC-12) and following discussions around proposed modifications to ITU-R Recommendation TF.460-6 to discontinue the insertion of leap seconds in the definition of UTC. Responsibility for approving the Recommendation had been elevated to RA-12 since the relevant ITU-R study groups that were working on that particular Recommendation could not achieve consensus, despite extensive debates over several years. RA-12 did not approve the modifications to TF.460-6 and recommended that WRC-12 should consider creating an agenda item for WRC-15 to allow further study of the matter.
- 6.13 The elimination of leap seconds from the definition of UTC would effectively break the link between the current time standard and the rotation of the earth. Some operators of global navigational systems and the financial industry have argued that the insertion of leap seconds can be difficult and burdensome to accommodate. They claim this is because it introduces uncertainty into the dissemination of time where used in these scientific/technical systems.
- 6.14 The UK's National Measurement Office (NMO), an Agency of BIS, advised by the National Physical Laboratory (NPL), has led on the development of UK policy on this agenda item as Ofcom has no role in time standard policy. The Government conducted a public dialogue on the leap second issue and the results were published at <http://leapseconds.co.uk/>. Following this, the Government confirmed that the UK supported the retention of the leap second via a method that would see UTC with leap seconds disseminated as the primary time standard, with a transmitted offset to allow for atomic time to be derived accordingly.
- 6.15 While the UK had some support, we appeared to be in a minority at the start of the Conference. In particular, the Americas and Asia/Pacific regions all supported the abolition of leap seconds, while CEPT and Africa had not been able to agree common positions in advance of the Conference. This led to some lengthy discussions at WRC-15 and a general conclusion that further work was required and other institutions consulted before a decision could be taken.
- 6.16 As a result, the conference decided to adopt Resolution 655 to leave the current situation in place until 2023 when that WRC (WRC-23) will consider the conclusions. In the meantime, international bodies responsible for time standards (e.g. the International Bureau of Weights and Measures (BIPM), International Committee for Weights and Measures (CIPM) and General Conference on Weights and Measures (CGPM) etc.) will engage in dialogue between now and WRC-23 to study the various aspects of current and potential future reference timescales, including their impacts and applications. UK Government will expect to take a leading role in these discussions. Any decisions taken at the WRC in 2023 will be framed by the views and discussions in these other groups and not solely set by the ITU/WRC.
- 6.17 This represents a good outcome for the UK and we believe the plan to engage with a wider base of international bodies and not just the ITU will provide for a better informed future decision on the leap second issue.

¹⁸ Radiocommunication Assemblies (RA) are responsible for the structure of, programme of the related work and the approval mechanism of radiocommunication studies in the ITU.

Section 7

Satellite use of spectrum and associated regulations

7.1 This section addresses the following agenda items:

- 1.6 Additional fixed satellite allocations between 10 and 17 GHz
- 1.7 Review of FSS use in the band 5 091 – 5 150 MHz
- 1.8 Review of the provisions relating to earth stations located on board vessels
- 1.9.1 Additional fixed satellite allocations in the 7 & 8 GHz bands
- 1.9.2 Potential allocations to the maritime-mobile satellite service in 7/8 GHz
- 1.10 Additional mobile satellite IMT allocations in the 22-26GHz range
- 7 Resolution 86 (satellite networks);
- 9.1.1 Protection of the systems operating in the mobile-satellite service in the band 406-406.1 MHz
- 9.1.2 Studies on possible reduction of the satellite coordination arc criteria
- 9.1.3 Use of satellite orbital positions and associated spectrum by developing countries
- 9.1.8 Regulatory aspects for nano and pico satellites
- 9.2 Any difficulties or inconsistencies encountered in the application of the Radio Regulations;
- 9.3 Action in response to Resolution 80 (Rev.WRC-07)

Agenda Item 1.6 (parts 1.6.1 and 1.6.2) - additional fixed satellite allocations between 10 and 17 GHz - Priority Status: Medium and Low respectively

7.2 The intent of this agenda item was to make additional fixed satellite service (FSS) spectrum allocations in the range 10 – 17 GHz (Ku band) in order to address the predicted growth in demand for services such as VSAT¹⁹, DTH²⁰ broadband internet and television, satellite news gathering and telecommunication links.

7.3 The arguments for this agenda item were on the basis that, at a global level, there was less FSS Ku band spectrum in Region 1 compared with Regions 2 and 3. It was argued that making equal FSS allocations across the three ITU Regions would simplify the planning of satellite networks that have coverage areas spanning more than one ITU Region. In addition, there was an imbalance of uplink and downlink spectrum within Regions 2 and 3, where there was less uplink spectrum compared to the downlink. It was argued that addressing these spectrum imbalances could simplify the design and construction of satellite networks and lead to reduced cost of services.

¹⁹ VSAT – Very Small Aperture Terminal: a two-way satellite ground station or a stabilised maritime satellite antenna with a dish antenna diameter that is normally smaller than 3 metres. VSATs are most commonly used to transmit narrowband data (point of sale transactions such as credit card, polling or general data) as well as broadband data (for the provision of satellite internet access).

²⁰ DTH – “Direct To Home”

7.4 The bands under consideration were:

FSS (space-to-Earth)

- 13.4 - 13.75 GHz with preference for the band 13.4 - 13.65 GHz to allow a gap below the existing up-link FSS allocation in the band 13.75 - 14.5 GHz;
- 14.8 - 15.35 GHz

FSS (Earth-to-space)

- 14.5 - 14.8 GHz

7.5 Going into the conference we supported the CEPT position for FSS (space-to-Earth) allocations in the frequency band 13.4-13.65 GHz but not having a proposal for FSS (Earth-to-space) allocation in any bands. This was primarily due to the lack of agreement over the potential for sharing the band with other aeronautical based services.

7.6 The conference decided relatively quickly to make an additional primary allocation of 250 MHz to the FSS (space-to-Earth) in Region 1 in the frequency band 13.40-13.65 GHz. However, the Earth-to-space aspects of this agenda item proved more contentious. Eventually, after long and difficult discussions, the conference decided that in certain countries (set out in new Resolutions 163 and 164), the scope of use of the existing allocation to the FSS (Earth-to-space) in Regions 1 and 2 in 14.5 – 14.75 GHz and in Region 3 in 14.5-14.8 GHz should be broadened subject to the following technical and operational limitations set out in new footnotes to the Table of Allocations;

- this FSS use is not for feeder links to BSS and is limited to geostationary satellites,
- minimum antenna diameter of 6m and maximum power spectral density of -44.5 dBW/Hz at the input of the antenna,
- maximum power flux-density of -151.5dB(W/(m² . 4kHz)) produced by this earth station at all altitudes up to 19 km above sea level at 22 km seaward from all coasts, defined as the low-water mark, as officially recognized by each coastal state,
- the location of earth stations shall maintain a separation distance of at least 500 km from the border(s) of other countries unless shorter distances are explicitly agreed by those administrations. RR No. 9.17 does not apply, and
- earth stations in the fixed-satellite service (Earth-to-space) not for feeder links for the broadcasting-satellite service shall not constrain the future deployment of the fixed and mobile services.

7.7 The UK was comfortable with this outcome. In particular, while we did not feel that the case for additional uplink capacity in Region 1 was made, we were content with the additional allocation that was made with the technical and operational limits identified.

Agenda Item 1.7 – Review of FSS use in the band 5 091 -5 150 MHz - Priority Status: Low

- 7.8 The frequency band 5 091 – 5 150 MHz contains a number of allocations, some of which are related to aeronautical use. One of these aeronautical uses is for microwave landing systems (MLS) - this band being for additional capacity, once the core MLS band at 5 030 – 5 091 MHz was full. In addition the band is allocated, on a primary basis, to the fixed satellite service (FSS) where it is used for feeder links to non-geostationary mobile satellite systems.
- 7.9 The FSS allocation, which was made back in WRC-97, comes with certain regulatory requirements and technical limitations so as to protect potential MLS use of the band where demand dictates it is necessary. This agenda item explored whether these limitations and requirements could be relaxed to allow for expanding FSS use in the band in future.
- 7.10 In the main, most of the MLS use is accommodated in the band 5 030 – 5 091 MHz and, at least in the UK, there does not appear to have been any need to make use of the band 5 091 – 5 150 MHz for MLS.
- 7.11 The CEPT position was to support removing some of the limitations (including timing restrictions) on FSS use, whilst continuing to recognise the established regulatory framework for systems such as MLS. The UK supported the CEPT position. The conference made an early decision to maintain the FSS allocation for MSS feeder links with associated provisions in line with the European Common Proposals (ECP). This was a good outcome for the UK and CEPT as it allows for certain restrictions on the FSS to be lifted thereby providing more flexible usage in the band.

Agenda Item 1.8 - review the provisions relating to earth stations located on board vessels (ESVs) - Priority Status: Medium

- 7.12 The purpose of this Agenda Item was to review the provisions relating to earth stations located on board vessels (ESVs) that transmit in the fixed satellite service (FSS) uplink bands at 5 925 – 6 425 MHz ('C' band) and 14.0 - 14.5 GHz (Ku band).
- 7.13 Under the arrangements prior to WRC-15, the minimum distance from a coastal state at which an ESV could operate without the prior agreement of the concerned coastal state was 300 km in the 5 925 – 6 425 MHz band and 125 km in the 14.0 - 14.5 GHz band. These minimum distances were necessary to ensure that transmissions from ESVs did not cause interference to terrestrial fixed services that may be operating in the coastal state.
- 7.14 CEPT adopted an ECP for this Agenda Item to reduce these minimum distances. Following further consideration in the UK we concluded that we could not support the CEPT position to reduce the minimum distances due to concerns over the potential for interference to communication links used to interconnect oil and gas platforms in the North Sea. As a result, the UK opposed the ECP and submitted a No Change proposal to the conference. We also moved the UK priority of this agenda item from low to medium.

7.15 Following discussion, the conference decided to make no changes to the existing regulations for ESV operating in the 14.0 - 14.5 GHz band. For the 5 925 – 6 425 MHz band minor changes were agreed allowing ESVs to operate with 1.2m antenna, but with a minor increase in the minimum distance to 330km. This is felt to be a good result for the UK, as it maintains the existing levels of protection of the millimetric wave communication links used to interconnect oil and gas platforms in the North Sea.

Agenda Item 1.9 (1.9.1) - Additional fixed satellite (FSS) allocations in the 7 & 8 GHz bands - Priority Status: Medium

- 7.16 The CEPT position taken into the conference supported new primary worldwide FSS allocations of 2x100 MHz in the bands 7 150 – 7 250 MHz (space-to-Earth) and 8 400 - 8 500 MHz (Earth-to-space) under the following conditions:
- their use is limited to geostationary FSS satellites;
 - FSS space stations in the band 7 150 – 7 235 MHz shall comply with an e.i.r.p mask to protect the Space Research Service (SRS);
 - FSS earth stations in the band 8 400 – 8 500 MHz shall operate at specified fixed points with a minimum antenna diameter of 3.5 m (consistent with Resolution 758, WRC-12)²¹ and shall be subject to coordination under RR Nos. 9.17 and 9.17A; and
 - FSS space stations in the band 8 400-8 500 MHz and FSS earth stations in the band 7 150-7 250 MHz shall not claim protection from SRS, and footnote RR No. 5.43A does not apply.
- 7.17 The UK recognised the need for additional spectrum for FSS with a view to allowing flexible and shared use of the 7/8 GHz bands where possible. UK supported the CEPT position on the understanding that the conditions identified above would be applied.
- 7.18 This issue provoked much debate at the WRC and various compromise solutions were put forward to try to find a solution, including the establishment of an ad-hoc group under the plenary. However, in the end no way forward could be found, partially reflecting continued opposition from two regional groups. As a result, no new allocation to the FSS was made and no new studies will be performed. Whilst not in line with the CEPT position the UK is content with the result of the agenda item.

Agenda Item 1.9 (1.9.2) - Potential allocations to the maritime-mobile satellite service in 7/8 GHz - Priority Status: Medium

- 7.19 The position adopted by CEPT was to support a primary allocation to the MMSS (space-to-Earth), limited to geostationary satellites, in the band 7 375 – 7 750 MHz with the condition that MMSS does not claim protection from, nor constrain the use or development of the existing terrestrial services in this band. CEPT also supported No Change in the band 8 025 – 8 400 MHz.
- 7.20 The UK did not sign the European common position on this issue as we did not believe that the case had been sufficiently made for additional capacity for the MMSS in the space-to-Earth direction. Also we were concerned that receiving earth stations on vessels might seek to claim protection from fixed services operating in the band.

²¹ [Resolution 758 \(WRC-12\) - http://www.itu.int/dms_pub/itu-r/oth/0c/0a/ROC0A00000A0026PDFE.pdf](http://www.itu.int/dms_pub/itu-r/oth/0c/0a/ROC0A00000A0026PDFE.pdf)

- 7.21 In the UK there are varied interests that make use of these bands, including Ministry of Defence, fixed service links, PMSE and earth exploration satellites. The UK concurred with the CEPT that the results of technical analysis suggested that for some of the services mentioned, achieving compatibility would be very challenging. We also noted that no UK interests in an allocation were identified.
- 7.22 Although the conference agreed a space-to-Earth allocation at 7 375 – 7 750 MHz (for MMSS for GSO networks), provisions were put in place to protect fixed and mobile services. In addition, the receiving earth stations cannot claim protection from fixed services or mobile services. Moreover there will be no agenda item for WRC-19 to re-consider MSS allocations. The UK was content with this outcome and the conditions put in place.

Agenda Item 1.10 - Additional mobile satellite IMT allocations in the 22-26 GHz range - Priority Status: Low

- 7.23 Going into the conference neither the UK nor CEPT were convinced that a persuasive argument had been made for additional capacity for mobile broadband satellite. The UK has on-going usage in the 22-26 GHz frequency range for millimetric wave fixed links, radio astronomy (and other scientific use in the bands), as well as amateur radio use. Throughout the preparatory discussions there was no apparent UK satellite stakeholder interest for additional spectrum. For these reasons we did not support a new MSS allocation within the range 22-26 GHz. This was also the wider CEPT view on the issue.
- 7.24 A number of other countries and some other regional groups were supportive of a new allocation and discussions ran until the closing stages of the conference. Ultimately however no agreement could be reached and the conference decided on no changes to the band. This was in line with the UK and CEPT positions.

Agenda Item 7 - Resolution 86 (Satellite coordination and notification procedures) - Priority Status: Medium

- 7.25 WRC Resolution 86²² creates a standing item to deal with improvements in the satellite regulatory procedures to facilitate rational efficient and economical access to spectrum for satellites. There is potential for significant issues to be raised under this agenda item which may impact existing satellite users and operators, particularly due to the complexity of the regulatory processes and procedures.
- 7.26 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.
- 7.27 At WRC-15 Agenda item 7 had 20 separate issues in total to consider. The majority of these were resolved in line with the seventeen CEPT common positions agreed in the preparation of the WRC, all of which were supported by the UK. The issues covered were;

²² http://www.itu.int/dms_pub/itu-r/oth/0c/0a/R0C0A00000A0032PDFE.pdf

7.27.1 **Issue A:** Informing the Bureau of a suspension under RR No. 11.49 beyond six months

Final outcome: most input contributions were in line with the CEPT position which the UK supported. This introduced penalties for the late notification of the Bureau regarding suspension of assignments (RR No. 11.49). One regional group was pressing for No Change, but finally agreed with the CEPT position.

7.27.2 **Issue B:** Publication of information on bringing into use (BIU) of satellite networks at the ITU website

Final outcome: various regulatory texts were introduced and it was confirmed that the publication of BIU information should not be connected to the regulatory provision Resolution 49, consequentially clarifying the BR's publication procedure in Nos. 11.44B and 11.49. This met both the UK's and CEPT's position.

7.27.3 **Issue C:** Review or possible cancellation of the advance publication mechanism for satellite networks subject to coordination under section II of Article 9 of the Radio Regulations

Final outcome: a process was approved to automatically produce advance publication information (API) from coordination data (CR/C), rather than have separate submissions. Additionally a Resolution was approved covering transitional implementation procedures clarifying that satellite Advance Publication Information (API) cannot be submitted after 1 July 2016 and APIs remaining without full coordination notices (CR/Cs) having been submitted will be suppressed by 31 December 2016 as the automatic generation of APIs will start on 1 January 2017. This met both the UK's and CEPT's position.

7.27.4 **Issue D:** General use of modern electronic means of communications in coordination and notification procedures

Final outcome: it was agreed to permit the use of email alongside fax, in line with both the UK and CEPT position.

7.27.5 **Issue E:** Failure of a satellite during the bringing into use period

Final outcome: no changes were made in clarifying this procedure as it was considered to be a very rare event. This met both the UK's and CEPT's position.

- 7.27.6 **Issues F and G:** Modifications to RR Appendix 30B in relation to the suspension of use of a frequency assignment recorded in the MIFR and Clarification of bringing into use information provided under RR Nos. 11.44/11.44B

Final outcome: both issues were resolved accordance with the CEPT positions which the UK supported. Issue F embeds in the RR the three year suspension period that was already being applied through a Rule of Procedure, while Issue G allows the BR to request bringing into use information before the satellite filing network is recorded in the MIFR.

- 7.27.7 **Issue H:** Using one space station to bring into use frequency assignments at different orbital locations within a short period of time

Final outcome: CEPT did not have a position on this item. The UK took a view to support the development of provisions to limit the practice of “satellite hopping”. During discussion we were comfortable with the CEPT view to gather statistics on satellite hopping by requiring administrations to provide information when using the same space station to bring frequency assignments at different orbital locations into use.

- 7.27.8 **Issue I:** Possible method to mitigate excessive satellite network filings

Final outcome: no modifications regarding excessive satellite filings were made at the WRC-15. This met both the UK’s and CEPT’s position

- 7.27.9 **Issue J:** Removal of the link between the date of receipt of the notification information and the date of bringing into use in RR No. 11.44B

Final outcome: WRC-15 approved the approach to remove the link which was unintentionally created at WRC-12 between the date of receipt of the notification information and the date of bringing into use in RR No. 11.44B. This clarification was supported by CEPT as well as by most regions so it was quickly resolved.

- 7.27.10 **Issue K:** Addition of a regulatory provision in RR Article 11 for the case of launch failure

Final outcome: differing views on this issue were presented to the conference. The CEPT position was for No Change, and UK was aligned with this. Most other concerned regions were in favour of adding a specific paragraph to the RR to cover launch failure cases. After some debate, WRC-15 simply confirmed the decision of the last WRC (WRC-12), which was for No Change and which therefore meets both CEPT’s and UK’s position.

- 7.27.11 **Issue L:** Modification of certain provisions of Article 4 of RR Appendices (AP) 30 and 30A for Regions 1 and 3, namely replacement of tacit agreement with explicit agreement or alignment of those provisions of AP 30 and 30A for Regions 1 and 3 with those of AP 30B

Final outcome: the CEPT position for No Change, which UK supported, met with some opposition at the WRC. Hence CEPT during the WRC coordination process agreed to accept aligning AP30 and 30A with AP 30B as portrayed in CPM Report Method L2. Another proposal to modify § 6.14 of AP30B was also accepted.

- 7.27.12 **Issue np** Addition of a new provision to the Radio Regulations in the notification process, No. 11.41.3

Final outcome: Due to the fact that this proposal from CEPT, which the UK supported, was developed late in the WRC-15 process, it was not agreed. The issue may be raised again during the next study cycle (i.e. for WRC-19) under AI 7.

Agenda Item 9.1, issue 9.1.1 - Protection of the mobile-satellite service in 406 - 406.1 MHz - Priority Status: Medium

- 7.28 This item focused on the use of this band by the mobile-satellite service, and particularly, by distress and search and rescue (SAR) systems generally referred to as Cospas-Sarsat.
- 7.29 The International Cospas-Sarsat Programme assists SAR activities on a worldwide basis by providing distress alert and location data to the international community. Alert messages triggered by 406 MHz beacons are detected by a network of (GSO and NGSO) satellites and are then relayed (via the SAR band 1 544 – 1 545 MHz) to control centres on the ground, assisting in both land and sea rescue.
- 7.30 There is therefore general recognition of the need to detect and successfully process the signals at 406 MHz. This requires co-ordination at both national and international level. At a national level, Ofcom maintains regular contact with those organisations which have responsibilities in this area in the UK, such as the Maritime and Coastguard Agency (MCA) and the Civil Aviation Authority (CAA).
- 7.31 On the other hand, there is also recognition of the need to not place undue constraints on existing and planned systems in the adjacent frequency bands (e.g. 390 - 406 MHz and 406.1 – 420 MHz).
- 7.32 The conference reinforced the protection of search and rescue beacons that transmit signals in the 406-406.1 MHz frequency band to search and rescue satellites, such as the Cospas-Sarsat system. The applicable WRC Resolution 205 was modified to ensure that frequency drift characteristics of radiosondes are taken into account when operating above 405 MHz to avoid drifting close to 406 MHz. Administrations are now requested to avoid making new frequency assignments for the mobile and fixed services within the adjacent frequency bands to prevent interference in the frequency band 406-406.1 MHz. As of December 2013, the Cospas-Sarsat System has provided assistance in rescuing over 37,000 persons in over 10,300 incidents worldwide.

Agenda Item 9.1, issue 9.1.2 – Studies on possible reduction of the satellite coordination arc - Priority Status: Medium

7.33 This item looked at the appropriateness and effectiveness of the current technical criteria in the Radio Regulations for identifying coordination (under RR No 9.41), and considered possible alternatives. It also considered whether the current values of the 'coordination arc' (an orbital separation, in degrees, either side of a proposed geostationary satellite network), could be reduced (in Ka band), or further reduced (in C and Ku band) from the values agreed at WRC-12.

7.34 The conference decided the following

- to reduce the coordination arc in C and Ku band by one degree;
- To keep unchanged the interference threshold in Articles 9 and 11;
- To apply a pfd threshold in C-band (Earth-to-space only) and Ku-band (E-to-s and s-to-E) outside the coordination arcs

7.35 These outcomes may help, in part, to speed up the process of obtaining coordination agreements with relevant satellite network operators by excluding some networks from coordination and they will also permit an element of self-declaration (based of the application of the pfd threshold) in the satellite coordination processes. This solution is a modification of the original CEPT proposal, which the UK supported, and it was endorsed during CEPT internal coordination

Agenda Item 9.1, issue 9.1.3 - Use of satellite orbital positions and associated spectrum by developing countries - Priority Status: Medium

7.36 This item was seeking to see that:

- (1) ITU-R continues to collaborate with, and provides information when requested by, ITU-D on satellite technologies and applications as defined in ITU-R Recommendations and Reports and on satellite regulatory procedures in the Radio Regulations that will help developing countries with the development and implementation of satellite networks and services;
- (2) ITU-R undertakes studies to determine whether it might be necessary to apply additional regulatory measures to enhance the availability of public mobile international telecommunication services delivered through satellite technology.

7.37 Whilst UK recognised the aims of resolves 1, and that developing countries do indeed face challenges when planning satellite networks, we and other CEPT countries were mindful of the potential risk to satellite stakeholders of any proposals that could affect the current balance in the provisions of the Radio Regulations for equitable access to orbital resources through Article 9 and/or Article 11.

7.38 As a result of these concerns, CEPT's position going into the Conference was to make No Change to the Radio Regulations and to suppress Resolution 11.

- 7.39 The Radiocommunication Assembly (RA-15, which met immediately prior to the conference) had adopted new ITU-R Resolution 69 on development and deployment of international public telecommunications via satellite in developing countries. Since this ITU-R Resolution contains the same principles as Resolution 11 (WRC-12), WRC-15 decided to suppress Resolution 11. No changes were made to the Radio Regulations by WRC-15 and so studies will continue as per Resolution 69 and will be reported to WRC-19 by the Director of the Radiocommunication Bureau. This met both CEPT's and UK's objectives.

Agenda Item 9.1, issue 9.1.8 - Regulatory aspects for nano and pico-satellites - Priority Status: Medium

- 7.40 Under this issue, the Director reported on the results of work to examine the procedures for notifying space networks and consider possible modifications to enable the deployment and operation of nano and pico-satellites, taking into account their short development time, short mission time and unique orbital characteristics.
- 7.41 The UK supports the development of nano and pico-satellites. However, our initial view was that no specific changes to the satellite coordination and notification processes in the RRs needed to be made in respect of nano and pico-satellites, and that the existing approach to their regulation was sufficient. In particular, we did not support change to Articles 9 and 11.
- 7.42 The Radiocommunication Assembly (RA-15) approved new ITU-R Resolution 68 on improving the dissemination of knowledge concerning the applicable regulatory procedures for small satellites, including nanosatellites and picosatellites. Recognising this, WRC-15 decided to make No Change to the Radio Regulations for this issue, and further considered that the regulatory and procedural aspects of the issue could be addressed under Agenda Item 7 of future Conferences. This was in line with both CEPT's and UK's objectives.

Agenda Item 9.2 - difficulties or inconsistencies encountered in the application of the Radio Regulations - Priority Status: Medium

- 7.43 This part of the Director's Report summarizes the experiences of the Radiocommunication Bureau in administering the Radio Regulations (RRs), including difficulties and inconsistencies encountered in the application of the relevant provisions. The Director cannot make formal proposals to change the Radio Regulations as these proposals can only be made by the ITU member states themselves. However the Director's Report provides an opportunity for the ITU secretariat to highlight what they consider to be difficulties or inconsistencies in the RRs.
- 7.44 Through consideration of the Report, the UK noted the view of the Director on footnote No. 5.526 in the Radio Regulations, which applies to the bands 29.9 – 30 and 20.1 – 20.2 GHz globally, and to the band 29.5 – 30 and 19.7 – 20.2 GHz only in ITU Region 2. It permits networks which operate in both the fixed-satellite service (FSS) and the mobile-satellite service (MSS), to operate links between earth stations at specified or unspecified points or while in motion, through one or more satellites for point-to-point or point-to-multipoint communications.

- 7.45 In parallel, the Radiocommunication Bureau had recently published a Circular Letter (Doc. CR/358²³) through which a new Class of Station (code UC) was created for an earth station while in motion, associated with a space station in the fixed-satellite service (FSS) in the bands listed under footnote 5.526.
- 7.46 For the operation of Earth Stations On Mobile Platforms (ESOMPs²⁴), the UK considered that amending this footnote to apply to the FSS allocation in 29.5 - 30.0 GHz and 19.7 - 20.2 GHz in Regions 1 and 3, thereby aligning this with Region 2, would bring flexibility to the Radio Regulations whilst not increasing the potential for interference.
- 7.47 Recognising that CEPT already has regulatory provisions that permit the use of Earth Stations On Mobile Platforms, CEPT proposed changes to No. 5.526 including (a) removing the requirement for these networks to be in the MSS as well as FSS, (b) extending the applicability of the footnote to the bands 29.5 - 30.0 GHz and 19.7 - 20.2 GHz in all three regions, and (c) adopting a new Resolution specifying the technical requirements that should be met by such earth stations.
- 7.48 After lengthy discussion the conference agreed on a footnote linked with new Resolution 156 which permits the use of earth stations in motion (revised terminology: ESOMP replaced with ESIM) in the bands referenced, at a global level. This met both the UK's and CEPT's objectives. Other satellite matters raised in the Director's Report were addressed and resolved broadly in line with the CEPT position.
- 7.49 In addition to the above, WRC-15 discussed the issue of the absence of appropriate regulatory provisions for the bringing into use of frequency assignments for non-GSO FSS/MSS systems. The UK felt this was an issue worthy of debate. However, while others recognised the lack of such provisions the conference was unable to conclude on the matter.
- 7.50 This issue may be examined in ITU-R in the next study cycle, with the possibility to develop regulatory provisions requiring additional milestones beyond those already within the Radio Regulations. It was made clear that such a study may also consider the implications of the application of such milestones to non-GSO FSS/MSS systems brought into use after WRC-15. The UK was comfortable with this outcome.

Agenda Item 9.3 - on action in response to Resolution 80 - Priority Status: Medium

- 7.51 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, at times, prove to be very controversial.
- 7.52 The main subject of discussion under this 9.3 at WRC-15 concerned the part of the Radio Regulations Board's report on Resolution 80 which related to Article 48 of the Constitution (section 4.4). During discussion we and CEPT noted that Article 48 refers to "military radio installations" and not to stations used for governmental purposes in general. As a result the RR Articles 13 and 15 should see No Changes.

²³ https://www.itu.int/md/dologin_md.asp?lang=en&id=R00-CR-CIR-0358!!MSW-E.

²⁴ ESOMPs – Earth Stations on Mobile Platforms: an application of the fixed-satellite service, where the earth station may operate from a single defined location, multiple points or whilst in motion.

7.53 This UK and CEPT position was used to develop a text relating to Article 48 of the Constitution. This appeared in the Minutes of the Plenary.

Section 8

Standing agenda items

- 8.1 This section addresses the standing agenda items which cover a range of recurring, housekeeping and reporting issues. It also includes issues that were agreed for study, but where regulatory changes are not normally envisaged. The more significant of these agenda items are addressed below.
- 8.2 This section addresses the following agenda items:
- 8 Deletion of, or removal of names from, country footnotes;
 - 9 Report of the Director of the Radiocommunication Bureau;
 - 9.1 Activities of the Radiocommunication Sector since WRC-12
 - 9.1.4 Updating the Radio Regulations
 - 9.1.5 Satellite use of 3.4 – 4.2 GHz, for aeronautical and meteorological services
 - 9.1.6 Studies towards review of the definitions of fixed service, fixed station and mobile station
 - 9.1.7 Spectrum management guidelines for emergency and disaster relief radiocommunication

Agenda Item 8 - Deletion, or removal of, country names from footnotes - Priority Status: Low

- 8.3 Some Footnotes to the table of frequency allocations, in the Radio Regulations, provide alternative arrangements for named countries. The removal of names from these country footnotes under this agenda item presents a relatively straightforward exercise by requiring us and other countries to assess the need for said footnotes. This is not normally considered a controversial issue and as such is seen as low priority. However, it should be noted that there is also a need to check proposals from other countries to ensure there is no adverse impact to the UK, e.g. if a country withdraws from a footnote which was giving us a more favourable co-ordination situation than the table allocation. This can normally only be done relatively late in the process and sometimes during the conference itself.
- 8.4 The most notable item for the UK, as addressed under this agenda item, was for UK to remove its name from footnote 5.431 (secondary amateur in the band 3 400 – 3 475 MHz). This is to ensure consistency with the current UK amateur licensing (notice of variation) conditions. These changes will also be reflected in the revision to the UK FAT which will be published after WRC-15. This change was actioned by the conference.

Agenda Item 9 - Report of the Director of the Radiocommunication Bureau

- 8.5 The report of the Director can give rise to major issues, for example where the Radio Regulations Board (RRB) has been unable to resolve controversial issues, e.g. cases involving satellite filings and networks or radiocommunications use for Earth observation applications.

- 8.6 It was comprised of 3 main parts – 9.1, 9.2 and 9.3. Some elements of 9.1, as well as items 9.2 and 9.3, are covered in the satellite section above, whereas those sub issues of Agenda Item 9.1 that relate to other issues or which are of a more general nature are addressed below.

Agenda Item 9.1, issue 9.1.4 – Updating the Radio Regulations (RRs) - Priority Status: Low

- 8.7 This a standing item for all Conferences to review the RRs to remove or update out of date or redundant material.
- 8.8 There were no substantive issues from a UK perspective and CEPT had a No Change position going into the conference, although that was a relatively relaxed position and left room for CEPT to be receptive to proposals made by other regions or countries.
- 8.9 As a result, the Conference decided on minor refinements to RR Articles 1, 2 and 4 and the suppression of Resolution 67 (“Updating and rearrangement of the Radio Regulations – WRC-12). This outcome is in line with CEPT proposal as the modifications made were considered to be editorial in nature.

Agenda Item 9.1, issue 9.1.5 - Satellite use of 3.4 – 4.2 GHz, for aeronautical and meteorological services - Priority Status: Low

- 8.10 At WRC-12 it was highlighted that in some countries across Africa, where there is a lack of terrestrial infrastructure, satellite communications continue to play a critical role. This includes the satellite downlink band at 3.4 - 4.2 GHz which supports, among others, air traffic communications and the distribution of meteorological information.
- 8.11 Use of fixed broadband wireless has been possible in parts of the 3.4 – 4.2 GHz band for a number of years. Additionally the band 3.4 – 3.6 GHz was identified for mobile use in a number of countries at WRC-07. As a result, this Agenda Item was agreed to look into what measures could be taken to support the on-going use of the frequency band by satellite earth station receivers. It also closely linked with discussions under Agenda Item 1.1 which included discussion of parts of this band (as noted earlier in this document).
- 8.12 Both UK and CEPT were of the view that the operation of FSS earth stations in the band 3 400-4 200 MHz should not require additional technical and/or regulatory measures within the Radio Regulations. However, bringing more attention to the issue, so that administrations can take better informed decisions, is an approach we supported. This was achieved by making enhancements to Resolution 154.

Agenda Item 9.1, issue 9.1.6 - Studies towards review of the definitions of fixed service, fixed station and mobile station - Priority Status: Medium

- 8.13 The purpose of this agenda item was to investigate the possible changing or updating of the Radio Regulations definitions of the fixed service, fixed station and mobile station. This has been an on-going issue over several Conferences where many different points of view have been discussed without any substantive outcome.

8.14 We shared the CEPT position going into this conference that there was no need for change. This is based on the fact that the coordination of very large numbers of existing fixed/mobile stations with satellites and other terrestrial services is totally dependent on these definitions. Any change would require many new coordination procedures which would result in considerable risk and significant consequential activity. All the submitted proposals to WRC-15 on AI 9.1 issue 9.1.6 proposed No Change to the Radio Regulation and the suppression of Resolution 957 (“Studies towards review of the definitions of fixed service, fixed station and mobile station”) and this was the outcome agreed at the conference.

Agenda Item 9.1, issue 9.1.7 - Spectrum management guidelines for emergency and disaster relief radiocommunication- Priority Status: Low

8.15 Under this issue, the Director reported on studies associated with the spectrum used for emergency and disaster relief communications. This includes the provision by the ITU of a spectrum database to assist with the choice of options available during cross border incidents.

8.16 The ITU has established a list of focal points on a country by country basis within its existing database. Within the CEPT administrations there is already on-going cooperation in these areas and there is no wish to provide detailed operational information on a national basis to the ITU. All information requirements in an emergency are already available from the ITU listed contact points.

8.17 This item links with Agenda Item 1.3 which is covered in Section 4 of this document.

Other standing Agenda items

8.18 The following standing agenda items were addressed:

- 2 ITU-R Recommendations incorporated by reference;
- 3 Consequential changes to the Radio Regulations;
- 4 Review of WRC Resolutions and Recommendations;
- 5 Report from the Radiocommunication Assembly;
- 6 Items requiring urgent action by the study groups.

8.19 These agenda items cover the mainly maintenance activities related to the Radio Regulations. For example, a decision needs to be taken when a recommendation which is referenced from the Radio Regulations has been updated as to whether the old or new version should be referenced in the RR. This is mainly procedural and it is not felt necessary to provide details in this document.

Section 9

Future WRC Agenda items

- 9.1 As explained in previous Ofcom documents on WRC-15, CEPT took a number of proposals for future agenda items into the conference which we wished to see considered in the next study period for conclusion at the WRC currently planned for 2019 (WRC-19). Some of these were as a direct result of UK proposals into CEPT. In addition proposals for new agenda items came from other regional groups and, as is normally the case at a WRC, compromises had to be made. A number of agenda items were agreed, including all of the CEPT proposals, which included three that were initiated by the UK. A full list of these is given in Annex 2.
- 9.2 Among the items the UK has a keen interest in is the range of frequency bands to be studied for the next evolution of mobile broadband (i.e. wideband 5G). The agreement was to undertake technical studies in a number of specific frequency ranges between 24 and 86 GHz. The bands that were finally agreed for study were; 24.25-27.5 GHz, 31.8-33.4 GHz, 37-40.5 GHz, 40.5-42.5 GHz, 42.5-43.5 GHz, 45.5-47 GHz, 47-47.2 GHz, 47.2-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz.
- 9.3 The UK supported the identification of these bands and opposed extension to certain other bands. In particular, there was heavy lobbying for consideration of the frequency band 27.5 – 29.5 GHz under this proposal. The UK position, supported by the CEPT, was that a convincing argument had not been made for the inclusion of this band. Nonetheless a number of countries were strongly supportive of including this band for study and discussions ran to the end of the final week of the conference. Ultimately however the band was not included in the list, in line with UK and CEPT's objectives.
- 9.4 Another agenda item that the UK has a strong interest in is regarding additional spectrum for Wi-Fi in the 5 GHz band. The UK has previously identified the need to find more spectrum to enable future growth of RLAN wireless access systems (WAS). This issue was considered for WRC-15 but the studies were not completed. After much discussion a new agenda item was agreed for WRC-19 covering the wider band 5150-5925 MHz.
- 9.5 The third future agenda item put forward by the UK concerns the extension of provisions relating to Earth Stations in Motion (ESIMs) in Fixed Satellite (FSS) bands. This relates to the discussions which took place under AI 9.2 at WRC-15 and a new agenda item could see the approach that was agreed extended to further bands.

WRC-19 Agenda Items: Initial Perspectives and Preparations

- 9.6 Ofcom is currently considering the full suite of agenda items that were agreed for WRC-19 and assessing what priority we should place against each. We will engage with stakeholders and expect to set out an initial assessment in the coming weeks. This will be a living document as it is likely that the prioritisation associated with specific agenda items will change as we approach WRC-19.

- 9.7 In addition Ofcom is assessing the effectiveness of the UK preparatory process for WRC-15 and considering what lessons we might take on board for WRC-19. Stakeholders are encouraged to feed into this process. At this stage we believe that, overall, the WRC-15 UK preparatory process worked well and contributed to successful outcomes for the UK at the Conference. We particularly appreciate the importance of regular stakeholder engagement, allowing for a full and wide airing of views and thereby leading to the development of clear and robust positions to take into both the CEPT and WRC process. We therefore do not believe that the current system requires substantial change but would welcome views from stakeholders and any suggestions for improvements. Please address any comments to ofcom.international@ofcom.org.uk.

Annex 1

WRC-15 Agenda Items

WRC-15 Agenda Item	Title
1	on the basis of proposals from administrations, taking account of the results of WRC-12 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the bands under consideration, to consider and take appropriate action in respect of the following items:
1.1	to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution 233 (WRC-12) ;
1.2	to examine the results of ITU-R studies, in accordance with Resolution 232 (WRC-12) , on the use of the frequency band 694-790 MHz by the mobile, except aeronautical mobile, service in Region 1 and take the appropriate measures;
1.3	to review and revise Resolution 646 (Rev.WRC-12) for broadband public protection and disaster relief (PPDR), in accordance with Resolution 648 (WRC-12) ;
1.4	to consider possible new allocation to the amateur service on a secondary basis within the band 5 250-5 450 kHz in accordance with Resolution 649 (WRC-12) ;
1.5	to consider the use of frequency bands allocated to the fixed-satellite service not subject to Appendices 30, 30A and 30B for the control and non-payload communications of unmanned aircraft systems (UAS) in non-segregated airspaces, in accordance with Resolution 153 (WRC-12) ;
1.6	to consider possible additional primary allocations:
1.6.1	to the fixed-satellite service (Earth-to-space and space-to-Earth) of 250 MHz in the range between 10 GHz and 17 GHz in Region 1;
1.6.2	to the fixed-satellite service (Earth-to-space) of 250 MHz in Region 2 and 300 MHz in Region 3 within the range 13-17 GHz;
	and review the regulatory provisions on the current allocations to the fixed-satellite service within each range, taking into account the results of ITU-R studies, in accordance with Resolutions 151 (WRC-12) and 152 (WRC-12) , respectively;
1.7	to review the use of the band 5 091-5 150 MHz by the fixed-satellite service (Earth-to-space) (limited to feeder links of the non-geostationary mobile-satellite systems in the mobile-satellite service) in accordance with Resolution 114 (Rev.WRC-12) ;
1.8	to review the provisions relating to earth stations located on board vessels (ESVs), based on studies conducted in accordance with Resolution 909 (WRC-12) ;
1.9	to consider, in accordance with Resolution 758 (WRC-12) :
1.9.1	possible new allocations to the fixed-satellite service in the frequency bands 7 150-7 250 MHz (space-to-Earth) and 8 400-8 500 MHz (Earth-to-space), subject to appropriate sharing conditions;
1.9.2	the possibility of allocating the bands 7 375-7 750 MHz and 8 025-8 400 MHz to the maritime-mobile satellite service and additional regulatory measures, depending on the results of appropriate studies;
1.10	to consider spectrum requirements and possible additional spectrum allocations for the mobile-satellite service in the Earth-to-space and space-to-Earth directions, including

	the satellite component for broadband applications, including International Mobile Telecommunications (IMT), within the frequency range from 22 GHz to 26 GHz, in accordance with Resolution 234 (WRC-12) ;
1.11	to consider a primary allocation for the Earth exploration-satellite service (Earth-to-space) in the 7-8 GHz range, in accordance with Resolution 650 (WRC-12) ;
1.12	to consider an extension of the current worldwide allocation to the Earth exploration-satellite (active) service in the frequency band 9 300-9 900 MHz by up to 600 MHz within the frequency bands 8 700-9 300 MHz and/or 9 900-10 500 MHz, in accordance with Resolution 651 (WRC-12) ;
1.13	to review No. 5.268 with a view to examining the possibility for increasing the 5 km distance limitation and allowing space research service (space-to-space) use for proximity operations by space vehicles communicating with an orbiting manned space vehicle, in accordance with Resolution 652 (WRC-12) ;
1.14	to consider the feasibility of achieving a continuous reference time-scale, whether by the modification of coordinated universal time (UTC) or some other method, and take appropriate action, in accordance with Resolution 653 (WRC-12) ;
1.15	to consider spectrum demands for on-board communication stations in the maritime mobile service in accordance with Resolution 358 (WRC-12) ;
1.16	to consider regulatory provisions and spectrum allocations to enable possible new Automatic Identification System (AIS) technology applications and possible new applications to improve maritime radiocommunication in accordance with Resolution 360 (WRC-12) ;
1.17	to consider possible spectrum requirements and regulatory actions, including appropriate aeronautical allocations, to support wireless avionics intra-communications (WAIC), in accordance with Resolution 423 (WRC-12) ;
1.18	to consider a primary allocation to the radiolocation service for automotive applications in the 77.5-78.0 GHz frequency band in accordance with Resolution 654 (WRC-12) ;
2	to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations communicated by the Radiocommunication Assembly, in accordance with Resolution 28 (Rev.WRC-03) , and to decide whether or not to update the corresponding references in the Radio Regulations, in accordance with the principles contained in Annex 1 to Resolution 27 (Rev.WRC-12) ;
3	to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the Conference;
4	in accordance with Resolution 95 (Rev.WRC-07) , to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation;
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;
6	to identify those items requiring urgent action by the Radiocommunication Study Groups in preparation for the next world radiocommunication conference;
7	to consider possible changes, and other options, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, an advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution 86 (Rev.WRC-07) to facilitate 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-07) ;
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-12;
	9.1.1 Protection of the systems operating in the mobile-satellite service in the band 406-406.1 MHz
	9.1.2 Studies on possible reduction of the coordination arc and technical criteria used in application of No. 9.41 in respect of coordination under No. 9.7
	9.1.3 Use of satellite orbital positions and associated frequency spectrum to deliver international public telecommunication services in developing countries
	9.1.4 Updating and rearrangement of the Radio Regulations
	9.1.5 Consideration of technical and regulatory actions in order to support existing and future operation of fixed satellite service earth stations within the band 3 400-4 200 MHz, as an aid to the safe operation of aircraft and reliable distribution of meteorological information in some countries in Region 1
	9.1.6 Studies towards review of the definitions of fixed service, fixed station and mobile station
	9.1.7 Spectrum management guidelines for emergency and disaster relief radiocommunication
	9.1.8 Regulatory aspects for nano and pico-satellites
	9.2 on any difficulties or inconsistencies encountered in the application of the Radio Regulations; and
	9.3 on action in response to Resolution 80 (Rev.WRC-07) ;
10	to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention.
RESOLUTION 185 (Busan 2014)	to include in its agenda, as a matter of urgency, the consideration of global flight tracking, including, if appropriate, and consistent with ITU practices, various aspects of the matter, taking into account ITU-R studies

Annex 2

WRC-19 Agenda Items

WRC-19 Agenda Item	Title
1	on the basis of proposals from administrations, taking account of the results of WRC-15 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 an allocation of the frequency band 50-54 MHz to the amateur service in Region 1, in accordance with Resolution COM6/6 (WRC-15) ;
1.2	to consider in-band power limits for earth stations operating in the mobile-satellite service, meteorological-satellite service and Earth exploration-satellite service in the frequency bands 401-403 MHz and 399.9-400.05 MHz, in accordance with Resolution COM6/7 (WRC-15) ;
1.3	to consider possible upgrading of the secondary allocation to the meteorological satellite service (space-to-Earth) to primary status and a possible primary allocation to the Earth exploration-satellite service (space-to-Earth) in the frequency band 460-470 MHz, in accordance with Resolution COM6/8 (WRC-15) ;
1.4	to consider the results of studies in accordance with Resolution COM6/9 (WRC-15) , and review, and revise if necessary, the limitations mentioned in Annex 7 to Appendix 30 (Rev.WRC-12), while ensuring the protection of, and without imposing additional constraints on, assignments in the Plan and the List and the future development of the broadcasting-satellite service within the Plan, and existing and planned fixed-satellite service networks;
1.5	to consider the use of the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion communicating with geostationary space stations in the fixed-satellite service and take appropriate action, in accordance with Resolution COM6/17 (WRC-15) ;
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 COM6/18 (WRC-15) ;
1.7	to study the spectrum needs for telemetry, tracking and command in the space operation service for non-GSO satellites with short duration missions, to assess the suitability of existing allocations to the space operation service and, if necessary, to consider new allocations, in accordance with Resolution COM6/19 (WRC-15) ;
1.8	to consider possible regulatory actions to support Global Maritime Distress Safety Systems (GMDSS) modernization and to support the introduction of additional satellite systems into the GMDSS, in accordance with Resolution 359 (Rev.WRC-15) ;
1.9	to consider, based on the results of ITU-R studies:

1.9.1	regulatory actions within the frequency band 156-162.05 MHz for autonomous maritime radio devices to protect the GMDSS and automatic identifications system (AIS), in accordance with Resolution COM6/10 (WRC-15) ;
1.9.2	modifications of the Radio Regulations, including new spectrum allocations to the maritime mobile-satellite service (Earth-to-space and space-to-Earth), preferably within the frequency bands 156.0125-157.4375 MHz and 160.6125-162.0375 MHz of Appendix 18, to enable a new VHF data exchange system (VDES) satellite component, while ensuring that this component will not degrade the current terrestrial VDES components, applications specific messages (ASM) and AIS operations and not impose any additional constraints on existing services in these and adjacent frequency bands as stated in recognizing d) and e) of Resolution 360
1.10	to consider spectrum needs and regulatory provisions for the introduction and use of the Global Aeronautical Distress and Safety System (GADSS), in accordance with Resolution COM6/11 (WRC-15) ;
1.11	to take necessary actions, as appropriate, to facilitate global or regional harmonized frequency bands to support railway radiocommunication systems between train and trackside within existing mobile service allocations, in accordance with Resolution COM6/12 (WRC-15) ;
1.12	to consider possible global or regional harmonized frequency bands, to the maximum extent possible, for the implementation of evolving Intelligent Transport Systems (ITS) under existing mobile-service allocations, in accordance with Resolution COM6/13 (WRC-15) ;
1.13	to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution COM6/20 (WRC-15) ;
1.14	to consider, on the basis of ITU-R studies in accordance with Resolution COM6/21 (WRC-15) , appropriate regulatory actions for high-altitude platform stations (HAPS), within existing fixed-service allocations;
1.15	to consider identification of frequency bands for use by administrations for the landmobile and fixed services applications operating in the frequency range 275-450 GHz, in accordance with Resolution COM6/14 (WRC-15) ;
1.16	to consider issues related to wireless access systems, including radio local area networks (WAS/RLAN), in the frequency bands between 5 150 MHz and 5 925 MHz, and take the appropriate regulatory actions, including additional spectrum allocations to the mobile service, in accordance with Resolution COM6/22 (WRC-15) ;
2	to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations communicated by the Radiocommunication Assembly, in accordance with Resolution 28 (Rev.WRC-15) , and to decide whether or not to update the corresponding references in the Radio Regulations, in accordance with the principles contained in Annex 1 to Resolution 27 (Rev.WRC-12) ;
3	to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the conference;
4	in accordance with Resolution 95 (Rev.WRC-07) , to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation;
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;
6	to identify those items requiring urgent action by the radiocommunication study groups in preparation for the next world radiocommunication conference;
7	to consider possible changes, and other options, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, an advance publication, coordination,

	notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution 86 (Rev.WRC-07), in order to facilitate 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-07) ;
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-15;
9.1.1	Implementation of International Mobile Telecommunications in the frequency bands 1 885-2 025 MHz and 2 110 2 200 MHz. Resolution 212 (Rev.WRC 15) ;
9.1.2	Compatibility of International Mobile Telecommunications and broadcasting-satellite service (sound) in the frequency band 1 452-1 492 MHz in Regions 1 and 3. Resolution 761 [COM4/7] (WRC 15) ;
9.1.3	Study of technical and operational issues and regulatory provisions for new non-geostationary-satellite orbit systems in the 3 700-4 200 MHz, 4 500-4 800 MHz, 5 925-6 425 MHz and 6 725-7 025 MHz frequency bands allocated to the fixed-satellite service. Resolution 157 [COM5/6] (WRC 15) ;
9.1.4	Stations on board sub-orbital vehicles. Resolution 763 [COM5/7] (WRC 15) ;
9.1.5	Consideration of the technical and regulatory impacts of referencing Recommendations ITU R M.1638 1 and ITU R M.1849 1 in Nos. 5.447F and 5.450A of the Radio Regulations. Resolution 764 [COM6/1] (WRC 15) ;
	Urgent studies required in preparations for the 2019 World Radiocommunication Conference. Resolution 958 [COM6/15] (WRC 15) ;
9.1.6	Studies concerning Wireless Power Transmission (WPT) for electric vehicles, to assess the impact of WPT for electric vehicles on radiocommunication services and to study suitable harmonized frequency ranges which would minimize the impact on radiocommunication services from WPT for electrical vehicles
9.1.7	Studies to examine whether there is a need for possible additional measures in order to limit uplink transmissions of terminals to those authorized terminals in accordance with No. 18.1 and the possible methods that will assist administrations in managing the unauthorized operation of earth station terminals deployed within its territory, as a tool to guide their national spectrum management programme, in accordance with Resolution ITU R 64 (RA 15) ;
9.1.8	Studies on the technical and operational aspects of radio networks and systems, as well as spectrum needed, including possible harmonized use of spectrum to support the implementation of narrowband and broadband machine-type communication infrastructures, in order to develop Recommendations, Reports and/or Handbooks, as appropriate, and to take appropriate actions within the ITU Radiocommunication Sector (ITU-R) scope of work.
9.1.9	Resolution 162 [COM6/24] (WRC 15) Studies relating to spectrum needs and possible allocation of the frequency band 51.4-52.4 GHz to the fixed-satellite service (Earth-to-space)
9.2	on any difficulties or inconsistencies encountered in the application of the Radio Regulations; and
9.3	on action in response to Resolution 80 (Rev.WRC-07) ;

10	<p>to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences.</p> <p>In addition a provisional list of items to be considered at the conference after WRC-19 (provisionally 2023, WRC-23) are;</p> <ul style="list-style-type: none">• Consideration of regulatory provisions for modernisation of the Global Maritime Distress and Safety System and related to the implementation of e navigation Resolution 656 [COM6/4] (WRC 15)• Possible allocation to the Earth exploration-satellite service (active) for spaceborne radar sounders in the range of frequencies around 45 MHz• Spectrum needs and protection of space weather sensors• Studies relating to spectrum needs and possible allocation of the frequency band 37.5-39.5 GHz to the fixed-satellite service Resolution 235 [COM4/6] (WRC 15)• Review of the spectrum use of the frequency band 470-960 MHz in Region 1
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Annex 3

Glossary of terms

3GPP	3rd Generation Partnership Project. Collaboration between groups of telecommunications associations, to make a globally applicable third-generation (3G) mobile phone system specification within the scope of the International Mobile Telecommunications-2000 project of the International Telecommunication Union (ITU)
5G	5G (5th generation mobile networks or 5th generation wireless systems) denotes the next major phase of mobile telecommunications standards beyond the current 4G/IMT-Advanced standards.
Administration(s)	A country's governmental department or organisation that is responsible for discharging that country's obligations/activities in the International Telecommunication Union (ITU).
AIS	Automatic Identification System. A broadcast transponder system operating in the VHF maritime mobile frequency band. It is capable of sending ship's navigation information to other ships and to shore.
AM(R)S	Aeronautical Mobile (Route) Service: An aeronautical mobile service reserved for communications relating to safety and regularity of flight, primarily along national or international civil air routes.
AMS(R)S	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.
APG	Asia-Pacific Telecommunity Conference Preparatory Group. The subgroup of the Regional Group covering the Asia-Pacific region which prepares positions and proposals for the WRC
API	Advance Publication Information: a set of initial data about a proposed satellite network published on the BR IFIC
ARNS	Aeronautical Radionavigation Service
ASM	Application Specific Messages, Application-Specific Messages (ASM) are messages that have been developed to allow the exchange of information via the Automatic Identification System (AIS) in addition to the standard set of messages defined in the ITU Recommendation - ITU-R M.1371-4
ASMG	Arab Spectrum Management Group. The Regional group covering the 22 Arab countries in North Africa and the Middle East
ATM	Air Traffic Management. The dynamic, integrated management of air traffic and airspace including air traffic services, airspace management and air traffic flow management – safely, economically and efficiently – through the provision of facilities and seamless services in collaboration with all parties and involving airborne and ground-based functions
ATU	African Telecommunications Union. The Regional group preparing African positions and proposals for the WRC
BR IFIC	International Frequency Information Circular of the Radiocommunication Bureau of the ITU published every two weeks
CAA	Civil Aviation Authority
CEPT	European Conference of Postal and Telecommunications Administrations

CITEL	Inter-American Telecommunication Commission. The Regional group which prepares common proposals for the WRC for Region 2 of the ITU (North, Central and South America)
CNPC	control and non-payload communications: communications links through which an unmanned body is controlled
CPM	Conference Preparatory Meeting. The ITU meeting which produces a Report to the WRC explaining the background and the various methods proposed to resolve the agenda items
DTH	Direct-to-home
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
e.i.r.p.	equivalent isotropically radiated power. The product of the power supplied to the antenna and the antenna gain relative to an isotropic antenna
ECC	Electronic Communications Committee. The highest level spectrum policy body in the CEPT
ECP	European Common Proposal. A proposal for the WRC supported by a certain number of CEPT countries
ERP	Effective Radiated Power
EESS	Earth Exploration Satellite Service
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.
ESA	European Space Agency
ESIM	Earth Stations In Motion
ESOMP	Earth Station on-board a Moving Platform
ESV	Earth Station on-board a Vessel
EUROCONTROL	The European Organisation for the Safety of Air Navigation whose objective is the development of a seamless, pan-European Air Traffic Management (ATM) system
EVA	extra-vehicular activity: activity in close proximity to an orbiting spacecraft
FSS	Fixed-Satellite Service
GADSS	Global Aeronautical Distress and Safety System
GHz	gigahertz: a unit of frequency equal to 1000 million (1×10^9) Hz or cycles per second.
GMDSS	Global Maritime Distress and Safety System
GMT	Greenwich Mean Time. Mean solar time at the prime meridian (0° longitude)
GSO	Geostationary-Satellite Orbit. 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
ICAO	International Civil Aviation Organisation: a specialised agency of the United Nations dealing with civil aviation matters
IFPG	International Frequency Planning Group: the committee which agrees the UK position for the WRC. Membership is limited to government and

relevant regulatory bodies

IMO	International Maritime Organisation: a specialised agency of the United Nations dealing with maritime matters
IMT	International Mobile Telecommunications: the ITU term that encompasses 3G, 4G and 5G wireless broadband systems
IPTV	Internet Protocol Television: the term used for television and/or video signals that are delivered to subscribers or viewers using Internet Protocol (IP)
ITU	International Telecommunication Union: a specialised agency of the United Nations, consisting of 193 Member States and over 700 private-sector entities academic institutions, headquartered in Geneva
ITU-D	The Telecommunication Development Sector of the ITU
ITU-R	The Radiocommunication Sector of the ITU
JTG 4-5-6-7	Joint Task Group of Study Groups 4, 5, 6 and 7 of the ITU-R: the ITU-R group responsible for conducting studies relevant to Agenda Items 1.1 and 1.2 of WRC-15
kHz	kilohertz: a unit of frequency, equal to 1000 (1×10^3) Hz or cycles per second.
L-band	the range of frequencies between about 960 and 1800MHz
LTE	Long Term Evolution is a standard for communication of high-speed data for mobile phones and data terminals. The term 4G is generally used to refer to mobile broadband services delivered using the next generation of mobile broadband technologies, including Long Term Evolution (LTE) and WiMAX
MDS	Mobile Data Strategy
MetSat	Meteorological-Satellite Service
MHz	megahertz: a unit of frequency equal to 1,000,000 (1×10^6) Hz or cycles per second.
MLS	microwave landing system
MMSS	Maritime Mobile-Satellite Service
MoD	Ministry of Defence: The UK's defence ministry responsible for the protection and the security, independence and interests of the UK at home and abroad.
MSS	Mobile-Satellite Service
non-GSO	Non-geostationary satellite orbit
Nano-satellite	a small satellite of the order of less than 1m x 1m x 1m
PFD	power flux density: radiated power passing through a given area
Pico-satellite	a very small satellite of the order of 10cm x 10cm x 10cm
PMSE	Programme Making and Special Events: radio applications that support a wide range of activities in entertainment, broadcasting, news gathering and community events.
PPDR	Public Protection and Disaster Relief: includes emergency services such as the police, fire brigade and ambulance.

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 bind themselves
RAS	Radio Astronomy Service. A radiocommunication service involving the use of radio astronomy to receive radio waves emanating from astronomical or celestial objects.
Res	Resolution: An ITU or WRC document which; give instructions on the organization, methods or programmes of Radiocommunication Assembly or Study Group work and give details of agreements made at World Radiocommunication Conferences that are incorporated into the Radio Regulations, respectively.
RCC	Regional Commonwealth in the field of Communications. The Regional group comprising the Russian Federation and the Commonwealth of Independent States
RLAN	Radio Local Area Network
RRB	Radio Regulations Board
SOS	Space Operations service
SRS	Space Research Service
TAI	International Atomic Time: a high-precision atomic coordinated time standard. It is the basis for Coordinated Universal Time (UTC). TAI as a time scale is a weighted average of the time kept by over 200 atomic clocks in over 50 national laboratories worldwide
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
UA	Unmanned Aircraft: an aircraft which has limited or no physical 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
UKSSC	UK Spectrum Strategy Committee. Government committee responsible for cross-government spectrum management, including signing off the final UK positions for the WRC
UTC	Coordinated Universal Time: time scale in seconds as defined in ITU Recommendation TF.460-6
VDES	VHF Data Exchange System
VSAT	Very Small Aperture Terminal
Wi-Fi	Short range wireless technologies that allow an over-the-air connection between a wireless device and a base station, or between two wireless devices. WiFi has a range of over 30 metres indoors, and around a kilometre outside.
WAIC	Wireless Aircraft Intra-Communications
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