



*International Civil Aviation Organization*

**MIDANPIRG Communication, Navigation and Surveillance Sub-Group**

**Eleventh Meeting (CNS SG/11)**  
*(Muscat, Oman, 16-19 May 2022)*

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**Agenda Item 4: CNS planning and implementation in the MID Region**

**WRC23**

*(Presented by the Secretariat)*

**SUMMARY**

This paper presents the ICAO position to the World RadioTelecommunication Conference 2023 (WRC23) and highlight States roles in supporting the ICAO WRC23 position

Action by the meeting is at paragraph 3.

**REFERENCES**

- MIDANPIRG/19 Report
- Assembly Resolution A38-6
- ICAO SL E 3/5-21/37

**1. INTRODUCTION**

1.1 The radio spectrum is a scarce natural resource with finite capacity for which demand is constantly increasing. Aeronautical radio services are recognized internationally to be prime users of radio frequencies, without which aircraft operation would not be capable of meeting the global demand for safe, efficient and cost-effective transport.

1.2 The ICAO WRC23 Position aims at protecting aeronautical spectrum for all radiocommunication and radionavigation systems used for ground facilities and on board aircraft.

**2. DISCUSSION**

2.1 The process of international competition between expanding radio services, which takes place in the ITU, obliges all existing spectrum users, aeronautical and non-aeronautical alike, to continually defend and justify the retention of frequency bands or the addition of new bands to those already allocated to their service. Civil aviation requirements continue to grow, requiring more navigation and communication facilities, thus creating ever-increasing pressure to an already stretched resource, similarly to other, non-aviation users, with whom aviation shares the frequency spectrum resource.

2.2 Civil aviation must develop and present its agreed policies and its quantified and qualified statements of requirement for radio frequency spectrum so as to ensure continuing availability and access to the frequency spectrum resource and, ultimately, the ongoing viability of air navigation services throughout the world.

2.3 The meeting may wish to note the following Items for which aviation is seeking an action for WRC-23:

- a) regulatory provisions to facilitate radiocommunications for sub-orbital vehicles (Agenda Item 1.6);
- b) a new aeronautical mobile-satellite (R) service (AMS(R)S) allocation for aeronautical very high frequency (VHF) communications in the frequency band 117.975-137 MHz, while preventing any undue constraints on existing aeronautical VHF systems operating in the band (Agenda Item 1.7);
- c) appropriate regulatory actions, with a view to reviewing and, if necessary, revising Resolution 155 to accommodate the use of fixed-satellite service (FSS) networks by RPAS C2 Links (Agenda Item 1.8);
- d) review of Appendix 27 of the Radio Regulations and consideration of appropriate regulatory actions to accommodate digital technologies for aviation safety-of-life applications in existing aeronautical high frequency (HF) bands (Agenda Item 1.9);
- e) studies on spectrum needs and regulatory measures for possible new allocations for the aeronautical mobile service for the use of non-safety aeronautical mobile applications (Agenda Item 1.10); and
- f) consideration of any difficulties or inconsistencies encountered in the application of the Radio Regulations (Agenda Item 9.2).

2.4 Other issues that will be addressed at WRC-23 for which aviation needs to ensure there is no undue impact to aeronautical systems or services include the following:

- a) possible measures to address protection of stations in the aeronautical and maritime mobile services in the frequency band 4 800-4 990 MHz, located in international airspace and waters, from other stations located within national territories (Agenda Item 1.1);
- b) identification of the frequency bands 3 300-3 400 MHz, 3 600-3 800 MHz, 6 425-7 025 MHz, 7 025-7 125 MHz and 10.0-10.5 GHz for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis (Agenda Item 1.2);
- c) primary service allocation of the frequency band 3 600-3 800 MHz to the mobile service within ITU Region 1 (Agenda Item 1.3);
- d) use of high-altitude platform stations as IMT base stations in the mobile service in certain frequency bands below 2.7 GHz already identified for IMT, on a global or regional level (Agenda Item 1.4);
- e) possible regulatory actions to support the modernization of the Global Maritime Distress and Safety System (GMDSS) and the implementation of e-navigation (Agenda Item 1.11);
- f) possible upgrade of the allocation of the frequency band 14.8-15.35 GHz to the space research service (Agenda Item 1.13);
- g) harmonization of the use of the frequency band 12.75-13.25 GHz (Earth-to-space) by earth stations on aircraft and vessels communicating with geostationary space stations in the FSS (Agenda Item 1.15);

- h) technical, operational and regulatory measures to facilitate the use of the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by non-geostationary FSS earth stations in motion, while ensuring due protection of existing services in those frequency bands (Agenda Item 1.16);
- i) appropriate regulatory actions for the provision of inter-satellite links in specific frequency bands, or portions thereof, by adding an inter-satellite service allocation where appropriate (Agenda Item 1.17);
- j) review of Resolutions and Recommendations of previous WRCs with a view to their possible revision, replacement or abrogation (Agenda Item 4); and
- k) review of the amateur service and the amateur-satellite service allocations in the frequency band 1 240-1 300 MHz to determine if additional measures are required to ensure protection of the radionavigation-satellite (space-to-Earth) service operating in the same band (Agenda Item 9.1, topic b).

2.5 Major threats to aviation, should ICAO's spectrum goals not be met in a satisfactory manner, include the possibility of harmful interference to essential aeronautical radionavigation and radiocommunication systems. The consequences of this could be manifold and have a direct and severe impact on the safety as well as the efficiency of flight operations.

2.6 To satisfy the future frequency spectrum needs of aviation, long-term planning and engagement is required. In order to provide a proactive response to the increasing pressure of other frequency spectrum dependent industries, active participation by the aviation regulatory authorities and industry is required in the national and international fora leading to and including WRC-23.

2.7 The meeting may wish to note that support for the ICAO Position as at **Appendix A** within States, when developing their proposals and delegation briefs in preparation to the WRC-23, is required to ensure that decisions taken by the conference are in favour of the aeronautical requirements. Therefore, it is necessary that States:

- a) in preparing their proposals to the ITU WRC-23, include, to the maximum extent possible, the material contained in the Appendix;
- b) undertake to provide for aviation authorities to fully participate in the development of States' positions to ensure support for the ICAO Position at the WRC-23;
- c) include representatives of their civil aviation administrations and experts from aviation in their national delegations to the extent possible, when participating in the ITU-R and regional preparatory activities for WRC-23; and
- d) ensure, to the extent possible, that their delegations to the WRC-23 include representatives of their civil aviation administrations.

### 3. ACTION BY THE MEETING

3.1 The meeting is invited to review ICAO Position for the ITU WRC-23 at **Appendix A** and Take appropriate actions as at para. 2.7

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APPENDIX A

**DRAFT ICAO POSITION  
FOR THE INTERNATIONAL TELECOMMUNICATION UNION (ITU)  
WORLD RADIOCOMMUNICATION CONFERENCE 2023 (WRC-23)**

**SUMMARY**

This paper reviews the agenda for the International Telecommunication Union (ITU) World Radiocommunication Conference 2023 (WRC-23), discusses points of aeronautical interest and provides the ICAO Position for these agenda items.

The goal of the ICAO Position is to ensure aeronautical access to appropriately protected spectrum for radiocommunication and radionavigation systems that support current and future safety-of-flight applications. In particular, it describes the safety considerations necessary to ensure adequate protection against harmful interference.

Support of the ICAO Position by ITU Member States is required to ensure that the position is supported at the WRC-23 and that aviation requirements are met.

1. Introduction
2. ICAO and the international regulatory framework
3. Spectrum requirements for international civil aviation
4. Aeronautical aspects on the agenda for WRC-23

**Attachment:**

Agenda for ITU WRC-23

## 1. INTRODUCTION

1.1 The ICAO Position on issues of interest to international civil aviation to be addressed at the 2023 ITU World Radiocommunication Conference (WRC-23) is presented below. The agenda of this Conference is contained in the attachment. The ICAO Position is to be considered in conjunction with sections 7-II and 8 of the *Handbook on Radio Frequency Spectrum Requirements for Civil Aviation, Volume I — ICAO spectrum strategy, policy statements and related information* (Doc 9718, Second Edition, 2018). Doc 9718 is available on <http://www.icao.int/safety/fsmp> (see webpage: Documents). It should be noted that the Handbook contains a long-term policy based on a snapshot in time and, as such, it may lag behind the ICAO WRC Position. As a result, when there is conflict between the Handbook and a current ICAO WRC Position, the Position should be seen as being the guiding document.

1.2 ICAO supports the working principle within the ITU, as established during studies for WRC-07, that ICAO will ensure the compatibility of ICAO standard systems with existing or planned aeronautical systems operating in accordance with international aeronautical Standards. Compatibility of ICAO standard systems with non-ICAO standard aeronautical systems (or non-aeronautical systems) will be addressed in the ITU.

## 2. ICAO AND THE INTERNATIONAL REGULATORY FRAMEWORK

2.1 ICAO is the specialized agency of the United Nations providing for the international regulatory framework for civil aviation. The *Convention on International Civil Aviation* is an international treaty providing required provisions for the safety of flights over the territories of the 193 ICAO Member States and over the high seas. It includes measures to facilitate air navigation, including international Standards and Recommended Practices commonly referred to as SARPs.

2.2 The ICAO Standards constitute the rule of law through the ICAO Convention and form a regulatory framework for aviation, covering personnel licensing, technical requirements for aircraft operations, airworthiness requirements, aerodromes and systems used for the provision of communications, navigation and surveillance, as well as other technical and operational requirements.

## 3. SPECTRUM REQUIREMENTS FOR INTERNATIONAL CIVIL AVIATION

3.1 Air transport plays a major role in driving sustainable economic and social development worldwide. Since the mid-1970s and until the end of 2019, air traffic growth has consistently defied economic recessionary cycles, expanding two-fold once every 15 years. It is estimated that in 2018 air transport directly and indirectly supported the employment of 65.5 million people, contributing over U.S.\$ 2.7 trillion to the global gross domestic product (GDP), and carried over 4.3 billion passengers and over 60 million tonnes of cargo.

3.2 While the 2020 COVID-19 outbreak has significantly impacted the global air transport industry, the industry continues to play a critical role in supporting humanity's fight against the global pandemic. The industry contributions include delivering medical equipment and medicines, supporting traveller repatriations and medical evacuations, and maintaining crucial global supply chains through increased air cargo operations.

3.3 The safety of air operations is dependent on the availability of reliable communication and navigation services. Current and future communication, navigation, and surveillance/air traffic management (CNS/ATM) systems are highly dependent upon the availability of sufficient, suitably protected radio spectrum that can support the high integrity and availability requirements associated with aeronautical safety systems. Spectrum requirements for current and future aeronautical CNS systems are specified in the ICAO Spectrum Strategy<sup>1</sup>, as addressed by the Twelfth Air Navigation Conference, and as approved by the ICAO Council.

3.4 In support of the safety aspects related to the use of radio frequency spectrum by aviation, **Article 4.10** of the Radio Regulations states, “*ITU Member States recognize that the safety aspects of radionavigation and other safety services require special measures to ensure their freedom from harmful interference; it is necessary therefore to take this factor into account in the assignment and use of frequencies.*” In particular, compatibility of aeronautical safety services with co-band or adjacent band aeronautical non-safety services or non-aeronautical services must be considered with extreme care in order to preserve the integrity of the aeronautical safety services.

3.5 The continuous increase in air traffic movements as well as the additional requirement for accommodating new and emerging applications such as unmanned aircraft systems (UAS<sup>2</sup>) and commercial sub-orbital vehicle flights are placing an increased demand on both the aviation regulatory and air traffic management mechanisms. As a result, the airspace is becoming more complex and the demand for frequency assignments (and consequential spectrum allocations) is increasing. While some of this demand can be met through improved spectral efficiency of existing radio systems in frequency bands currently allocated to aeronautical services, it is inevitable that these frequency bands may need to be increased or additional aviation spectrum allocations may need to be agreed upon to meet this demand.

3.6 The ICAO Position for the ITU WRC-23 was initially developed in 2020 with the assistance of the Frequency Spectrum Management Panel (FSMP) and was reviewed by the Air Navigation Commission at the seventh meeting of its 215th Session on 27 October 2020. Following the review by the Commission, it was submitted to ICAO Contracting States and relevant international organizations for comment. After a further review of the ICAO Position in light of the comments received by the Commission on xx April/May 2021, the ICAO Position was reviewed and approved by the ICAO Council on xx June 2021.

3.7 States and international organizations are requested to make use of the ICAO Position, to the maximum extent possible, in their preparatory activities for the WRC-23 at the national level, in the activities of the regional telecommunication organizations<sup>3</sup> and in the relevant meetings of the ITU.

#### 4. AERONAUTICAL ASPECTS ON THE AGENDA FOR WRC-23

*Note 1.— The statement of the ICAO Position on an agenda item is given in a text box at the end of the section addressing the agenda item, after the introductory background material.*

<sup>1</sup> The ICAO spectrum strategy is included in the ICAO *Handbook on Radio Frequency Spectrum Requirements for Civil Aviation*, Volume I — *ICAO spectrum strategy, policy statements and related information* (Doc 9718).

<sup>2</sup> For the purposes of this document, UAS is referred to in ICAO as remotely piloted aircraft systems (RPAS).

<sup>3</sup> African Telecommunication Union (ATU), Asia-Pacific Telecommunity (APT), European Conference of Postal and Telecommunications Administrations (CEPT), Inter-American Telecommunication Commission (CITEL), Arab Spectrum Management Group (ASMG) and the Regional Commonwealth in the Field of Communications (RCC).

*Note 2.— WRC-23 Agenda Items 1.6, 1.7, 1.8, 1.9, 1.10 and 9.2 address issues where aviation is seeking action by the WRC.*

*Note 3.— WRC-23 Agenda Items 1.1, 1.2, 1.3, 1.4, 1.11, 1.13, 1.15, 1.16, 1.17, 4, 8, and 9.1 topic b could potentially affect aviation use of spectrum and hence aviation should participate in studies to ensure there is no undue impact. As a result, they are included in this position.*

*Note 4.— No impact on aeronautical services has been identified from WRC-23 Agenda Items 1.5, 1.12, 1.14, 1.18, 1.19, 2, 3, 5, 6, 7, 9.1 topic a, 9.1 topic c, 9.1 topic d and 9.3 which are therefore not addressed in this position.*

*Note 5.— When in this document reference is made to “No. X.YYY”, it means “No. X.YYY of the ITU Radio Regulations”.*

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**WRC-23 Agenda Item 1.1**

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**Agenda Item Title:**

**to consider, based on the results of the ITU-R studies, possible measures to address, in the frequency band 4 800-4 990 MHz, protection of stations of the aeronautical and maritime mobile services located in international airspace and waters from other stations located within national territories, and to review the pfd criteria in No. 5.441B in accordance with Resolution 223 (Rev.WRC-19).**

**Discussion:**

This agenda item seeks to study the technical and regulatory provisions necessary to ensure the protection of aeronautical and maritime mobile services, located either in or above international waters, from other stations located within national territories and operating in the frequency band 4 800-4 990 MHz. Additionally, the agenda item calls for the review of the pfd criteria contained in No. **5.441B**.

The frequency bands 4 800-4 825 MHz and 4 835-4 950 MHz are allocated to the aeronautical mobile service worldwide in accordance with the Table of Frequency Allocations and No. **5.442**. In addition, in parts of Region 2 and Australia as well as adjacent international airspace the frequency bands 4 400-4 940 and 4 825-4 835 MHz are used for aeronautical mobile telemetry for flight testing in accordance with the provisions of No. **5.440A**, **5.442** and Resolution **416 (WRC-07)**. According to Resolution **416 (WRC-07)** the aeronautical mobile telemetry emissions are limited to transmission from aircraft stations only.

Flight testing is key to maintaining and enhancing the safety of aircraft operation. Analysis of data gathered during flight testing is used to evaluate the aerodynamic flight characteristics of the vehicle and the performance of the systems onboard that vehicle in order to validate the design and its safety. The flight test phase allows any identified design issues to be addressed and resolved, as well as verifying and documenting the vehicle's performance for government certification and customer acceptance. It is key to ensure the integrity of the flight test data. Any interference to the transmission or reception of flight test data, if spotted, may invalidate the test data gathered during that flight and hence require a repetition of that flight test or if not spotted cause nugatory work to be carried out to address an issue that does not exist.

However, assignments to certain types of aeronautical systems, for example radio links between aircraft, are not registered in the MIFR. The absence of such recording together with No. **8.1**, which states that *rights and obligations of administrations in respect of frequency assignments shall be derived from the recording of those assignments in the MIFR*, could lead to questions being raised as to why the protection of the aeronautical mobile service is required. Unfortunately, although the Radio Regulations require assignments to be registered in order to be internationally recognized (No. **11.2** & **11.8**), provision No.

**11.14** precludes the notification and registration of frequency assignments to aeronautical mobile stations that do not have associated aeronautical land stations. This apparent discrepancy should be resolved in a manner that ensures recognition and protection of aviation systems when they are operated in international airspace.



Though this agenda item is limited to the frequency band 4 800-4 990 MHz, its considerations might have influence on a general regulatory mechanism of protection of the aeronautical mobile service in international airspace. It is essential to ensure that the proposed methods to satisfy this agenda item would not have a negative impact on the use of aviation systems in other frequency bands.

**ICAO Position:**

To support any measures taken to enhance the protection of flight testing in international airspace that are consistent with the results of agreed studies.

To oppose any proposed measure that is not in line with the results of agreed studies and reduces the level of protection afforded to flight test operations in international airspace and above international waters.

To ensure that the proposed methods to satisfy this agenda item do not have a negative impact on the use of aviation systems in other frequency bands.

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**WRC-23 Agenda Item 1.2**

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**Agenda Item Title:**

**to consider identification of the frequency bands 3 300-3 400 MHz, 3 600-3 800 MHz, 6 425-7 025 MHz, 7 025-7 125 MHz and 10.0-10.5 GHz for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution 245 (WRC-19);**

**Discussion:**

The agenda item, based on the called for studies, seeks additional IMT identification, and possible new allocations to the mobile service identified for IMT on a primary basis in the frequency bands:

- 3 300-3 400 MHz (Region 1 & 2);
- 3 600-3 800 MHz (Region 2);
- 6 425-7 025 MHz (Region 1);
- 7 025-7 125 MHz (globally);
- 10.0-10.5 GHz (Region 2).

In parts of Region 2, as well as adjacent international airspace, the frequency band 5 925-6 700 MHz is used for aeronautical mobile telemetry for flight testing in accordance with the provisions of Resolution **416 (WRC-07)**.

Flight testing is key to maintaining and enhancing the safety of aircraft. Analysis of data gathered during flight testing is used to evaluate the aerodynamic flight characteristics of the vehicle and the performance of the systems onboard that vehicle in order to validate the design and its safety. The flight test phase allows any identified design issues to be addressed, as well as verifying and documenting the vehicles performance for government certification and customer acceptance.

It is key to ensure the integrity of the flight data. Any interference to the transmission or reception of flight test data, if spotted, may invalidate the test data gathered during that flight and hence require a repetition of that flight or if not spotted cause nugatory work to be carried out to address an issue that does not exist.

Also, the frequency bands 3 600-3 800 MHz and 6 425-7 025 MHz are allocated to the fixed satellite service (FSS), and parts of these bands are used for the provision of aeronautical services including the use of geostationary orbit (GSO) FSS very small aperture (VSAT) systems for the transmission of critical aeronautical and meteorological information. Parts of these frequency bands are also used by FSS feeder links (downlinks and uplinks) of GSO mobile satellite service (MSS) networks to support the transmission of AMS(R)S communications in the 1.6/1.5 GHz bands, which is used to support ATC and aircraft operations by many ANSPs and airlines.

ITU-R studies identified under Resolution **245 (WRC-19)** will need to be completed to determine the potential for sharing of IMT with the FSS. In advance of results of these studies ITU-R Report S.2368 contains sharing studies between IMT-Advanced systems and GSO FSS in the 3 400-4 200 MHz and 4 500-4 800 MHz frequency bands in the WRC study cycle leading to WRC-15<sup>4</sup>.

The report summarises the required separation distances presented in the individual technical studies to protect GSO FSS earth stations. The separation distances vary depending on the study and range from 10 km to around 100s km for protection of the FSS interference criteria.

**ICAO Position:**

To oppose any proposal in the frequency band 6 425- 7 025 MHz in Region 1 that would reduce the level of protection below an acceptable level and hence compromise flight test operations.

To oppose any proposal in the frequency bands 3 600- 3 800 MHz and 6 425-7 025 MHz that could lead to harmful interference or could constrain the use of these bands by the FSS for the provision of aeronautical services or GSO MSS feeder links.

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<sup>4</sup>Report ITU-R S.2368-0: Sharing studies between International Mobile Telecommunication-Advanced systems and geostationary satellite networks in the fixed-satellite service in the 3 400-4 200 MHz and 4 500-4 800 MHz frequency bands in the WRC study cycle leading to WRC-15 (<https://www.itu.int/pub/R-REP-S.2368>)

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**WRC-23 Agenda Item 1.3**

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**Agenda Item Title:**

**To consider primary allocation of the band 3 600-3 800 MHz to mobile service within Region 1 and take appropriate regulatory actions, in accordance with Resolution 246 (WRC-19);**

**Discussion:**

The agenda item, based on the called for studies, seeks to upgrade the secondary allocation to the mobile service identified for IMT in the frequency band 3 600-3 800 MHz in Region 1.

Systems operating under the allocation to the fixed satellite service (FSS) in the frequency range 3 400-4 200 MHz provide ground infrastructure for the transmission of critical aeronautical and meteorological information. These systems are also used for feeder links to support systems providing an aeronautical mobile satellite (route) service. ITU-R Reports M.2109 & S.2199 contain sharing studies between systems operating under an allocation to the FSS and international mobile telecommunication (IMT) systems and broadband wireless access systems respectively in the frequency range 3 400-4 200 MHz. Studies show a potential for interference from IMT and broadband wireless access stations into Earth station in the FSS at distances of up to several hundred kilometres. Such large separation distances would impose substantial constraints on both mobile and satellite deployments. The studies also show that interference can occur when IMT systems are operated in frequency bands adjacent to those used by the FSS.

In addition, WRC-12 adopted Resolution 154 (revised at WRC-15) to support existing and future operation of Earth stations in the FSS within the frequency band 3 400-4 200 MHz, as an aid to safe operation of aircraft and reliable distribution of meteorological information in some countries, mainly in Africa, of Region 1

**ICAO Position:**

<p>To oppose any changes to existing regulatory provisions of the ITU Radio Regulations for the frequency bands 3 600-3 800 MHz that adversely affect the aeronautical use of systems operating in the FSS in Region 1.</p>
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**WRC-23 Agenda Item 1.4**

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**Agenda Item Title:**

**to consider, in accordance with Resolution 247 (WRC-19), the use of high-altitude platform stations as IMT base stations (HIBS) in the mobile service in certain frequency bands below 2.7 GHz already identified for IMT, on a global or regional level.**

**Discussion:**

At WRC-2000, the frequency bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3, and the frequency bands 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2 were identified in RR No. **5.388A** for possible use by high-altitude platform stations as international mobile telecommunications (IMT) base stations (HIBS) within the mobile service allocation. Resolution **221 (Rev.WRC-07)** referred to in RR No. **5.388A** stipulates technical conditions for HIBS necessary for the protection of ground-based IMT stations in neighboring countries and other services based on the sharing and compatibility studies with IMT-2000.

In view of increasing demand to provide mobile broadband services to underserved areas and noting the increase in the number of frequency bands within which ground based IMT is deployed, there is a need to review the existing regulations for HIBS with a view to providing flexibility for the operators to deploy HIBS in all frequency bands below 2.7 GHz that are identified for IMT. This review should include the fact that HIBS are expected to be used as a part of terrestrial IMT networks and may use the same frequency bands as ground-based IMT base stations. As a result, this agenda item considers appropriate technical conditions and regulatory actions for HIBS in certain frequency bands below 2.7 GHz that are already identified for IMT, i.e.:

- 694-960 MHz;
- 1 710-1 885 MHz (1 710-1 815 MHz to be used for uplink only in Region 3);
- 2 500-2 690 MHz (2 500-2 535 MHz to be used for uplink only in Region 3, except 2 655-2 690 MHz in Region 3).

In accordance with *resolves* 2 of Resolution 247 (WRC-19), the sharing and compatibility studies under this agenda item should ensure the protection of services having allocations in the same and adjacent frequency bands.

One of the frequency bands considered for HIBS is 694-960 MHz, which is adjacent to the band 960- 1 164 MHz allocated to AM(R)S and ARNS and heavily used by aeronautical systems, e.g. ADS-B, DME, LDACS, SSR etc.

Another frequency band being considered is 2 500-2 690 MHz which is close to the frequency band 2 700-2 900 MHz used for the provision of primary approach radars. Regarding that latter band, in order to enable the deployment of ground based IMT below 2 690 MHz the existing radars had to be modified to increase the receiver front end filter rejection in order to cope with the power in the IMT fundamental signal. The design of those modifications was based on a specific set of assumptions about the deployment of IMT base stations, the antenna characteristics including height and directivity, and the use of a specific terrestrial propagation model (Recommendation ITU-R P.452). Placing the IMT base station

on a high-altitude platform changes the assumptions used in determining the modifications required to the radar receiver front ends to accommodate ground based IMT. It is essential to ensure that by placing the base station on a high altitude platform the maximum level of signal received by the radar both in-band and out of band from IMT does not exceed those predicted during the studies on ground based IMT and on which the radar modifications were designed.

**ICAO Position:**

To ensure that high-altitude platform stations as IMT-base stations (HIBs) sharing and compatibility studies performed under Resolution **247 (WRC-19)** address the protection of aeronautical systems operating in the frequency bands 960-1 164 MHz and 2 700-2 900 MHz.

In particular, to oppose the use of HIBS within the frequency band 2 500-2 690 MHz or parts thereof where agreed studies have not demonstrated that the signal levels from the HIBS will be below the predicted levels from the ground based IMT studies.

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**WRC-23 Agenda Item 1.6**

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**Agenda Item Title:**

**to consider, in accordance with Resolution 772 (WRC-19), regulatory provisions to facilitate radiocommunications for sub-orbital vehicles.**

**Discussion:**

Sub-orbital vehicles have been developed to reach altitudes and velocities that are much higher than conventional aircraft. Re-usable sub-orbital vehicles that launch like traditional rockets have become routine. However, with the advances in technology, re-useable sub-orbital vehicles that take off and land on a traditional runway are close to becoming a reality with companies testing such vehicles. These vehicles are intended to perform various missions, such as deploying satellites, conducting scientific research, or carrying passengers and cargo, and then returning to the Earth's surface. As one example, such vehicles could lead to hypersonic travel from Europe to Australia in 90 minutes, down from the current 24 hours.

The introduction of sub-orbital vehicles will create numerous challenges for spectrum usage and frequency management. They must safely share airspace with conventional aircraft during certain portions of flight. Therefore, there is a need to track sub-orbital vehicles for the entire duration of the flight and for those vehicles to communicate with other airspace users and air traffic control.

With respect to spectrum for systems and applications related to aviation safety, ICAO standardized systems are necessary for harmonization and interoperability with the air traffic management system. However, sub-orbital vehicles are intended to achieve altitudes and velocities that are much higher than conventional aircraft and hence do not always perform as an aircraft. Also, the way that on-board ICAO- standard terrestrial or satellite systems operate may not necessarily be consistent with the definitions in the Radio Regulations. Therefore, there is not a clear regulatory understanding as to how stations on board sub-orbital vehicles should be addressed and hence no clear understanding as to the radio service(s) under which they should operate.

Studies have shown that in principle from a technical perspective, some of the current ICAO standardized systems should have the capability, although potentially not the capacity, to provide suitable radio links for sub-orbital vehicles to operate safely. Additional regulatory and technical analysis is required to address the questions and concerns raised in the studies called for by Resolution 772 (WRC-19).

**ICAO Position:**

To support ITU-R studies and the definition of relevant technical characteristics as called for by Resolution **772 (WRC-19)** to ensure aviation needs are satisfied.

To support, if identified as required by the studies called for in Resolution **772 (WRC-19)**, modifications to the Radio Regulations that help enable the integration of sub-orbital vehicles into the airspace structure.

To support, if studies show the need for access to additional spectrum, the establishment of a WRC agenda item at a future competent conference.



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**WRC-23 Agenda Item 1.7**

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**Agenda Item Title:**

**to consider a new aeronautical mobile-satellite (R) service (AMS(R)S) allocation in accordance with Resolution 428 (WRC-19) for both the Earth-to-space and space-to-Earth directions of aeronautical VHF communications in all or part of the frequency band 117.975-137 MHz, while preventing any undue constraints on existing VHF systems operating in the AM(R)S, the ARNS, and in adjacent frequency bands.**

**Discussion:**

In the past the level of aircraft traffic and separation in oceanic and remote areas has been limited due to either the geographical impracticality and/or prohibitive costs of providing and maintaining suitable terrestrial communication, navigation and surveillance (CNS) systems. However, with the existing availability of global navigation satellite systems and the implementation at WRC-15 of a satellite based surveillance broadcast systems in the frequency band 1 087.7-1 092.3 MHz, there has been progress in the areas of navigation and surveillance. However, in certain regions of the world there remains insufficient communications capability to complement these satellite navigation and surveillance functions.

One proposal currently being studied uses low-Earth orbiting satellites to relay regional air traffic control messages between the pilot and controller. Were the system to be operated in the frequency band 117.975-137 MHz, currently allocated to the aeronautical mobile (Route) service (AM(R)S), then it would be possible to avoid carrying out a prohibitively expensive aircraft retrofit programme as the system would utilize existing on-board radios.

Availability of VHF satellite communications in oceanic and remote areas, as noted above where terrestrial infrastructure is non-existent or impractical, would also enhance the efficiency and capacity of aircraft operations as well as supporting communications to RPAS (Remotely Piloted Aircraft Systems) flight operations. The primary intention of the VHF satellite concept is to provide bi-directional communications from ATC to aircraft, and aircraft to ATC. The satellite concept is not designed or intended to be a replacement for existing VHF terrestrial infrastructure due to limitations with the satellite payload.

Aeronautical VHF channel assignments are planned in accordance with the principles contained in ICAO Annex 10 to the Convention on International Civil Aviation Volume V and detailed in the Handbook on Radio Frequency Spectrum Requirements for Civil Aviation Volume II. These criteria have been designed to ensure that communications are free from harmful interference. Co-ordination is then undertaken prior to deployment, in line with ITU procedures, between the relevant aeronautical authorities including ICAO to ensure there are no objections to the proposed assignment with a master list of approved assignments normally being published regularly by the relevant ICAO regional office. The satellite VHF relay concept would be subject to the same scrutiny with planning criteria needing to be developed within ICAO to ensure that both the terrestrial and satellite aeronautical VHF frequencies are free from harmful interference and co-ordination procedures are established to ensure that all relevant entities are consulted before any frequency is used.

The satellite system allocation to AMS(R)S shall operate in accordance with international standards, practices and procedures in accordance with the Convention on International Civil Aviation and

not adversely impact or limit the operation of existing AM(R)S terrestrial VHF systems in the frequency band 117.975-137 MHz, nor require any changes to aircraft equipment or existing installations.

**ICAO Position:**

To support ITU-R studies and the definition of relevant technical characteristics as called for by Resolution **428 (WRC-19)**.

To support a global allocation to the aeronautical mobile-satellite (route) service for both the Earth-to-space and space-to-Earth directions in the frequency band 117.975-137 MHz and that the use of the allocation be limited to the relaying of aeronautical VHF air traffic management communications.

To support that those systems shall operate in accordance with international Standards and Recommended Practices and procedures established in accordance with the Convention on International Civil Aviation.

To ensure that any change to the regulatory provisions and spectrum allocation resulting from this agenda item do not adversely impact the operation of existing VHF systems in the band 117.975-137 MHz operating in the AM(R)S, including regional usage of terrestrial VHF, nor require any changes to aircraft equipment or to existing installations.

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**WRC-23 Agenda Item 1.8**

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**Agenda Item Title:**

**to consider, on the basis of ITU-R studies in accordance with Resolution 171 (WRC-19), appropriate regulatory actions, with a view to reviewing and, if necessary, revising Resolution 155 (Rev.WRC-19) and No. 5.484B to accommodate the use of fixed-satellite service (FSS) networks by control and non-payload communications of unmanned aircraft systems.**

**Discussion:**

Resolution **155 (Rev.WRC-19)** was initially developed at WRC-15 and modified by WRC-19, with the aim of enabling the use of geostationary-satellite networks operating in the fixed satellite service (FSS) to be used for the provision of unmanned aircraft control and non-payload communication (CNPC) in the following frequency bands:

- For downlink (space-to-Earth):
  - 10.95-11.2 GHz,
  - 11.45-11.7 GHz,
  - 11.7-12.2 GHz in Region 2,
  - 12.2-12.5 GHz in Region 3,
  - 12.5-12.75 GHz in Regions 1 and 3,
  - 19.7-20.2 GHz,
- For uplink (Earth-to-space):
  - 14-14.47 GHz,
  - 29.5-30.0 GHz.

Resolution **155 (Rev.WRC-19)**, in its resolves, contains the conditions under which an unmanned aircraft can use a satellite network operating in the FSS for CNPC. However, it was recognised when the Resolution was originally developed that:

- ICAO had yet to complete the development of the relevant international aeronautical Standards and Recommended Practices (SARPs),
- additional work would be required to assess the feasibility of using the satellite networks under the conditions contained in Resolution **155**,
- there may be inconsistencies between some of the **resolves**,
- Resolution **155 (Rev.WRC-19)** was originally developed during WRC 15, and modifications may be required once the further study work and relevant ICAO SARPs material had been completed to ensure that the provisions of the Resolution meet the ICAO requirements.

Therefore, the Resolution as developed by WRC-15, contained a clause requiring WRC-23 “to consider the results of the above studies referred to in this Resolution with a view to reviewing and, if necessary, revising this Resolution, and take necessary actions, as appropriate”. It also precluded operational use of the FSS by UAS CNPC before the review by WRC-23.

At WRC-19 Resolution **155** was revised and WRC-23 Agenda Item 1.8 adopted that through Resolution **171 (WRC-19)** resolved to invite the ITU Radiocommunication Sector to:

- continue and complete in time for WRC-23 relevant studies of the technical, operational and regulatory aspects, based on the frequency bands mentioned in *resolves* 1 of Resolution **155 (Rev.WRC-19)**, in relation to the implementation of Resolution **155 (Rev.WRC-19)**, taking into account the progress obtained by ICAO in the completion of SARPs on use of the FSS for the UAS CNPC links,
- review No. **5.484B** and Resolution **155 (Rev.WRC-19)** taking into account the results of the above studies.

Additionally, Resolution **171 (WRC-19)** *invites the 2023 World Radiocommunication Conference* to revise, if necessary, No. **5.484B** and Resolution **155 (Rev.WRC-19)** and take other necessary actions, as appropriate, on the basis of the studies conducted under Resolution **155 (Rev.WRC-19)** and **171 (WRC-19)**. Work on the ITU-R studies is continuing, and the final outcome of the work has not yet been reached in order to allow WRC-23 to make decisions.

In this context, ICAO is invited to develop aeronautical Standards and Recommended Practices (SARPs) identifying how UAS CNPC operate under the existing FSS primary allocation, based on the Resolution **155 (Rev.WRC-19)**. As a basis for developing these SARPs, since CNPC is a safety-of-life aeronautical system, ICAO is expecting that the decision of WRC-23 results in a Resolution that;

- clearly provides primary status to the various elements of the UAS CNPC link, including both the UAES and the UACS Earth station, taking into account the definitions contained within the radio regulations,
- removes the apparent inconsistency, in common frequency bands, between a) Resolutions **156, 169**, and any future Resolution that require that Earth stations in motion shall not be used or relied upon for safety-of-life applications and b) Resolution **155** that addresses the use of Earth stations in motion on board UA for safety-of-life applications,
- acknowledges that in accordance with the Annexes of the Convention of the International Civil Aviation Organization (ICAO) on international civil aviation it is the States that are responsible for ensuring the safety-of-life aspects of the use of UAS CNPC,
- provides operators, air traffic service providers and regulatory authorities sufficient information about the level of interference within the area of the UAS operation, including outside of the territory where they provide air traffic services, to support and/or validate supporting documentation for safety cases,
- ensures that safety cases or supporting documentation do not need to be revisited as a result of future satellite co-ordination agreements.

Within the ITU during the last study period work has made substantive progress but it has not been formally completed for the following two documents that addressed various resolves within Resolution 155:

- ITU-R M.[UAS\_CNPC\_CHAR] - Characteristics of unmanned aircraft system control and non-payload Earth stations for use with space stations operating in the Fixed Satellite Service,
- ITU-R M.[UA\_PFD] - Review of power flux-density limits in accordance with resolves 16 of Resolution **155 (WRC-15)**.

It has to be noted that these documents will contain critical information that will be used for assessing the feasibility of UAS CNPC for different operational conditions, by ICAO, under Resolution 155.

Within ICAO work has progressed on the development of Standards and Recommended Practices (SARPs) material. The first package of SARPs dealing with the identification of frequency bands (including those listed in Resolves 1 of Resolution **155 (Rev.WRC-19)** and C2 Link procedures, are

expected to be adopted and become effective by Q3 of 2021 once a review of comments received from States has been undertaken. The second package of SARPs, scheduled to be completed by 2022, will address the technical solutions for the FSS systems and the other relevant resolves of the Resolution 155. ICAO will be responsible for the safety-of-life aspects of UAS CNPC under the existing RF environment given by the Resolution 155. It should be noted that this work is still under development within ICAO.

The Director of the Radiocommunication Bureau will decide if the conditions included in the *instructs the Director of the Radiocommunication Bureau* 4 of Resolution **155 (Rev. WRC-19)** have been met. If they have, satellite network filings submitted by administrations with a new class of station can then be considered for processing.

It should be noted that work under Agenda Item 1.16 (Resolution **173 (WRC-19)**) and Agenda Item 1.17 (Resolution **773 (WRC-19)**) may have impacts on the use of the FSS by UAS CNPC during the WRC-23 cycle. The implications of any proposed amendment under these Agenda Items to the Radio Regulations need to be assessed and action taken, if necessary, to ensure that the radio regulatory provisions established during WRC-23 do not adversely impact the use of the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz by unmanned aircraft for CNPC.

#### **ICAO Position:**

To support ITU-R studies, as called for by Resolutions **155 (Rev.WRC-19)** and **171 (WRC-19)**.

To support the modification of No. 5.484B and Resolution **155 (Rev.WRC-19)**.

ICAO is expecting that the decision of WRC-23 will result in a Resolution that:

- clearly provides primary status;
- removes any apparent inconsistencies;
- acknowledges that States are responsible for ensuring the safety-of-life;
- provides sufficient information to support and/or validate safety cases; and
- ensures that safety cases do not need to be revisited as a result of future satellite co-ordination agreements.

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**WRC-23 Agenda Item 1.9**

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**Agenda Item Title:**

**to review Appendix 27 of the Radio Regulations and consider appropriate regulatory actions and updates based on ITU-R studies, in order to accommodate digital technologies for commercial aviation safety-of-life applications in existing HF bands allocated to the aeronautical mobile (route) service and ensure coexistence of current HF systems alongside modernized HF systems, in accordance with Resolution 429 (WRC-19).**

**Discussion:**

HF is the only terrestrial service with means of providing ubiquitous global communication coverage for aircraft, and is still the long-range system required by many aviation regulators for the provision of safety and regularity of flight communications in oceanic, polar and remote areas. Access to the various frequency bands in the range 2 850-22 000 kHz assigned to the aeronautical mobile (route) service (AM(R)S) is therefore essential. Since the last substantive review of Appendix 27 at the 1979 World Administrative Radio Conference, use of HF by aviation has continued to evolve and grow, especially with the introduction of HF datalink in the 1990s; now used by many airlines.

To date, operational capacity has been limited by the number of channels and channel bandwidths (maximum of 3 kHz) available in the HF band. However, the development of advanced digital techniques, including new waveforms, allows the aggregation of both contiguous and non-contiguous channels. This opens the possibility for simultaneous transmission of voice and data, thus improving capacity, connectivity, and quality of HF communication systems. Aviation would like to take advantage of these developments to provide aircraft with additional capabilities and to improve the reliability, availability and continuity of communications especially when used in conjunction with existing L-band aviation SATCOM systems.

In order to take advantage of the various benefits that a modern wideband HF communication system could offer, Appendix 27 of the Radio Regulations needs to be modified to allow the introduction of digital wideband systems in accordance with Resolution 429 (WRC-19).

**ICAO Position:**

To support ITU-R studies as called for by Resolution 429 (WRC-19).

To support, based on agreed studies, the necessary modification of Appendix 27 to the Radio Regulations that will enable the introduction of HF wideband aeronautical communication systems. Those systems shall be operated in accordance with international Standards and Recommended Practices and procedures established in accordance with the Convention on International Civil Aviation.

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**WRC-23 Agenda Item 1.10**

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**Agenda Item Title:**

**to conduct studies on spectrum needs, coexistence with radiocommunication services and regulatory measures for possible new allocations for the aeronautical mobile service for the use of non-safety aeronautical mobile applications, in accordance with Resolution 430 (WRC-19).**

**Discussion:**

As technology has developed and miniaturization has advanced, it has become possible to use aircraft as platforms for payload applications such as fire and border surveillance, air quality and environment monitoring, video surveillance, terrain mapping, and imagery such as film-making. As a result, the number of aircraft equipped with sensors and the demand for associated communication links to offload large amounts of data has also grown and is expected to continue to grow. Those communication links, whilst not associated with aeronautical safety, can be mission critical in providing data or sensor control for the application that they are supporting.

At the same time, there is no clear identification of the frequency bands in which non-safety aeronautical mobile applications can operate, due in-part to the limitations often placed on existing mobile allocations that either preclude or place technical/operational restrictions that are not compatible with aeronautical use. This has stifled further development due to a lack of confidence within the industry of long-term spectrum access and stability.

In consequence, there is a need for adaptation of the current regulatory framework in order to clearly identify spectrum that could only be used for aeronautical payload communication, giving the industry the stability it needs to allow it to develop innovative applications that can deliver tangible benefits. However, it is important that there is a clear distinction between such systems and those used to provide safety and regularity of flight communications, including UAS command and control functions.

The objective of this agenda item is to assess spectrum requirements for new non-safety aeronautical mobile applications and seek:

- possible new primary allocations to the aeronautical mobile service in frequency band 15.4-15.7 GHz for such non-safety aeronautical applications, and
- possible revision or deletion of the “except aeronautical mobile” in the frequency band 22-22.21 GHz, already allocated on a primary basis to the mobile, except aeronautical mobile, service.

**ICAO Position:**

To support ITU-R studies as called for by Resolution **430 (WRC-19)**.

To support, based on the agreed results of studies, new allocations to the aeronautical mobile service only for use by non-safety aeronautical mobile applications.

To ensure that any such modification does not adversely affect the status or provision of aeronautical safety services.



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**WRC-23 Agenda Item 1.11**

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**Agenda Item Title:**

**to consider possible regulatory actions to support the modernization of the Global Maritime Distress and Safety System (GMDSS) and the implementation of e-navigation, in accordance with Resolution 361 (Rev.WRC-19).**

**Discussion:**

Aircraft, of which helicopters are a subset, are an integral part of the global maritime distress and safety system, providing a rapid search capability that can affect a rescue or direct surface vessels to the scene of the incident. As such, they are fitted with appropriate global maritime distress and safety system (GMDSS) radio equipment to facilitate such activities. It is therefore essential to ensure that any change to the regulatory provisions and spectrum allocations resulting from this agenda item do not adversely impact on the capability of search and rescue aircraft to effectively communicate with vessels during disaster relief operations.

In addition, ICAO requires, inter alia, that satellite systems supporting aeronautical satellite safety communications (aeronautical mobile-satellite (route) service), must comply with priority requirements contained in ICAO Standards and Recommended Practices (SARPs). Therefore, if a system which already carries such communications were to be approved by the International Maritime Organization and identified to carry GMDSS, any resultant changes to the Radio Regulations should not adversely impact that, or other, system's SARPs compliance

**ICAO Position:**

To ensure that any change to the regulatory provisions and spectrum allocations resulting from this agenda item do not adversely impact on the capability of search and rescue aircraft, including helicopters, to effectively communicate with vessels during disaster-relief operations.

To ensure that any regulatory provisions in response to this agenda item do not adversely impact SARPs compliance of aeronautical mobile-satellite (route) service systems.

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**WRC-23 Agenda Item 1.11**

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**Agenda Item Title:**

**to consider a possible upgrade of the allocation of the frequency band 14.8-15.35 GHz to the space research service, in accordance with Resolution 661 (WRC-19).**

**Discussion:**

Under this agenda item, the following studies are to be conducted:

- a) to investigate and identify all relevant scenarios between data relay satellites, non-geostationary satellites and manned flights in the space research service operating in the frequency band 14.8-15.35 GHz, to investigate and identify all relevant scenarios that need to be considered in compatibility and sharing studies, taking into account the latest relevant ITU Radiocommunication Sector (ITU-R) Recommendations,
- b) to conduct and complete in time for WRC-23 sharing and compatibility studies in order to determine the feasibility of upgrading the SRS allocation to primary status in the frequency band 14.8-15.35 GHz, with a view to ensuring protection of the primary services,
- c) to determine the technical and regulatory conditions according to the results of the studies necessary to ensure b) above.

Currently, the frequency band 14.8-15.35 GHz is allocated to the generic mobile and fixed services on a primary basis. According to Recommendations ITU-R M. 2089 mentioned in *noting a)* of Resolution **661 (WRC-19)**, systems operating in the aeronautical mobile service in the frequency range 14.5-15.35 GHz are used by airborne data links to support remote sensing applications on board either manned or unmanned aircraft. In addition, in some States systems operating under the fixed service allocation are used to support air traffic operations. Neither of these applications use ICAO standardized systems.

**ICAO Position:**

To support studies called for by Resolution **661 (WRC 19)** ensuring that they take account of systems operating in the aeronautical mobile service.

To ensure that any radio regulatory action taken as a result of agreed studies does not adversely affect the provision of aeronautical services,

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**WRC-23 Agenda Item 1.11**

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**Agenda Item Title:**

**to harmonize the use of the frequency band 12.75-13.25 GHz (Earth-to-space) by earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service globally, in accordance with Resolution 172 (WRC-19).**

**Discussion:**

This agenda item seeks to harmonize the use of the frequency band 12.75-13.25 GHz (Earth-to-space) by earth stations on board an aircraft or vessel communicating with geostationary space stations in the fixed satellite service operating in accordance with the provisions of Appendix **30B** (No **5.441**). It resolves that such earth stations shall not be used or relied upon for safety-of-life applications nor result in changes or restrictions to existing Plan allotments and List assignments made under Appendix **30B**.

Resolution **172 (WRC-19)** calls for studies to:

- Identify the technical and operational characteristics and user requirements of earth stations on aircraft and vessels that communicate or plan to communicate with geostationary (GSO) space stations in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space) under the envelope of Appendix **30B** Article 6 recorded in the List or the Master International Frequency Register (MIFR) with favourable finding only,
- address the sharing and compatibility issues between earth stations on aircraft and vessels communicating with GSO space stations in the fixed satellite service with current and planned stations of existing services as well as services in adjacent frequency bands,
- to study the responsibility of the entities involved in the operation of the earth stations on aircraft and vessels,
- to develop the criteria to ensure that earth stations on aircraft and vessels, as a new FSS application in this frequency band, shall not claim more protection nor cause more interference than filed earth stations in Appendix **30B**.

Once consensus has been reached on those studies the Resolution calls on the ITU-R to develop technical conditions and regulatory provisions for the harmonised operation of earth stations on aircraft and vessels communicating with GSO space stations in the FSS operating in the frequency band 12.75-13.25 GHz (Earth-to-space). Those technical conditions and regulatory provisions shall ensure the protection of and not impose undue constraints on, the existing services in that frequency band. Additionally, they shall not adversely affect the criteria contained in Annex 4 to Appendix **30B** including the cumulative effect of multiple earth stations on aircraft and vessels nor limit access of other administrations to their national resources in Appendix **30B**.

WRC-23 should then consider the relevant regulatory action necessary based on the work, as detailed above, undertaken during this study period whilst ensuring that any action taken does not result in any additional status than that of the GSO satellite networks with which these stations are communicating.

The introduction of earth station in motion operations into a frequency band that is subject to Appendix **30B** restrictions could provide a welcome additional capacity for non-safety passenger/payload communication. Additionally, given the restriction that such use shall not be or relied upon for safety-of-life communication this agenda item should not adversely affect the provision of aeronautical safety service nor set a precedent for their provision. However, how this agenda item develops needs to be

monitored to ensure that there is no adverse impact or precedent set.

See also agenda item 1.16.

**ICAO Position:**

To ensure that any radio regulatory action, taken as a result of this agenda item, neither adversely affects the provision of aeronautical safety-of-life services nor sets an unwanted precedent.

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**WRC-23 Agenda Item 1.16**

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**Agenda Item Title:**

**to study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by non-geostationary fixed-satellite service earth stations in motion, while ensuring due protection of existing services in those frequency bands, in accordance with Resolution 173 (WRC 19).**

**Discussion:**

This agenda item seeks to extend the concept of earth stations in motion (ESIMs) communicating with geostationary space stations, to operation of ESIMs with non-geostationary space stations in the fixed satellite service (FSS) to the 17.7-18.6 GHz, 18.8-19.3 GHz, 19.7-20.2 GHz (space-to-Earth), 27.5-29.1 GHz and 29.5-30 GHz frequency bands.

Resolution **173 (WRC-19)** calls for studies to:

- identify the technical and operational characteristics and user requirements of the different types of ESIMs that plan to operate within non-geostationary (non-GSO) satellite systems operating in the FSS in the frequency bands or parts thereof identified,
- address the sharing and compatibility between ESIMs communicating with non-GSO FSS systems and current & planned stations of primary services allocated in the frequency bands identified as well as in the adjacent frequency bands.

The Resolution also calls on the ITU-R to develop technical conditions and regulatory provisions for the operation of aeronautical and maritime ESIMs communicating with non-GSO space stations operating in the FSS in the frequency bands identified. Those technical conditions and regulatory provisions shall ensure the protection of and not impose additional constraints on the existing services in the frequency bands identified.

ITU-R should also consider the relevant regulatory action necessary based on the work, as detailed above, undertaken during this study period.

It should be noted that the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz are identified within Resolution **155 (Rev. WRC-19)** for the provision of unmanned aircraft systems (UAS) control and non-payload communication (CNPC). However, both Resolution **156 (WRC-15)** that regulates the use of these frequency bands for ESIMs communicating to GSO satellites and Resolution **173 (WRC-19)** that seeks to facilitate the use of ESIMs communicating to non-GSO satellites in these frequency bands preclude the use of the relevant ESIMs from being used or relied upon for safety-of-life applications. The implications of any proposed amendment under agenda item 1.16 to the Radio Regulations need to be assessed and action taken if they:

- could adversely affect the provision of UAS CNPC under Resolution **155 (Rev. WRC-19)**,
- do not make a clear regulatory distinction between satellite networks or satellite network resources providing UAS CNPC and those providing non-safety ESIMs applications,
- set a precedent that could adversely affect the provision of aeronautical safety-of-life services.

See also agenda item 1.8, 1.15 and 1.17.

**ICAO Position:**

To ensure that any radio regulatory action taken as a result of this agenda item:

- do not adversely affect the provision of UAS CNPC under Resolution **155 (Rev. WRC-19)**;
- make a clear regulatory distinction between satellite networks or satellite network resources providing UAS CNPC and those providing non-safety ESIMs applications;
- do not set a precedent that could adversely affect the provision of aeronautical safety-of-life services.

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**WRC-23 Agenda Item 1.17**

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**Agenda Item Title:**

**to determine and carry out, on the basis of ITU R studies in accordance with Resolution 773 (WRC 19), the appropriate regulatory actions for the provision of inter-satellite links in specific frequency bands, or portions thereof, by adding an inter-satellite service allocation where appropriate.**

**Discussion:**

Inter-satellite links have traditionally been used to relay communication between space stations, normally situated on non-geostationary satellites, and an earth station where direct communication is impeded for some reason such as being beyond visual line of sight. With the planned expansion in the use of low earth orbit satellites the demand for inter-satellite links and associated spectrum is also increasing. This agenda item seeks to develop the technical conditions and regulatory provisions, including potential new allocations to the inter-satellite service, by which the different types of space station can operate inter-satellite links in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz.

Resolution **773 (WRC-19)** calls for studies to:

- identify the technical and operational characteristics, including spectrum requirements, for transmissions between space stations in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz,
- address the sharing and compatibility between satellite-to-satellite links intending to operate between space stations in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz and current and planned stations of the FSS and other existing services allocated in same frequency bands and adjacent frequency bands,

Based on those studies the Resolution calls on the ITU-R to develop, for different types of space stations, the technical conditions and regulatory provisions for satellite-to-satellite operations, including potential new inter-satellite service allocations, in the frequency bands identified.

WRC-23 should then consider the relevant regulatory action necessary based on the work, as detailed above, undertaken during this study period whilst ensuring the protection of the fixed and mobile services allocated on a primary basis within the identified frequency bands.

It should be noted that the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz are identified within Resolution **155 (Rev. WRC-19)** for the provision of unmanned aircraft systems (UAS) control and non-payload communication (CNPC). It is therefore important that the implications of any proposed amendment under agenda item 1.17 to the Radio Regulations are assessed and action taken if they could adversely affect the provision of UAS CNPC under Resolution **155 (Rev. WRC-19)**,

See also agenda item 1.8 and 1.16.

**ICAO Position:**

To ensure that any radio regulatory action taken as a result of this agenda item does not adversely affect the provision of UAS CNPC under Resolution **155 (Rev. WRC-19)**,

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**WRC-23 Agenda Item 4**


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**Agenda Item Title:**

**in accordance with Resolution 95 (Rev.WRC-19), to review the Resolutions and Recommendations of previous conferences with a view to their possible revision, replacement or abrogation.**

**ICAO Position:****Resolutions:**

<i>Resolution No.</i>	<i>Title</i>	<i>Action recommended</i>
<b>18</b> (Rev. WRC-15)	Relating to the procedure for identifying and announcing the position of ships and aircraft of States not parties to an armed conflict.	No change
<b>20</b> (Rev. WRC-03)	Technical cooperation with developing countries in the field of aeronautical telecommunications.	No change
<b>26</b> (Rev. WRC-19)	Footnotes to the Table of Frequency Allocations in Article 5 of the Radio Regulations.	No change
<b>27</b> (Rev. WRC-19)	Use of incorporation by reference in the Radio Regulations.	No change
<b>63</b> (Rev. WRC-12)	Protection of radiocommunication services against interference caused by radiation from industrial, scientific and medical (ISM) equipment.	No change
<b>76</b> (Rev. WRC-15)	Protection of geostationary fixed-satellite service and geostationary broadcasting-satellite service networks from the maximum aggregate equivalent power flux-density produced by multiple non-geostationary fixed-satellite service systems in frequency bands where equivalent power flux-density limits have been adopted.	No change
<b>95</b> (Rev. WRC19)	General review of the resolutions and recommendations of world administrative radio conferences and world radiocommunication conferences.	No change
<b>114</b> (Rev. WRC-15)	Studies on compatibility between new systems of the aeronautical radionavigation service and the fixed-satellite service (Earth-to-space) (limited to feeder links of the non-geostationary mobile-satellite systems in the mobile-satellite service) in the frequency band 5 091-5 150 MHz.	No change



<i>Resolution No.</i>	<i>Title</i>	<i>Action recommended</i>
<b>140</b> (Rev. WRC-15)	Measures and studies associated with the equivalent power flux-density (epfd) limits in the band 19.7-20.2 GHz.	No change
<b>154</b> (WRC-15)	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.	No change
<b>155</b> (Rev. WRC-19)	Regulatory provisions related to earth stations on board unmanned aircraft which operate with geostationary-satellite networks in the fixed-satellite service in certain frequency bands not subject to a plan of Appendices 30, 30A and 30B for the control and non-payload communications of unmanned aircraft systems in non-segregated airspaces.	Subject to WRC-23 Agenda Item 1.8.
<b>156</b> (WRC-15)	Use of the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz by earth stations in motion communicating with geostationary space stations in the fixed-satellite service	Modify if necessary to ensure clear delineation between ESIMs and unmanned aircraft control and non payload communication covered in Resolution <b>155 (Rev. WRC-19)</b> .
<b>160</b> (WRC-15)	Facilitating access to broadband applications delivered by high-altitude platform stations.	Suppress based on the results of studies carried out under WRC-19 Agenda Item 1.14.
<b>165</b> (WRC-19)	Use of the frequency band 21.4-22 GHz by high-altitude platform stations in the fixed service in Region 2	No change
<b>166</b> (WRC-19)	Use of the frequency band 24.25-27.5 GHz by high-altitude platform stations in the fixed service in Region 2	No change
<b>167</b> (WRC-19)	Use of the frequency band 31-31.3 GHz by high-altitude platform stations in the fixed service	No change

<i>Resolution No.</i>	<i>Title</i>	<i>Action recommended</i>
<b>168</b> (WRC-19)	Use of the frequency band 38-39.5 GHz by high-altitude platform stations in the fixed service	No change
<b>169</b> (WRC-19)	Use of the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz by earth stations in motion communicating with geostationary space stations in the fixed-satellite service	Modify if necessary to ensure that the provisions for ESIMs do not limit the use of unmanned aircraft control and non payload communication covered in Resolution <b>155 (Rev. WRC-19)</b> .
<b>171</b> (WRC-19)	Review and possible revision of Resolution <b>155 (Rev.WRC-19)</b> and No. <b>5.484B</b> in the frequency bands to which they apply	Subject to WRC-23 Agenda Item 1.8.
<b>172</b> (WRC-19)	Operation of earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service in the frequency band 12.75-13.25 GHz (Earth-to-space)	Subject to WRC-23 Agenda Item 1.15.
<b>173</b> (WRC-19)	Use of the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by earth stations in motion communicating with non-geostationary space stations in the fixed-satellite service	Subject to WRC-23 Agenda Item 1.16.
<b>176</b> (WRC-19)	Use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary space stations in the fixed-satellite service	Modify or suppress as necessary based on the results of studies carried out (preliminary WRC-27 Agenda Item 2.2).
<b>205</b> (Rev. WRC-19)	Protection of the systems operating in the mobile satellite service in the band 406-406.1 MHz.	No change
<b>207</b> (Rev. WRC-15)	Measures to address unauthorized use of and interference to frequencies in the bands allocated to the maritime mobile service and to the aeronautical mobile (R) service.	No change
<b>217</b> (WRC-97)	Implementation of wind profiler radars.	No change

<b><i>Resolution No.</i></b>	<b><i>Title</i></b>	<b><i>Action recommended</i></b>
<b>222</b> ( <i>Rev. WRC-12</i> )	Use of the frequency bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service, and procedures to ensure long-term spectrum access for the aeronautical mobile-satellite (R) service.	No change
<b>223</b> ( <i>Rev WRC-19</i> )	Additional frequency bands identified for International Mobile Telecommunications	Modify or suppress <i>invites the ITU Radiocommunications Sector 1 to Resolution 223</i> , as appropriate, based on the results of the studies called for by that provision.
<b>225</b> ( <i>Rev. WRC-12</i> )	Use of additional frequency bands for the satellite component of IMT.	No change
<b>229</b> ( <i>Rev. WRC-19</i> )	Use of the frequency bands 5 150-5 250 MHz, 5 250-5 350 MHz and 5 470-5 725 MHz by the mobile service for the implementation of wireless access systems including radio local area networks	No change
<b>240</b> ( <i>WRC-19</i> )	Spectrum harmonization for railway radiocommunication systems between train and trackside within the existing mobile-service allocations.	Monitor studies and ensure protection of aeronautical systems.
<b>245</b> ( <i>WRC-19</i> )	Studies on frequency-related matters for the terrestrial component of International Mobile Telecommunications identification in the frequency bands 3 300-3 400 MHz, 3 600-3 800 MHz, 6 425-7 025 MHz, 7 025-7 125 MHz and 10.0-10.5 GHz	Subject to WRC-23 Agenda Item 1.2.
<b>246</b> ( <i>WRC-19</i> )	Studies to consider possible allocation of the frequency band 3 600-3 800 MHz to the mobile, except aeronautical mobile, service on a primary basis within Region 1	Subject to WRC-23 Agenda Item 1.3.
<b>247</b> ( <i>WRC-19</i> )	Facilitating mobile connectivity in certain frequency bands below 2.7 GHz using high-altitude platform stations as International Mobile Telecommunications base stations	Subject to WRC-23 Agenda Item 1.4.

<b>249</b> (WRC-19)	Study of technical and operational issues and regulatory provisions for space-to-space transmissions in the Earth-to-space direction in the frequency bands [1 610-1 645.5 and 1 646.5-1 660.5 MHz] and the space-to-Earth direction in the frequency bands [1 525-1 544 MHz], [1 545-1 559 MHz], [1 613.8-1 626.5 MHz] and [2 483.5-2 500 MHz] among non-geostationary and geostationary satellites operating in the mobile-satellite service	Modify or suppress as necessary based on the results of studies carried out for WRC-27 (preliminary WRC-27 Agenda Item 2.8)
<b>250</b> (WRC-19)	Studies on possible allocations to the land mobile service (excluding International Mobile Telecommunications) in the frequency band 1 300-1 350 MHz for use by administrations for the future development of terrestrial mobile-service applications	Modify or suppress as necessary based on the results of studies carried out for WRC-27 (preliminary WRC-27 Agenda Item 2.9)
<b>251</b> (WRC-19)	Removal of the limitation regarding aeronautical mobile in the frequency range 694-960 MHz for the use of International Mobile Telecommunications user equipment by non-safety applications	Modify or suppress as necessary based on the results of studies carried out for WRC-27 (preliminary WRC-27 Agenda Item 2.12)
<b>339</b> (Rev. WRC-07)	Coordination of NAVTEX services.	No change
<b>354</b> (WRC-07)	Distress and safety radiotelephony procedures for 2 182 kHz.	No change
<b>356</b> (WRC-07)	ITU maritime service information registration.	No change
<b>361</b> (Rev. WRC-19)	Consideration of regulatory provisions for modernization of the global maritime distress and safety system and related to the implementation of e-navigation.	Subject to WRC-23 Agenda Item 1.11.
<b>405</b> (Geneva 1979)	Relating to the use of frequencies of the aeronautical mobile (R) service.	Subject to WRC-23 agenda item 1.9.
<b>413</b> (Rev. WRC-12)	Use of the band 108-117.975 MHz by aeronautical service.	No change
<b>417</b> (Rev. WRC-12)	Use of the frequency band 960-1 164 MHz by the aeronautical mobile (R) service.	No change

<b>418</b> (Rev. WRC-15)	Use of the band 5 091-5 250 MHz by the aeronautical mobile service for telemetry applications.	No change
<b>422</b> (WRC-12)	Development of methodology to calculate aeronautical mobile-satellite (R) service spectrum requirements within the frequency bands 1 545-1 555 MHz (space-to-Earth) and 1 646.5-1 656.5 MHz (Earth-to-space).	Suppress as a result of the approval of Recommendation ITU-R M.2091.
<b>424</b> (WRC-15)	Use of wireless avionics intra-communications in the frequency band 4 200-4 400 MHz.	No change
<b>425</b> (Rev. WRC-19)	Use of the frequency band 1 087.7-1 092.3 MHz by the aeronautical mobile-satellite (R) service (Earth-to-space) to facilitate global flight tracking for civil aviation.	No change
<b>428</b> (WRC-19)	Studies on a possible new allocation to the aeronautical mobile-satellite (R) service within the frequency band 117.975-137 MHz in order to support aeronautical VHF communications in the Earth-to-space and space-to-Earth directions	Subject to WRC-23 Agenda Item 1.7.
<b>429</b> (WRC-19)	Consideration of regulatory provisions for updating Appendix 27 of the Radio Regulations in support of aeronautical HF modernization	Subject to WRC-23 Agenda Item 1.9.
<b>430</b> (WRC-19)	Studies on frequency-related matters, including possible additional allocations, for the possible introduction of new non-safety aeronautical mobile applications	Subject to WRC-23 Agenda Item 1.10.
<b>608</b> (Rev. WRC-19)	Use of the frequency band 1 215-1 300 MHz by systems of the radionavigation satellite service.	No change
<b>609</b> (Rev. WRC-07)	Protection of aeronautical radionavigation systems from the equivalent power flux-density produced by radionavigation satellite service networks and systems in the 1 164-1 215 MHz band.	No change
<b>610</b> (Rev. WRC-19)	Coordination and bilateral resolution of technical compatibility issues for radionavigation satellite networks and systems in the band 1 164-1 300 MHz, 1 559-1 610 MHz and 5 010-5 030 MHz.	No change
<b>612</b> (Rev. WRC-12)	Use of the radiolocation service between 3 and 50 MHz to support oceanographic radar operations.	No change

<i>Resolution No.</i>	<i>Title</i>	<i>Action recommended</i>
<b>660</b> (WRC-19)	Use of the frequency band 137-138 MHz by non-geostationary satellites with short-duration missions in the space operation service.	No change
<b>661</b> (WRC-19)	Examination of a possible upgrade to primary status of the secondary allocation to the space research service in the frequency band 14.8-15.35 GHz	Subject to WRC-23 Agenda Item 1.13.
<b>705</b> (Rev. WRC-15)	Mutual protection of radio services operating in the band 70-130 kHz.	No change
<b>729</b> (Rev. WRC-07)	Use of frequency adaptive systems in the MF and HF bands.	No change
<b>748</b> (Rev. WRC-19)	Compatibility between the aeronautical mobile (R) service and the fixed satellite service (Earth-to-space) in the band 5 091-5 150 MHz.	No change
<b>762</b> (WRC-15)	Application of power flux density criteria to assess the potential for harmful interference under 11.32A for fixed-satellite and broadcasting-satellite service networks in the 6 GHz and 10/11/12/14 GHz bands not subject to a plan.	No change
<b>772</b> (WRC-19)	Consideration of regulatory provisions to facilitate the introduction of sub-orbital vehicles.	Subject to WRC-23 agenda item 1.6.
<b>773</b> (WRC-19)	Study of technical and operational issues and regulatory provisions for satellite-to-satellite links in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8 20.2 GHz and 27.5-30 GHz	Subject to WRC-23 agenda item 1.17.
<b>774</b> (WRC-19)	Studies on technical and operational measures to be applied in the frequency band 1 240-1 300 MHz to ensure the protection of the radionavigation-satellite service (space-to-Earth)	Subject to WRC-23 agenda item 9.1 topic b.

**Recommendations:**

<i>Recommendation No.</i>		<i>Action recommended</i>
<b>7</b> ( <i>Rev. WRC-97</i> )	Adoption of standard forms for ship station and ship earth station licences and aircraft station and aircraft earth station licences.	No change
<b>9</b>	Relating to the measures to be taken to prevent the operation of broadcasting stations on board ships or aircraft outside national territories.	No change
<b>71</b>	Relating to the standardization of the technical and operational characteristics of radio equipment.	No change
<b>75</b> ( <i>Rev. WRC-15</i> )	Study on the boundary between the out-of-band and spurious domains of primary radars using magnetrons.	No change
<b>401</b>	Relating to the efficient use of aeronautical mobile (R) worldwide frequencies.	No change
<b>608</b> ( <i>Rev. WRC-07</i> )	Guidelines for consultation meetings established in Resolution <b>609</b> ( <b>WRC-07</b> ).	No change

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**WRC-23 Agenda**  
**Item 8**

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**Agenda Item Title:**

**to consider and take appropriate action on requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, taking into account Resolution 26 (Rev.WRC-19).**

**Discussion:**

Allocations to the aeronautical services are generally made for all ITU regions and normally on an exclusive basis. These principles reflect the global process of standardization within ICAO for the promotion of safety and to support the global interoperability of radiocommunication and radionavigation equipment used in civil aircraft. In some instances, however, footnotes to the ITU Table of Frequency Allocations allocate spectrum in one or more countries to other radio services in addition or alternatively to the aeronautical service to which the same spectrum is allocated in the body of the table.

The use of country footnote allocations to non-aeronautical services in aeronautical bands is generally not recommended by ICAO, on safety grounds, as such use may result in harmful interference to safety services. Furthermore, this practice generally leads to an inefficient use of available spectrum to aeronautical services, particularly when the radio systems sharing the band have differing technical characteristics. It also may result in undesirable (sub-) regional variations with respect to the technical conditions under which the aeronautical allocations can be used. This can have a serious impact on the safety of aviation.

The following footnotes in aeronautical bands should be carefully reviewed by administrations in order to preserve the safety and efficiency of aeronautical services for the reasons as discussed below:

- a) In the frequency bands used for the ICAO instrument landing system (ILS), (marker beacons 74.8-75.2 MHz; localizer 108-112 MHz and glide path 328.6-335.4 MHz) and the VHF omnidirectional radio range system (VOR); 108-117.975 MHz, Nos. 5.181, 5.197 and 5.259 allow for the introduction of the mobile service on a secondary basis and subject to agreement obtained under No. 9.21 of the Radio Regulations when these bands are no longer required for the aeronautical radionavigation service. The use of both ILS and VOR is expected to continue. In addition, WRC-03, as amended by WRC-07, has introduced No. 5.197A stipulating that the band 108-117.975 MHz is also allocated on a primary basis to the aeronautical mobile (R) service (AM(R)S), limited to systems operating in accordance with recognized international aeronautical standards. Such use shall be in accordance with Resolution 413 (Rev. WRC-12). The use of the band 108-112 MHz by the AM(R)S shall be limited to systems composed of ground-based transmitters and associated receivers that provide navigational information in support of air navigation functions in accordance with recognized international aeronautical standards. ICAO encourages administrations listed in Nos. 5.181, 5.197 and 5.259 to review their use and if no longer required, to remove their country's name from these footnotes.
- b) Nos. **5.201** and **5.202** allocate the frequency bands 132-136 MHz and 136-137 MHz in some



States to the aeronautical mobile (off-route) service (AM(OR)S). Since these frequency bands are heavily utilized for ICAO-standard VHF voice and data communications, ICAO encourages those concerned administrations to review their use and if no longer required, to remove their country's name from these footnotes.

- c) In the frequency band 1 215-1 300 MHz, which is used by civil aviation for the provision of radionavigation services through No. **5.331**. Footnote No. **5.330** allocates the band in a number of countries to the fixed and mobile service. Given the receiver sensitivity of aeronautical uses of the frequency band, ICAO does not support the continued inclusion of an additional service through country footnotes. ICAO would therefore encourage administrations to review their use and if no longer required, to remove their country's name from No. **5.330**.
- d) in the frequency band 1 525-1 530 MHz, which is used by civil aviation for the provision of satellite services No. **5.352A** specifies that stations in the mobile-satellite service, except stations in the maritime mobile-satellite service, shall not cause harmful interference to, or claim protection from, stations of the fixed service in a number of countries that were notified prior to 1 April 1998. As of August 2020, the ITU Master International Frequency Register shows out of 20 administrations listed in this footnote, only 4 Administrations have fixed stations notified prior to 1 April 1998. ICAO would therefore encourage Administrations listed in the footnote to review their use of fixed service assignments in 1 525-1 530 MHz, and if no longer required, to remove their country's name from No. **5.352A**.
- e) In the frequency bands 1 540-1 559 MHz, 1 610.6-1 613.8 MHz and 1 613.8-1 626.5 MHz, within which some portions are assigned to or used by the aeronautical mobile-satellite (R) service, No. **5.355** also allocates the band on a secondary basis to the fixed service in a number of countries. Given that portions of these bands are utilized by a safety-of-life service, ICAO does not support the continued use of No **5.355** country footnote. ICAO encourages those concerned administrations to review their use and if no longer required, to remove their country's name from No. **5.355**.
- f) In the frequency bands 1 550-1 559 MHz, 1 610-1 645.5 MHz and 1 646.5-1 660 MHz which are assigned to mobile-satellite services, including in some portions assignment to or use by the aeronautical mobile-satellite (R) service, No. **5.359** also allocates the bands to the fixed service on a primary basis in a number of countries. Given that portions of these bands are utilized by a safety-of-life service, ICAO does not support the continued use of No. **5.359** country footnote. ICAO would therefore encourage those concerned administrations to review their use and if no longer required, to remove their country's name from No. **5.359**.
- g) In the frequency band 4 200-4 400 MHz, which is reserved for use by airborne radio altimeters and wireless avionics intra-communications (WAIC), No. **5.439** allows the operation of the fixed service on a secondary basis in some countries. Radio altimeters are a critical element in aircraft automatic landing systems and serve as a sensor in ground proximity warning systems. WAIC provides aircraft safety communications between points on an airframe. Interference from the fixed service has the potential to affect the safety of both of these systems. ICAO would therefore encourage those concerned administrations to review their use and if no longer required, to remove their country's name from No. **5.439**.

**ICAO Position:**

To encourage administrations listed in the footnotes to review Nos. **5.181**, **5.197** and **5.259**, as access to the frequency bands 74.8-75.2, 108-112 and 328.6-335.4 MHz by the mobile service is difficult and could create the potential for harmful interference to important radionavigation systems used by aircraft at final approach and landing as well as systems operating in the aeronautical mobile service in the frequency band 108-112 MHz.

To encourage administrations listed in the footnotes to review Nos. **5.201** and **5.202**, as use by the AM(OR)S of the frequency bands 132-136 MHz and 136-137 MHz in some States may cause harmful interference to aeronautical safety communications.

To encourage administrations listed in the footnote to review No. **5.330** as access to the frequency band 1 215-1 300 MHz by the fixed and mobile services could potentially cause harmful interference to services used to support aircraft operations.

To encourage administrations listed the footnote to review No. **5.352A** as access to the frequency bands 1 525-1 530 MHz by the fixed services could potentially constrain aeronautical use of this frequency band.

To encourage administrations listed in the footnote to review No. **5.355** as access to the frequency bands 1 540-1 559, 1 610.6-1 613.8 and 1 613.8-1 626.5 MHz by the fixed services could potentially constrain aeronautical use of these frequency bands.

To encourage administrations listed in the footnote to review No. **5.359** as access to the frequency bands 1 550-1 559 MHz, 1 610-1 645.5 MHz and 1 646.5-1 660 MHz by the fixed services could potentially jeopardize aeronautical use of those frequency bands.

To encourage administrations listed in the footnote to review No. **5.439** to ensure the protection of the safety critical operation of radio altimeters and WAIC systems in the frequency band 4 200-4 400 MHz.

ICAO would encourage administrations to take appropriate actions under this agenda item to remove their country's name from these footnotes if no longer required.

*Note 1.— Administrations indicated in the footnotes mentioned in the ICAO Position above which are urged to remove their country names from these footnotes are as follows:*

*No. 5.181 Egypt, Israel and Syrian Arab Republic No.*

*No. 5.197 Syrian Arab Republic*

*No. 5.201 Armenia, Azerbaijan, Belarus, Bulgaria, Estonia, the Russian Federation, Georgia, Hungary, Iran (Islamic Republic of), Iraq (Republic of), Japan, Kazakhstan, Mali, Mongolia, Mozambique, Uzbekistan, Papua New Guinea, Poland, Kyrgyzstan, Romania, Senegal, Tajikistan, Turkmenistan and Ukraine*

*No. 5.202 Saudi Arabia, Armenia, Azerbaijan, Bahrain, Belarus, Bulgaria, the United Arab Emirates, the Russian Federation, Georgia, Iran (Islamic Republic of), Jordan, Mali, Oman, Uzbekistan, Poland, the Syrian Arab Republic, Kyrgyzstan, Romania, Senegal, Tajikistan, Turkmenistan and Ukraine*

*No. 5.259 Egypt and Syrian Arab Republic*

*No. 5.330 Angola, Bahrain, Bangladesh, Cameroon, Chad, China, Djibouti, Egypt, Eritrea, Ethiopia, Guyana, India, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Japan, Jordan, Kuwait, Nepal, Oman, Pakistan, the Philippines, Qatar, Saudi Arabia, Somalia, Sudan, South Sudan, the Syrian Arab Republic, Togo, the United Arab Emirates and Yemen*

*No. 5.355 Bahrain, Bangladesh, Congo (Rep of the), Djibouti, Egypt, Eritrea, Iraq, Israel, Kuwait, Qatar, Syrian Arab Republic, Somalia, Sudan, South Sudan, Chad, Togo and Yemen*

*No. 5.352A Algeria, Saudi Arabia, Egypt, Guinea, India, Israel, Italy, Jordan, Kuwait, Mali, Morocco, Mauritania, Nigeria, Oman, Pakistan, the Philippines, Qatar, Syrian Arab Republic, Viet Nam and Yemen*

*No. 5.359 Germany, Saudi Arabia, Armenia, , Azerbaijan, Belarus, Cameroon, the Russian Federation, Georgia, Guinea, Guinea-Bissau, Jordan, Kazakhstan, Kuwait, Lithuania, Mauritania, Uganda, Uzbekistan, Pakistan, Poland, the Syrian Arab Republic, Kyrgyzstan, the Dem. People's Rep. of Korea, Romania, Tajikistan, Tunisia, Turkmenistan and Ukraine*

*No. 5.439 Iran (Islamic Republic of)*

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**WRC-19 Agenda Item 9.1**

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**Agenda Item Title:**

**To consider and approve the report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention:**

**On the activities of the Radiocommunication Sector since WRC-19.**

*Note.— The subdivision of Agenda Item 9.1 into topics, such as a), b), etc. was made at the first session of the Conference Preparatory Meeting for WRC-23 (CPM23-1) and is summarized in the BR Administrative Circular CA/251, 19th December 2019. In addition, a topic d) was added which was not part of Resolution 811 (WRC-19) (the WRC-23 agenda), however was agreed by WRC-19 (see WRC-19 document 573 §§ 35.2 to 35.4).*

## Topic 9.1 (b):

**Review of the amateur service and the amateur-satellite service allocations in the frequency band 1 240-1 300 MHz to determine if additional measures are required to ensure protection of the radionavigation-satellite (space-to-Earth) service operating in the same band in accordance with Resolution 774 (WRC-19).**

The amateur service has a secondary allocation in the frequency band 1 240-1 300 MHz (known as the “23 cm band” by the amateur community) and is currently used for amateur voice, data and image transmission. The frequency band is also allocated on a primary basis to the following services:

- Table Allocation
  - Earth exploration-satellite (active)
  - Radiolocation
  - Radionavigation Satellite (space-to-Earth) (space-to-space)
  - Space research(active)
- Footnote Allocation within various Countries
  - 5.330 Fixed
  - 5.330 Mobile
  - 5.331 Radionavigation

In the frequency band 1 240-1 300 MHz radionavigation satellite service (RNSS) systems such as GLONASS, Galileo, Beidou & QZSS are either operational, or becoming operational in various parts of the world with the expectation of enhancing the accuracy, reliability and positional accuracy of the current systems as well as offering additional features. However, there have been confirmed reports of harmful interference to the RNSS being caused by amateur service systems. This agenda item seeks to identify additional technical and operational measures that could be implemented to improve the protection of those RNSS from amateur and amateur-satellite systems operating under the secondary allocations to the amateur and amateur-satellite service without removing those amateur allocations.

Within the frequency band 1 240-1 300 MHz aviation currently operates primary surveillance radars used in the provision of air traffic control services. Past research has indicated that RNSS systems such as those indicated above can cause harmful interference to radars. The concern is that action taken under this agenda item could adversely affect the provision of those primary radar services with a consequential impact on air traffic control.

**ICAO Position:**

To ensure that ITU-R studies under Resolution **774 (WRC-19)** address whether potential mitigation measures will impact the protection of aeronautical radar systems operating under the existing aeronautical radionavigation or radiolocation service allocations.

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**WRC-19 Agenda Item 9.2**

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**Agenda Item Title:**

**To consider and approve the report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention:**

**on any difficulties or inconsistencies encountered in the application of the Radio Regulations.**

The relevant ITU-R working parties are invited to carry out the requested studies, indicated below, and to report the results of the studies to the Director of the Radiocommunication Bureau to be considered as the Director deems appropriate.

From Resolution 427 (WRC-19) “Updating provisions related to aeronautical services in the Radio Regulations – resolves to invite ITU-R States “to study the Articles, limited to Chapters IV, V, VI and VIII of Volume I of the Radio Regulations and their associated Appendices, as appropriate, in order to identify outdated aeronautical provisions with respect to ICAO Standards and Recommended Practices and to develop examples of regulatory texts for updating these provisions, while ensuring that potential changes to such provisions will not impact any other systems or services operating in accordance with the Radio Regulations”. (Responsible Group: WP 5B).

**ICAO Position:**

Participate in ITU-R studies to ensure any proposed changes to the Radio Regulations recommended in the Director’s Report to the WRC do not impact current or planned aeronautical systems or applications.
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## ATTACHMENT\*

### Agenda for the 2023 world radiocommunication conference

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

*considering*

- a) that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for a world radiocommunication conference (WRC) should be established four to six years in advance and that a final agenda shall be established by the ITU Council two years before the conference;
- b) Article 13 of the ITU Constitution relating to the competence and scheduling of WRCs and Article 7 of the Convention relating to their agendas;
- c) the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and WRCs,

*recognizing*

- a) that this conference has identified a number of urgent issues requiring further examination by WRC-23;
- b) that, in preparing this agenda, some items proposed by administrations could not be included and have had to be deferred to future conference agendas,

*resolves*

to recommend to the Council that a WRC be held in 2023 for a maximum period of four weeks, with the following agenda:

1 on the basis of proposals from administrations, taking account of the results of WRC-19 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the frequency bands under consideration, to consider and take appropriate action in respect of the following items:

1.1 to consider, based on the results of ITU-R studies, possible measures to address, in the frequency band 4 800-4 990 MHz, protection of stations of the aeronautical and maritime mobile services located in international airspace and waters from other stations located within national territories, and to review the power flux-density criteria in No. **5.441B** in accordance with Resolution **223 (Rev.WRC-19)**;

1.2 to consider identification of the frequency bands 3 300-3 400 MHz, 3 600-3 800 MHz, 6 425-7 025 MHz, 7 025-7 125 MHz and 10.0-10.5 GHz for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution **245 (WRC-19)**;

1.3 to consider primary allocation of the frequency band 3 600-3 800 MHz to the mobile service in Region 1 and take appropriate regulatory actions, in accordance with Resolution **246 (WRC-19)**;

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\*The text of the resolution included in this Annex has been copied from the ITU Radio Regulations, Edition of 2020, Volume III.

1.4 to consider, in accordance with Resolution **247 (WRC-19)**, the use of high-altitude platform stations as IMT base stations (HIBS) in the mobile service in certain frequency bands below 2.7 GHz already identified for IMT, on a global or regional level;

1.5 to review the spectrum use and spectrum needs of existing services in the frequency band 470- 960 MHz in Region 1 and consider possible regulatory actions in the frequency band 470-694 MHz in Region 1 on the basis of the review, in accordance with Resolution **235 (WRC-15)**;

1.6 to consider, in accordance with Resolution **772 (WRC-19)**, regulatory provisions to facilitate radiocommunications for sub-orbital vehicles;

1.7 to consider a new aeronautical mobile-satellite (R) service allocation in accordance with Resolution **428 (WRC-19)** for both the Earth-to-space and space-to-Earth directions of aeronautical VHF communications in all or part of the frequency band 117.975-137 MHz, while preventing any undue constraints on existing VHF systems operating in the aeronautical mobile (R) service, in the aeronautical radionavigation service, and in adjacent frequency bands;

1.8 to consider, on the basis of ITU-R studies in accordance with Resolution **171 (WRC-19)**, appropriate regulatory actions, with a view to reviewing and, if necessary, revising Resolution **155 (Rev.WRC-19)** and No. **5.484B** to accommodate the use of fixed-satellite service networks by control and non-payload communications of unmanned aircraft systems;

1.9 to review Appendix **27** of the Radio Regulations and consider appropriate regulatory actions and updates based on ITU-R studies, in order to accommodate digital technologies for commercial aviation safety-of-life applications in existing HF bands allocated to the aeronautical mobile (R) service and ensure coexistence of current HF systems alongside modernized HF systems, in accordance with Resolution **429 (WRC-19)**;

1.10 to conduct studies on spectrum needs, coexistence with radiocommunication services and regulatory measures for possible new allocations for the aeronautical mobile service for the use of non-safety aeronautical mobile applications, in accordance with Resolution **430 (WRC-19)**;

1.11 to consider possible regulatory actions to support the modernization of the Global Maritime Distress and Safety System (GMDSS) and the implementation of e-navigation, in accordance with Resolution **361 (Rev.WRC-19)**;

1.12 to conduct, and complete in time for WRC-23, studies for a possible new secondary allocation to the Earth exploration-satellite service (active) for spaceborne radar sounders within the range of frequencies around 45 MHz, taking into account the protection of incumbent services, including in adjacent bands, in accordance with Resolution **656 (Rev.WRC-19)**;

1.13 to consider a possible upgrade of the allocation of the frequency band 14.8-15.35 GHz to the space research service, in accordance with Resolution **661 (WRC-19)**;

1.14 to review and consider possible adjustments of the existing frequency allocations or possible new primary frequency allocations to the Earth exploration-satellite service (passive) in the frequency range 231.5-252 GHz, to ensure alignment with more up-to-date remote-sensing observation requirements, in accordance with Resolution **662 (WRC-19)**;



1.15 to harmonize the use of the frequency band 12.75-13.25 GHz (Earth-to-space) by earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service globally, in accordance with Resolution **172 (WRC-19)**;

1.16 to study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by non-geostationary fixed-satellite service earth stations in motion, while ensuring due protection of existing services in those frequency bands, in accordance with Resolution **173 (WRC-19)**;

1.17 to determine and carry out, on the basis of ITU-R studies in accordance with Resolution **773 (WRC-19)**, the appropriate regulatory actions for the provision of inter-satellite links in specific frequency bands, or portions thereof, by adding an inter-satellite service allocation where appropriate;

1.18 to consider studies relating to spectrum needs and potential new allocations to the mobile-satellite service for future development of narrowband mobile-satellite systems, in accordance with Resolution **248 (WRC-19)**;

1.19 to consider a new primary allocation to the fixed-satellite service in the space-to-Earth direction in the frequency band 17.3-17.7 GHz in Region 2, while protecting existing primary services in the band, in accordance with Resolution **174 (WRC-19)**;

2 to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations communicated by the Radiocommunication Assembly, in accordance with *further resolves* of Resolution **27 (Rev.WRC-19)**, and to decide whether or not to update the corresponding references in the Radio Regulations, in accordance with the principles contained in *resolves* of that Resolution;

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-19)**, 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 ITU 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, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, on 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 the rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit;

8 to consider and take appropriate action on requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, taking into account Resolution **26 (Rev.WRC-19)**;

9 to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the ITU Convention;

9.1 on the activities of the ITU Radiocommunication Sector since WRC-19:

- In accordance with Resolution **657 (Rev.WRC-19)**, review the results of studies relating to the technical and operational characteristics, spectrum requirements and appropriate radio service designations for space weather sensors with a view to describing appropriate recognition and protection in the Radio Regulations without placing additional constraints on incumbent services;
- Review the amateur service and the amateur-satellite service allocations in the frequency band 1 240-1 300 MHz to determine if additional measures are required to ensure protection of the radionavigation-satellite service (space-to-Earth) operating in the same band in accordance with Resolution **774 (WRC-19)**;
- Study the use of International Mobile Telecommunication systems for fixed wireless broadband in the frequency bands allocated to the fixed service on a primary basis, in accordance with Resolution **175 (WRC-19)**;

9.2 on any difficulties or inconsistencies encountered in the application of the Radio Regulations;<sup>1</sup> and

9.3 on action in response to Resolution **80 (Rev.WRC-07)**;

10 to recommend to the ITU Council items for inclusion in the agenda for the next world radiocommunication conference, and items for the preliminary agenda of future conferences, in accordance with Article 7 of the ITU Convention and Resolution **804 (Rev.WRC-19)**,

*invites the ITU Council*

to finalize the agenda and arrange for the convening of WRC-23, and to initiate as soon as possible the necessary consultations with Member States,

*instructs the Director of the Radiocommunication Bureau*

1 to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting (CPM) and to prepare a report to WRC-23;

2 to submit a draft report on any difficulties or inconsistencies encountered in the application of the Radio Regulations referred in agenda item 9.2 to the second session of the CPM and to submit the final report at least five months before the next WRC,

*instructs the Secretary-General*

to communicate this Resolution to international and regional organizations concerned.

— END —

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<sup>1</sup> This agenda sub-item is strictly limited to the Report of the Director on any difficulties or inconsistencies encountered in the application of the Radio Regulations and the comments from administrations. Administrations are invited to inform the Director of the Radiocommunication Bureau of any difficulties or inconsistencies encountered in the Radio Regulations.