



**Agenda Item 2:           Air Navigation Services**  
**2.1       Air Navigation Matters**

**RESULTS OF THE ITU WORLD RADIOCOMMUNICATION CONFERENCE (2007) (WRC-  
2007) AND INITIAL POSITION OF ICAO FOR WRC-2011**

(Presented by the Secretariat)

SUMMARY	
This working paper presents the results of the World Radiocommunication Conference (2007) (WRC-2007) and the initial position of ICAO for the next ITU scheduled for 2011.	
<b>References:</b> <ul style="list-style-type: none"><li>• Reports of the twelfth and thirteenth GREPECAS meetings;</li><li>• Council - Session 184 - C-WP/13183; and</li><li>• Meeting of Working Group F of the ACP Communications Panel (Montreal 18-22 May 2008).</li></ul>	
<b>Strategic Objectives:</b>	<i>This working paper is related to Strategic Objectives A and D.</i>

**1.           Introduction**

1.1           The availability of the necessary radio frequency spectrum continues to be a prerequisite for civil aviation safety and for the effective implementation of communication, navigation and surveillance/air traffic management (CNS/ATM) systems. However, given the constant growth of spectrum demand by non-aviation users, aviation is facing rising competition for the limited spectrum available, in particular from commercial telecommunications services. Therefore, it is essential for all ICAO Contracting States to fully support aeronautical radio frequency spectrum requirements in all international forums where the issue of radio spectrum allotments is discussed, in order to ensure that all vital aviation safety service requirements are duly presented and understood.

1.2 In this regard, Assembly Resolution A36-25 addressed ICAO policies and practices concerning radio frequency spectrum issues. The position of ICAO for WRC-2007, ref. State Circular E 3/5-05/85, dated 12 August 2005, was developed in 2003/2004 by the Aeronautical Communications Panel (ACP), reviewed by the Air Navigation Commission (167-1 and 167-2), submitted for consideration by ICAO Contracting States and international organizations, and approved by the Council (175/14) on 14 June 2005. The WRC-07 position was approved by the Council (181/4) on 28 May 2007. The updated position was circulated to the States through Letter E 3/5-07/49, dated 22 June 2007, and delivered to the ITU WRC-07 on 13 June 2007.

1.3 States/Territories/International Organizations expressed their support for the ICAO Position through actions reflected in Conclusions from Meetings of Directors such as NACC/DCA Conclusion 2/13 – *Support of States in the NAM/CAR Regions to ICAO's Position for the ITU WRC-2007*, as well as GREPECAS Conclusions 12/33 – *CAR/SAM Regional action for the preparation and support of the position of ICAO for WRC-07*, and 13/89 – *Support of CAR/SAM States to the ICAO position for the ITU WRC-2007*.

1.4 ITU WRC-2007 was held from 22 October to 16 November in Geneva, Switzerland. There were 2,800 delegates from 164 ITU Member States and 104 international organizations attending and participating in the work of the conference.

1.5 Three aviation coordination meetings were organized during the conference by the ICAO delegation and attended by approximately 60 aviation experts. The meetings addressed all of the issues connected with aviation, particularly those relating to specific proposals that were put forward during the conference. During these meetings, support for the ICAO position was coordinated bilaterally with individuals from aeronautical administrations, taking into account matters discussed at the conference.

## **2. Analysis**

### **Results of the WRC-2007 regarding agenda items related to international civil aviation**

2.1 **Appendix A** to this working paper summarizes the most important results for international civil aviation of WRC-07.

2.2 In general, the results of the conference were consistent with the ICAO position. In preparation for this conference, a significant element of ICAO activities was the early awareness and participation of Contracting States in the development of the ICAO position. The key factors of this accomplishment included:

- a) early development and dissemination of the ICAO preliminary position by the Secretariat and the Air Navigation Commission, assisted by the ACP and the Navigation Systems Panel (NSP);
- b) active participation by ICAO experts in preparations for the ITU;

- c) increased participation of ICAO experts in meetings of regional telecommunication organizations (APT, CEPT, CITEL, and ATU). The participation of Regional Offices with the help of Headquarters, when needed, was important in supporting the development of proposals by regional telecommunication organizations for the conference, which were aligned with the ICAO position;
- d) organization of meetings of ACP working groups and ICAO radio frequency seminars in the Regions;
- e) implementation of Assembly Resolution A32-13; and
- f) active participation in the conference itself by the ICAO delegation.

2.3 The detailed results of the conference regarding agenda items connected with aviation and a brief review of the results of the conference are found in tabular form in **Appendix B** to this working paper.

***Preliminary position of ICAO for ITU WRC 2011***

2.4 Working Group F of the Aeronautical Communications Panel met in Montreal on 12-22 May 2008, and developed the ICAO initial position for the next WRC meeting to be held in 2011 (WRC/11). **Appendix C** to this working paper shows the ICAO initial position for WRC 2011.

2.5 The next meeting of ACP Working Group F will take place in September 2008 to review the ICAO position at WRC11. Once reviewed, the preliminary position will be submitted to the Air Navigation Commission in November 2008. At the end of 2008, the ICAO preliminary position will be circulated to States for comments. The ICAO position before the ITU is expected to be completed and circulated to ICAO Contracting States, International Organizations and the ICAO Secretariat by mid 2009.

2.6 CAR/SAM States and International Organizations, with a view to the preparation of and support for the position of ICAO for ITU WRC-11, should support and follow-up on the preparation and updating of the ICAO position for WRC-11. They should also appoint, as they did in preparation for WRC-07, a focal point or person to serve as a liaison with ICAO and with the national radio frequency spectrum management authority to coordinate matters concerning WRC-11. Focal points should, in addition, continue to participate actively in the Organization of American States (OAS) CITEL meetings in preparation for WRC-11, as well as in any meetings or seminars convened by ICAO to explain and analyze the position of this organization for WRC-11, and participate actively in WRC-11 in support of the ICAO position.

2.7 Follow-up and active participation by States and International Organizations, from the review stage of the initial position for WRC-11 up until their participation in WRC-11, will make it possible to secure approval for the ICAO position. Accordingly, the meeting is requested to adopt the following draft conclusion:

**DRAFT****CONCLUSION 3/X****STATE SUPPORT OF ICAO POSITION FOR THE ITU WRC-11**

That NAM/CAR States, Territories and International Organizations, with a view to preparing and supporting the ICAO position for the ITU World Radiocommunication Conference – 2011 (WRC-11):

- a) support and follow up on the work of ICAO to prepare and update its position for WRC-11;
- b) appoint a focal point or a person to serve as liaison with ICAO and with the national radio frequency spectrum management authority to coordinate matters concerning WRC-11;
- c) participate actively in the Organization of American States (OAS) CITEL meetings in preparation for WRC-11;
- d) participate actively in any meetings and seminars convened by ICAO to explain and analyze the position of this organization for WRC-11;
- e) participate actively in WRC-11 in support of the ICAO position; and
- f) recommend and implement other appropriate measures

**3. Suggested action****3.1 The Meeting is invited to:**

- a) take note of the information contained in this working paper;
- b) review and recommend the results of WRC-2007 described in paragraphs 2.1 to 2.3 and in Appendices A and B;
- c) review and recommend regional action for the preparation and support of the ICAO position for WRC-11 described in paragraphs 2.4 to 2.7, bearing in mind the background information and the considerations set forth in this paper, including the adoption of the Draft Conclusion contained in paragraph 2.7; and
- d) propose any other action that may be deemed appropriate.

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## APPENDIX A

### SUMMARY OF THE MOST IMPORTANT RESULTS FOR INTERNATIONAL CIVIL AVIATION OF WRC-07

1. Protection of global navigation satellite system (GNSS) signals in the 1 559-1 610 MHz band (global positioning system [GPS], global navigation satellite system [GLONASS]) was enhanced by giving secondary status to the fixed service (FS) operating in this band in thirty-four countries. As a result, FS operation in those countries must protect the GNSS. Up until late 2009, this band will be assigned mainly in nine African and Middle Eastern countries. Although use of this band by FS must necessarily conclude no later than 2015, the GNSS service operating in this band will be protected globally until 2009. Furthermore, the elimination of aeronautical radio navigation service assignments in Sweden (used for radar systems) further enhanced GNSS protection in Europe.
2. The conference agreed to give primary status to the radiolocation service (RLS), giving the same primary assignment status to the earth exploration satellite service (EESS) (active) and the space research service (SRS) (active) in the 9 GHz bands. After an intense discussion, the conference agreed to give the aeronautical radio navigation service operating in these bands (ground-based radars and aircraft weather radars) the necessary regulatory protection, in keeping with the ICAO position.
3. It was agreed that assignments for the aeronautical mobile (route) service (AM(R)S) would be made in the 112-117.975 MHz, 960-1 164 MHz, and 5 091-5 150 MHz bands. This complies with the ICAO position, which was based on the bandwidth requirements identified in the Future Communications Study conducted by the Aeronautical Communications Panel, with the exception of the 5 GHz band, which might need more bandwidth. The new AM(R)S assignments are in bands that have also been assigned to the aeronautical radio navigation service (ARNS) and are used (or are planned to be used) by the VOR, DME, SSR, UAT, and MLS. Assignments are subject to not causing harmful interference and not being entitled to protection by stations operating in the ARNS. Assignments are limited to airport surface operations and are shared with assignments for aeronautical mobile telemetry (AMT) and with aeronautical safety (AS) transmissions. AS is an application that provides a broad aircraft-to-ground bandwidth link, like for instance a video transmission, in case of unlawful intervention.
4. In order to meet aeronautical mobile telemetry (AMT) requirements for flight tests, the conference agreed to have a global assignment in the 5 091-5 150 MHz band (MLS extension band). A number of band frequencies in the 4 and 6 GHz range that are not being currently used for aeronautical safety purposes, as well as the 5 091-5 150 band, were also assigned to AMT on a regional or subregional basis.
5. The conference agreed to eliminate the provision that gave MLS precedence over any other use in the 5 091-5 150 MHz band (MLS extension band). The deadline for new fixed satellite service (FSS) assignments in the MLS extension band was extended from 2012 to 2016.
6. It is acknowledged that VSAT networks operating in the fixed satellite service can be used for aeronautical safety applications. WRC 07 formulated a recommendation to this effect.

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**APPENDIX B / APENDICE B**

**RESULTADOS DE LA CONFERENCIA EN LOS ITEMS DE AGENDA RELACIONADOS CON  
LA AVIACION CIVIL INTERNACIONAL**

**RESULTS OF THE CONFERENCE ON THE AGENDA ITEMS RELATED TO  
INTERNATIONAL CIVIL AVIATION**

**1. Agenda Item 1.1: Requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, in accordance with Resolution 26 (Rev. WRC-97)**

1.1 Under this agenda item, the ICAO Position supported the deletion of footnotes Nos. **5.181**, **5.197** and **5.259**. These footnotes were introduced in about twenty countries in 1987 in view of the global transition from ILS to MLS, which, at that time, was expected to be completed by 1998. They were intended to enable the introduction of the mobile service in the ILS bands as and when these would no longer be required for ILS. However, it has now become apparent that ILS will continue to be used by aviation for the foreseeable future, and therefore the existence of these footnotes is no longer justified. Most administrations have removed their name from these footnotes prior to this conference; however, the following Administrations are still listed in these footnotes:

- 5.181 Egypt, Israel and the Syrian Arab Republic (ILS-marker beacon).
- 5.197 Pakistan and the Syrian Arab Republic. (ILS-localizer)
- 5.259 Egypt, Israel and the Syrian Arab Republic (ILS-glide path)

Further efforts by ICAO are required to convince all the countries still listed to remove their name and allow for suppression of the footnotes, since they do not represent a realistic expectation for an introduction of the mobile service in these bands and the use of this allocation may cause harmful interference to ILS/VOR/GBAS.

1.2 Through Nos. **5.203**, **5.203A** and **5.203B** the band 136-137 MHz was allocated in some countries to the fixed and mobile, except aeronautical mobile services, on a secondary basis until 1 January 2005. In addition, this band was also allocated to the meteorological satellite service until 1 January 2002 (No. **5.203** refers). The conference reviewed these provisions and agreed to their suppression for safety and efficiency reasons. The conference also deleted No. 5.198, through which the band 117.975-136 MHz was allocated to the aeronautical mobile satellite (R) service, as per ICAO policy statement (Re. the ICAO *Handbook on radio frequency spectrum requirements for civil aviation, including statement of approved ICAO policies* (Doc. 9718)). Furthermore, the conference removed No. 5.199 which was allocating the aeronautical emergency frequency 121.56 MHz to the mobile satellite service for the reception of emergency position radio beacons (emergency locator transmitters). This will not affect the current use of this frequency in the COSPAS/SARSAT system which is committed to receive and process signals on this frequency until at least 2009.

1.3 The ICAO Position also supported the deletion of footnotes **5.362B**, **5.362C** and **5.363**, which allocate the GNSS band 1 559-1 610 MHz to the (terrestrial) fixed service in certain countries. The use by the fixed service constitutes a severe and unacceptable constraint on the safe and effective use of GNSS in some areas of the world, as coordination distances of up to 400 km between the stations of the fixed service and the aircraft would be required.

1.3.1 The conference agreed to a modification of No. **5.362B** such that the band 1 559-1 610 MHz is now allocated to the fixed service on a primary basis until 1 January 2010 in Algeria, Cameroon, Jordan, Libyan Arab Jamahiriya, Mali, Mauritania, Saudi Arabia, Syrian Arab Republic and Tunisia.

1.3.2 In Footnotes **5.362B** and **5.362C** there is a provision for a secondary allocation to the fixed service in the band 1 559-1 610 MHz. A large number of countries in Africa, Europe and parts of Asia are still listed under this provision. After 1 January 2015, this provision will no longer be valid.

1.3.3 In this band the radionavigation satellite service (RNSS) is operating (GNSS, GPS and GLONASS). Interference-free operation of GNSS would require coordination with the radio regulators and/or operators in the fixed service to ensure that operation of the fixed stations in the band 1 559-1 610 MHz ceases in areas where it can cause interference to GNSS. The secondary status of the fixed service until 1 January 2015 would require the fixed service to not cause harmful interference to, nor claim protection from, GNSS, and would give GNSS priority over the fixed service. After 2015, the frequency band 1 559-1 610 MHz will be available on an exclusive basis for GNSS.

1.3.4 The conference agreed to delete No. **5.363**, which authorized Sweden to use the band 1 590-1 626.5 MHz for the aeronautical radionavigation service (radar stations). This measure improves the protection of GNSS signals in Europe.

1.4 The band 4 200-4 400 MHz is reserved for use by airborne radio altimeters, No. **5.439** allows the operation of the fixed service in this band on a secondary basis. Radio altimeters are a critical element in aircraft automatic landing systems and serve as a sensor in ground proximity warning systems. The ICAO Position asked for deletion of this footnote. Two countries, Iran (Islamic Republic of), and the Libyan Arab Jamahiriya remain in this footnote.

2. **Agenda Item 1.3: In accordance with Resolution 747 (WRC 03) consider the upgrading of the radiolocation service to primary allocation status in the bands 9000-9200 MHz and 9300-9500 MHz and extending by up to 200MHz the existing primary allocations to the Earth exploration-satellite service (active) and the space research service (active) in the band 9500-98800 MHz without placing undue constraints to the services to which the bands are allocated**

2.1 The ICAO Position on this agenda item was to support the primary allocations proposed for the radiolocation service (RLS), in the bands 9 000-9 200 MHz and 9 300-9 500 MHz and the Earth exploration satellite service (EESS) (active) and the space research service (SRS) (active) in the band 9 300-9 500 MHz, provided that adequate protection be given to the aeronautical radionavigation services (ARNS) operating in these bands. These bands are used by the (aeronautical) radionavigation service for ground based radar systems and airborne weather radar.

2.2 During the preparatory work in ITU-R, it was demonstrated that the proposed primary allocations to the RLS, EESS and SRS would not cause harmful interference to the ARNS. However, due to certain limitations in these studies, ICAO requested that a regulatory provision be introduced in the Radio Regulations securing protection to the ARNS from the RLS. After a long and difficult debate, the conference agreed to a provision which gives protection to the aeronautical radar systems. This was satisfactory for aviation.

3. **Agenda Item 1.4: To consider frequency related matters for the future development of IMT-2000 and systems beyond IMT-2000 taking into account the results of ITU-R studies in accordance with Resolution 228 (Rev. WRC-03)**

3.1 Proponents of IMT-2000 are seeking additional allocations for the future development of mobile communications and are especially looking at bands below 3 GHz.

3.2 In general, ICAO does not support the shared use of spectrum between aeronautical safety services (ARNS, AM(R)S and AMS(R)S) and other (non aeronautical) services, without relevant studies having been completed (either in ITU or in ICAO) that support shared use. All frequency bands used for aeronautical safety services are already heavily loaded or have already been forecast for full utilization and do not allow for sharing with non-aeronautical mobile services.

3.3 Under this agenda item, the conference did briefly consider the band 2 700-2 900 MHz, which is used for primary (medium range) radar systems, for IMT-2000 systems. This proposal was not agreed to. The overall result satisfies the ICAO Position.

4. **Agenda Item 1.5: To consider spectrum requirements and possible additional spectrum allocations for aeronautical telecommand and high-bit rate aeronautical telemetry, in accordance with Resolution 230 (WRC-03)**

4.1 The ICAO Position under this agenda item was as follows:

- a) To support the allocation of suitable spectrum for non-safety related aeronautical telemetry and associated telecommand systems and applications, in the bands between 3-30 GHz. These allocations, to be made to the mobile or aeronautical mobile service, should, in principle, not be made in bands currently allocated to the aeronautical mobile (R) service (AM(R)S), the aeronautical radionavigation service (ARNS) or their satellite equivalents. If allocations are made to such bands, and in particular in the frequency band 5 091-5 150 MHz, regulatory priority shall be given to these aeronautical safety services.
- b) No change to the current allocation in the band 5 030-5 091 MHz since this band is required to satisfy the requirements of the aeronautical radionavigation service (MLS).
- c) To support the continued use and protection of frequency bands currently allocated and used for aeronautical telemetry applications.

4.2 A proposal for an allocation for aeronautical mobile telemetry (AMT) in the MLS core band (5 030-5 091 MHz) was introduced. This proposal was strongly opposed by ICAO. Most regional telecommunication organizations supported ICAO and eventually it was withdrawn.

4.3 A global allocation was agreed by the conference for aeronautical mobile telemetry (AMT) in the MLS extension band (5 091-5 150 MHz). Of concern to aviation is the fact that the WRC did not recognize the required protection level for MLS as established by ICAO. Also of concern is the fact that No. 5.444, which ensured precedence of MLS in this band has now been limited to the MLS core band (5 030-5 091 MHz). [(see also [5.1.3.1] below)].



4.4 A number of frequency bands in the 4 to 6 GHz range, which are currently not used for aeronautical safety purposes, were allocated by the WRC for AMT on a regional and sub-regional basis. In general, the new allocation for AMT satisfy the needs for spectrum for flight testing.

**5. Agenda Item 1.6: To consider allocations for the aeronautical mobile (R) service in parts of the bands between 108 MHz to 6 GHz, in accordance with Resolution 414 (WRC-03) and to study current satellite frequency allocations that will support the modernization of civil aviation telecommunication systems, taking into account Resolution 415 (WRC-03)**

**5.1 Allocations for the aeronautical mobile (route) service (AM(R)S)**

5.1.1 **112-117.975 MHz.** The ICAO Position indicates that this band should become available for air-ground communications (voice and data), in particular to extend the current usage of the band 117.975-137 MHz in congested areas (e.g. Europe).

5.1.1.1 The conference agreed to modify the (restricted to the transmission of navigational information) allocation to the AM(R)S which would now allow the introduction of air-ground communication links. This is in line with the ICAO Position. The conditions, under which the ICAO GBAS system operates in the 108-112 MHz band remain unchanged. However, in order to avoid compatibility problems with FM broadcasting, airborne transmissions in the band 108-112 MHz are no longer permitted. As a consequence, an amendment to one recommendation contained in the VDL Mode 4 SARP will be required, but this will not impact any operational aspects of VDL Mode 4. The ITU-R is invited to study any compatibility issues that may arise between the new AM(R)S allocation and the FM broadcasting services in the 87-108 MHz band.

5.1.2 **960-1 164 MHz.** ICAO studies have identified the need for up to 60 MHz of usable bandwidth for the AM(R)S service in this band.

5.1.2.1 An allocation to the AM(R)S in the band 960-1 164 MHz was agreed to by the conference. This allocation is conditional to studies being successfully completed within the ITU-R to resolve potential compatibility issues with non-ICAO standardized ARNS systems which also operate in this band. An exception to this is the universal access transceiver (UAT) system, an ICAO standardized system for ADS-B, which can be used immediately within this allocation. All known compatibility issues between existing systems operating in this band have already been addressed in ICAO.

5.1.3 **5 000-5 150 MHz.** ICAO studies have identified that 60-100 MHz will be needed in this band for airport surface applications.

5.1.3.1 An allocation to the AM(R)S in the band 5 091-5 150 MHz (MLS extension band), limited to airport surface operations was agreed. This is a shared allocation with the aeronautical radionavigation service (MLS), fixed satellite service (FSS), AMT (see Agenda Item 1.5 above) and an Aeronautical Security (AS) application intended for the provision *radiocommunication used in response to unlawful interruption of aircraft operations*. AS, an application introduced and supported by EUROCONTROL, is intended to provide a wide-band link from an aircraft to the ground, i.e. a video feed, in case of an unlawful intervention. The precedence that was given to MLS in this band over other uses has been removed (see also [4.3] above). For the use of the band by the AM(R)S, AMT and AS, provisions to protect the fixed satellite service (FSS) (feederlink), which operates in the same band, were introduced.

5.1.3.2 A sunset date for assignments for the fixed satellite service (FSS) in the MLS extension band was extended from 2012 to 2016 (a date after which no new assignments should be made to the FSS service). ICAO supported this extension, in the light of the removed precedence for the MLS over other users in this band. A review of the allocation to the FSS in this band is now scheduled for WRC-2015, in particular with regard to the “sunset date”. The date-limitations to the FSS were introduced in 1995 to protect the use of the band 5 091-5 150 MHz for MLS. However, ICAO has recently determined that not all of this band may be required for MLS. As a result of removing the precedence to the MLS in this band, the limitations to the FSS may be removed at a future conference (i.e. the allocation to the FSS may become permanent). This extension provides for stable sharing conditions with the MLS and AM(R)S in the band.

5.1.3.3 The band 5 091-5 150 MHz will not provide sufficient spectrum capacity to satisfy the requirement identified above, and therefore additional spectrum was identified in the ICAO Position for an allocation to the AM(R)S in the band 5 000-5 030 MHz. An allocation, initially supported by a large number of administrations was eventually not agreed to, because of the absence of compatibility studies with regard to the radionavigation-satellite service (RNSS). It was agreed however to study these compatibility issues within the ITU-R, in time for review at WRC-11, with a possible new allocation for the AM(R)S in mind.

5.2 VSAT networks operate under an allocation to the fixed satellite service (FSS) which in the ITU is not recognized as a safety service. A recommendation on the *Use by civil aviation of frequency allocations on a primary basis to the fixed-satellite service* was developed by the conference. In this recommendation it is recognized that VSAT networks operating in the fixed satellite service can also be used for aeronautical safety applications, especially in remote and rural areas which often lack a terrestrial communication infrastructure that meets the evolving requirements of modern civil aviation. Administrations, particularly in developing countries, are urged to recognize the importance of VSAT operations to the modernization of civil aviation telecommunications systems and to encourage the implementation of VSAT systems to support aeronautical communication requirements. Administrations in developing countries are encouraged, to the maximum extent possible, to expedite the authorization process to enable aeronautical communications using VSAT technology. ICAO is invited to continue its assistance to developing countries to improve their aeronautical telecommunications, including interoperability of VSAT networks, and provide guidance to developing countries on how they could best make use of VSAT technology for this purpose. The approval of this recommendation satisfies the ICAO position and was achieved through close and successful cooperation between ICAO and the African administrations.

**6. Agenda Item 1.13: Taking into account Resolutions 729 (WRC-97), 351 (WRC-03) and 544 (WRC-03) to review the allocations to all services in the HF bands between 4 and 10 MHz, excluding those allocations to services in the frequency range 7 000-7 200 kHz and those bands whose allotment plans are in Appendices 25, 26 and 27 and whose channeling arrangements are in Appendix 17, taking into account the impact of new modulation techniques, adaptive control techniques and spectrum requirements for HF broadcasting**

6.1 The ICAO Position for this agenda item was to ensure that new allocations and techniques considered for introduction in the bands between 4 and 10 MHz will not cause harmful interference in the aeronautical HF bands.

6.2 Under this agenda item, the conference developed criteria for the use of frequency adaptive systems and digital modulation techniques for broadcast services, while ensuring that no harmful interference would be caused by existing maritime and aeronautical mobile services. A future agenda item concerning the use of digital modulation techniques in the maritime mobile service was developed.

7. **Agenda Item 1.16: To consider the regulatory and operational provisions for maritime mobile service identities (MMSIs) for equipment other than shipborne mobile equipment, taking into account Resolutions 344 (Rev. WRC-03) and 353 (WRC-03)**

7.1 MMSIs are unique identifiers for individual stations and provide a rapid method of identification. Several ITU-R recommendations cover the assignment and use of these MMSIs for ship and land stations. A need had been identified to assign MMSIs for automatic identification systems (AIS) on search and rescue (SAR) aircraft in order to communicate efficiently in the maritime mobile service, when engaged in SAR operations. Modifications were made to Article 19 of the Radio Regulations, making it possible to allocate MMSIs to SAR aircraft. This satisfies the ICAO Position on this agenda item.

8. **Agenda Item 1.17: To consider the results of ITU-R studies on compatibility between the fixed-satellite service and other services around 1.4 GHz, in accordance with Resolution 745 (WRC-03)**

8.1 Under this agenda item, the conference suppressed two secondary allocations to the fixed satellite service. No new allocations were considered. This satisfies the ICAO Position.

9. **Agenda Item 1.20: To consider the results of studies and proposals for regulatory measures, if appropriate, regarding the Earth exploration-satellite service (passive) from unwanted emissions of active services in accordance with Resolution 738 (WRC-03)**

9.1 Under this agenda item, the conference reviewed the results of studies and proposals for regulatory measures regarding the protection of the Earth exploration-satellite service (EESS) receiving in the band 1 400-1 427 MHz from unwanted emissions of active services transmitting in adjacent frequency bands. Studies in the ITU-R have shown that primary radar systems currently operating in the band 1 215-1 400 MHz and conforming to relevant ITU-R recommendations will most likely not be able to meet the suggested power levels for unwanted emissions. WRC-07 therefore agreed to only recommend a maximum level of unwanted emission power of -29 dBW/27 MHz from radiolocation service stations operating in the 1 350-1 400 MHz band. It should be noted that primary radar systems used for civil aviation purposes are operating under the aeronautical radionavigation service allocation in the 1 300-1 350 MHz band and are therefore not affected by this decision.

10. **Agenda Item 1.21: To consider the results of studies regarding the compatibility between the radio astronomy service and the active space services in accordance with Resolution 740 (Rev. WRC-03), in order to review and update, if appropriate, the tables of threshold levels used for consultation that appear in the Annex to Resolution 739 (WRC-03)**

10.1 The radio astronomy service uses frequencies in the band 1610-1613.8 MHz and is seeking protection from active services in the adjacent bands. Of concern to aviation is that the near adjacent band 1 559-1 610 MHz is used by the radionavigation satellite service for GNSS (GPS, GLONASS and the future Galileo system) and their operation should not be unduly constrained.

10.2 The conference developed a recommended limit of unwanted emissions from the GNSS service into the 1 610-1 613.8 MHz band, resolving that administrations take all reasonable steps to ensure that any satellite system being designed and constructed to operate in the GNSS band meet that limit. In case those systems cannot meet these limits, then the administrations which operate the affected radio astronomy stations shall be notified. The recommended limit is not expected to affect the currently operating and planned GNSS networks.

**11. Agenda Item 2: To examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations communicated by the Radiocommunication Assembly, in accordance with Resolution 28 (Rev. WRC-03), and to decide whether or not to update the corresponding references in the Radio Regulations, in accordance with principles contained in the Annex to Resolution 27 (Rev. WRC-03)**

11.1 The ICAO Position on this agenda item was to make no change to current references in the Radio Regulations relevant to aeronautical services, as no new or amended ITU-R recommendations referring to the aeronautical service have been identified. No such changes were made, although updated versions of relevant ITU-R recommendations are now included in the Radio Regulations.

11.2 This does not modify the status of the relevant material, and satisfies the ICAO Position.

**12. Agenda Item 4: In accordance with Resolution 95 (Rev. WRC-03), to review the resolutions and recommendations of previous conferences with a view of possible revision, replacement or abrogation**

12.1 The following resolutions and recommendations were addressed in a manner different from the ICAO Position:

- a) Resolution 18 relates to the procedure for identifying and announcing the position of ships and aircraft of States which are not party to an armed conflict. A minor update was made to this resolution, not affecting aviation.
- b) Resolution 26 relates to Footnotes to the Table of Frequency Allocations in Article 5 of the RR. A reference on how new footnotes or modifications of footnotes to the RR may be proposed to a WRC, in case of corrections of obvious errors has been amended to point to the relevant provision of the latest revision of the General Rules of Conferences, Assemblies and meetings of the Union (Antalya, 2006). This change does not affect aviation.
- c) Resolution 27 addresses the application of incorporation by reference in the RR. Minor updates were made to this resolution, mainly to clarify its application. This does not affect aviation.
- d) Resolution 63 addresses the protection of radiocommunication services against interference caused by radiation from industrial, scientific and medical (ISM) equipment. Minor updates were made to this resolution, mainly to clarify its application. These updates do not affect aviation.

- e) Resolution 95 addresses the general review of resolutions and recommendations of the world administrative radio conferences and the world radiocommunication conferences. An update was made to this resolution, inviting administrations to submit contributions relevant to this resolution to the ITU conference preparatory meeting (CPM). This update does not affect aviation.
- f) Resolution 222 addresses the use of the 1.5/1.6 GHz band and long-term spectrum availability for AMS(R)S. This resolution was updated by the conference in line with the ICAO Position, calling for further studies to be conducted in time for WRC-11, to ensure long-term spectrum availability to the AMS(R)S. (See also Agenda Item 7.2 refers, paragraph 13.1 below).
- g) Resolution 225 addresses the study of additional frequency bands for the satellite component of International Mobile Telecommunications (IMT). This resolution was modified to include the frequency bands 1 518-1 525 and 1 668-1 675 MHz, which are not used by aviation.
- h) Resolution 339, Coordination of NAVTEX services, was amended slightly, mainly in the form of an updated reference. This does not affect aviation in any way.
- i) Resolution 353, which dealt with maritime mobile service identities (MMSI) for equipment other than ship-borne equipment was suppressed in line with the amendments made under Agenda Item 1.16 (paragraph 7 above). This satisfies the ICAO Position.
- j) Resolution 413 addresses the use of the band 108-117.975 MHz and has been amended in line with the outcome of Agenda Item 1.6 for this band. It invites the ITU-R to study any compatibility issues between the broadcasting and the aeronautical mobile (route) service in the band, and to develop new or revised ITU-R recommendations as appropriate. This is in line with the ICAO Position.
- k) Resolution 608 addresses the use of the frequency band 1 215-1 300 MHz and provides protection to the radionavigation satellite service. The ICAO Position is to recommend this resolution for deletion once studies of the band are completed. This resolution is retained unchanged. This is not in disagreement with the ICAO Position.
- l) Resolution 609 provides protection to the aeronautical radionavigation systems from the equivalent power flux-density produced by the radionavigation satellite service networks and systems in the 1 164-1 215 MHz bands. This resolution provides for equitable share of the band between the different GNSS providers and other users of the band. Minor modifications were made to references which do not affect any systems or services used by aviation.
- m) Resolution 644 addresses telecommunication resources for disaster mitigation and relief operations. This resolution was modified, mainly to include a request that the ITU-R study the application of sensors and early warning systems as a means of disaster mitigation. This is in line with the ICAO Position.

- n) Resolution 729 adaptive systems at MF/HF, was addressed under Agenda Item 1.13. This resolution is intended to provide protection to existing maritime and aviation services as well as broadcasting services from frequency agile systems. The resolution which had some minor modifications does still provide protection to those services. This is in line with the ICAO Position.
- o) Resolution 951, calls for study to addresses options to improve the international spectrum regulatory framework. This resolution was expanded by the conference to include several potential options for a more flexible framework for the Radio Regulations. ICAO will need to monitor the continuation of this work closely, as it may ultimately affect the current protected status of aviation safety related allocations.
- p) Recommendation 608 gives guidelines for consultation meetings established in Resolution 609. References in this recommendation were updated. The updated references do not affect aviation.
- q) Recommendation 800 which provided the principles for establishing agendas for world radiocommunication conferences, was upgraded to a resolution. This is in line with the ICAO Position

**13. Agenda Item 7.2: To recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, taking into account Resolution 802 (WRC-03)**

13.1 In 1997, the exclusive allocations to the aeronautical, land and maritime satellite services in the L-band (1.5/1.6 GHz) were replaced by a generic type allocation to the mobile-satellite service, in spite of the serious reservations of the international civil aviation community on the compatibility between the aeronautical mobile satellite (route) service (AMS(R)S) with other mobile services. In 1997, and then further in 2000, a footnote was developed which stipulates priority and pre-emption by the AMS(R)S over other services in this band. In 2005, an ITU approved report concluded, inter alia, that “prioritization and intersystem real-time pre-emption” is not practical and, without significant advance in technology, is unlikely to be feasible for technical, operational and economic reasons. This means that the method approved by WRC-97 and WRC-2000 is insufficient to ensure long-term spectrum availability and protection to AMS(R)S communications in the L-band. During this conference, it was agreed to conduct, in time for consideration by WRC-11, the appropriate technical, operational and regulatory studies to ensure long-term spectrum availability for the aeronautical mobile-satellite (R) service (AMS(R)S). This includes the existing and future spectrum requirements. WRC-11 Agenda Item 1.7 refers (Resolution 222 (Rev. WRC-07)).

13.2 The conference agreed to include the following items of interest to aviation on the draft agenda for the WRC-11:

- 1.1 to consider and take appropriate action on requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, taking into account Resolution 26 (Rev.WRC-07);
- 1.3 to consider spectrum requirements and possible regulatory actions, including allocations, in order to support the safe operation of unmanned aircraft systems (UAS), based on the results of ITU-R studies, in accordance with Resolution [COM 6/8] (WRC-07);

- 1.4 to consider, based on the results of ITU-R studies, any further regulatory measures to facilitate introduction of new aeronautical mobile (R) service (AM(R)S) systems in the bands 112-117.975 MHz, 960-1 164 MHz and 5 000-5 030 MHz in accordance with Resolutions 413 (Rev. WRC-07), [COM 4/5] (WRC-07) and [COM 4/9] (WRC-07);
- 1.7 to consider the results of ITU-R studies in accordance with Resolution 222 (Rev. WRC-07) in order to ensure long-term spectrum availability and access to spectrum necessary to meet requirements for the aeronautical mobile-satellite (R) service, and to take appropriate action on this subject, while retaining unchanged the generic allocation to the mobile-satellite service in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz;
- 1.12 to protect the primary services in the band 37-38 GHz from interference resulting from aeronautical mobile service operations, taking into account the results of ITU-R studies, in accordance with Resolution [COM 6/12] (WRC-07);
- 1.19 to consider regulatory measures and their relevance, in order to enable the introduction of software-defined radio and cognitive radio systems, based on the results of ITU-R studies, in accordance with Resolution [COM 6/18] (WRC-07);
- 1.21 to consider a primary allocation to the radiolocation service in the band 15.4-15.7 GHz, taking into account the results of ITU-R studies, in accordance with Resolution [COM 6/19] (WRC-07);
- 1.23 to consider allocations of about 15 kHz in parts of the band 415-526.5 kHz to the amateur service on a secondary basis, taking into account the need to protect existing services;
- 1.25 to consider possible additional allocations to the mobile-satellite service, in accordance with Resolution [COM 6/21] (WRC-07);
- 4 in accordance with Resolution 95 (Rev. WRC-07), to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation;
- 7.2 to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, taking into account Resolution [COM 6/22] (WRC-07).

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**APPENDIX C / APENDICE C****DRAFT ICAO POSITION FOR THE ITU WRC-11****1. INTRODUCTION**

1.1 This paper contains the ICAO Position on issues of interest to international civil aviation to be decided at the 2011 ITU World Radiocommunication Conference (WRC-11). The agenda of the conference is contained in the Attachment. The ICAO Position should be considered in conjunction with section 7-II of the *Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including Statement of Approved ICAO Policies* (Doc 9718) (Civil aviation frequency allocations – ICAO policies and related information). An updated version of this section is available on website <http://www.icao.int/anb/panels/acp/index.cfm> which includes the amendments to the Radio Regulations as agreed at WRC-07. Also available at the above-mentioned website are the ITU WRC Resolutions referenced in the ICAO Position.

*(Editors Note: Update the link)*

1.2 ICAO supports the working principle, as utilized in studies for WRC-07 and reflected in the WRC-07 Conference Preparatory Meeting report material on Agenda Item 1.6. In particular that compatibility of ICAO standard systems with “existing or planned aeronautical systems operating in accordance with international aeronautical standards will be ensured by ICAO”. Compatibility of ICAO standard systems with non-ICAO standard systems will be addressed in ITU.

**2. SPECTRUM REQUIREMENTS FOR INTERNATIONAL CIVIL AVIATION**

2.1 The safety of air operation is dependent on the availability of reliable communication and navigation services. The Eleventh Air Navigation Conference (AN-Conf/11), which was held in Montreal, Canada from 22 September to 3 October 2003, noted that States, international organizations and ICAO had embarked on communication, navigation and surveillance/air traffic management (CNS/ATM) systems planning, intended to improve aircraft operations by making use of modern CNS/ATM technologies. The AN-Conf/11 endorsed the global air traffic management operational concept, to be used as guidance for the development of ICAO CNS/ATM related provisions. The planning horizon used for the concept was up to and beyond the year 2025.

2.2 The development of new CNS/ATM provisions is highly dependent upon the availability of radio frequency spectrum that can support the high integrity and availability requirements associated with aeronautical safety systems and demands special conditions to avoid harmful interference to these systems. It was recognized by AN-Conf/11 that currently available spectrum for CNS/ATM systems may need to be supplemented with new allocations to enable the introduction of new systems in aviation while the requirements for spectrum for current systems are to be maintained until a future undetermined period. **Article 4.10** of the Radio Regulations states that ITU Member States recognize that the safety aspects of radionavigation and other safety services requires special measures to ensure their freedom from harmful interference. These factors need to be taken into consideration in the allocation, assignment and use of frequencies for aeronautical systems. In particular, the sharing of aeronautical radio services with other aeronautical services or non-aeronautical services must be considered with extreme care. Where sharing conditions cannot meet the above requirements, exclusive aeronautical allocations need to be secured to preserve the integrity of aeronautical services.



2.3 The demand for access to airspace is increasing. The increase in air traffic movements of approximately 5% per annum by existing users as well as the additional requirement for new and emerging applications such as unmanned aircraft systems are placing increased demands on both the aviation regulatory and air traffic management mechanisms. As a result airspace is becoming more complex and the demand for frequency assignments and hence spectrum allocations are increasing. Whilst some of this capacity can be met through the improved spectral efficiency of new radio systems it is inevitable that existing allocations may need to be broadened or additional aviation spectrum allocations sought to meet this demand. While it is expected that WRC-11 will be able to address a majority of these requirements, consideration by future conferences (WRC-15 and beyond) will be necessary to fully meet the future aviation requirements.

[2.4 The ICAO Position was developed in 2003/2004 by the Aeronautical Communications Panel (ACP) and was reviewed by the Air Navigation Commission (ANC) at the first and second meetings of its 167th Session on 19 and 21 October 2004. Following the review by the ANC, it was submitted to ICAO Contracting States and international organizations for comment. After final review of the ICAO Position and the comments by the ANC on 28 April 2005 (169-3), it was approved by Council on 14 June 2005 (175/14). When the ICAO Position was established, studies were ongoing in the Navigation Systems Panel (NSP) and Aeronautical Communications Panel (ACP), in ITU and in regional telecommunication organizations, in particular on the protection of the microwave landing system (MLS) from interference, as well as the assessment of spectrum required for future communication systems. The ICAO studies were completed by the end of 2006 and an update to the ICAO Position was reviewed by the ANC on 20 February 2007 (174-7) and approved by Council on xx June 2007 (181/xx). States and international organizations in their preparatory activities for the WRC-07 at the national level, in the activities of the regional telecommunication organizations<sup>1</sup> and in the relevant meetings of the ITU are requested to make use of the ICAO Position, to the maximum extent possible]

*(Editors note: This paragraph needs revising as and when the relevant meetings have been held and could perhaps be deleted in the draft position)*

### 3. AERONAUTICAL ASPECTS ON THE AGENDA FOR WRC-11

*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.*

*Note 2.— No impact on aeronautical services has been identified from WRC-11 Agenda Items 1.6, 1.8, 1.10, 1.11, 1.13, 1.16, 1.17, 1.18, 1.20, 1.24, 2, 3, 5, 6, 7, and 8.1 which are therefore not addressed in the Position.*

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<sup>1</sup> African Telecommunication Union (ATU), Arab Group, Asia-Pacific Telecommunity (APT), European Conference of Postal and Telecommunications Administrations (CEPT) and the Inter-American Telecommunication Commission (CITEL).

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**WRC-07 Agenda Item 1.1**

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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-07);**

**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 in aeronautical bands to non-aeronautical services 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 conditions under which the technical conditions under which the aeronautical allocations can be used. This can have serious impact on the safety of aviation.

A number of footnotes in aeronautical bands that should be deleted for safety and efficiency reasons are discussed below.

- a) In the bands used for the ICAO standardised Non-Directional Beacons (NDB), (255-526.5 kHz), footnote No **5.72** allows for the used of the bands 283.5-490 & 510-526.5 kHz by Norwegian fixed stations located north of 60°. The use of NDBs in these bands is expected to continue for the foreseeable future. Whilst operation of these fixed links has not caused a problem in the past, it would be preferable if the footnote allocation could be removed.
- b) In the 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, limited to systems operating in accordance with recognized international aeronautical standards. Such use shall be in accordance with Resolution **413 (Rev.WRC-07)**. The use of the band 108-112 MHz by the aeronautical mobile (R) service 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. .. As a result, access to these bands by the mobile service is not feasible, in particular since no acceptable

sharing criteria that secure the protection of aeronautical systems have been established to date. Nos. **5.181**, **5.197** and **5.259** should now be deleted since they do not represent a realistic expectation for an introduction of the mobile service in these bands.

- c) In the band 1 215-1 300 MHz, which is used by civil aviation for the provision of Radionavigation services through No.5.331 as well as the reception of GNSS services, footnote No **5.330** allocates the band in a number of countries to the fixed and mobile service. Given the receiver sensitivity of both aeronautical uses of the band and the low signal levels delivered by GNSS systems, ICAO does not support the continued inclusion of an additional service through country footnote. ICAO would therefore urge administrations to remove their name from the No **5.330**.

*(Editors note: this needs to be reviewed in the light of ICAO policy on GNSS in this band)*

- d) In the band 1 559 - 1 610 MHz, which is used for elements of the ICAO Global Navigation Satellite System (GNSS), Nos. **5.362B** and **5.362C** allow the operation of the fixed service on a primary basis until 1 January 2005 (1 January 2010 in some countries) and on a secondary basis after those dates until 1 January 2015. This band is allocated, on a worldwide, primary basis, to the aeronautical radionavigation service (ARNS) and to the radionavigation-satellite service (RNSS). The band already supports operation of two prime elements of global navigation satellite system (GNSS), i.e. GLObal NAVigation Satellite System (GLONASS) and global positioning system (GPS), which have been defined in ICAO SARPs. SARPs for other RNSS systems, such as the European Galileo system, are under development. Studies undertaken in preparation for WRC-2000 indicate that a geographical separation distance exceeding line-of-sight (in the order of 400 km) between aircraft using GNSS and stations of the fixed service is required to ensure safe operation of GNSS. This is a very severe restriction, which can prohibit the safe use of GNSS over wide areas around any fixed service installation. To compensate for these restrictions, retention of current terrestrial radionavigation systems by aviation may be needed, leading to inefficient use of available spectrum. More importantly, harmful interference situations can arise leading to disruption to GNSS, affecting the safety of aircraft in flight. Thus, the WRC-2000 agreement to terminate all use by the fixed service in this band in 2015 still constitutes a severe and unacceptable constraint on the safe and effective use of GNSS in some areas of the world. It is, therefore, recommended that deletion of these allocations be effective from 2011.

*(Editors note: text needs updating to reflect the changes to No 5.362B & C made at WRC-07)*

- e) In the band 4 200 - 4 400 MHz, which is reserved for use by airborne radio altimeters, 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. Interference from the fixed service has the potential to affect the safety of all weather operations. Deletion of this footnote is recommended.

**ICAO Position:**

To support the deletion of No **5.72** as access to these bands by the fixed service could create the potential for harmful interference to important radionavigation systems used by aircraft to navigate especially in the North Sea.

To support deletion of Nos. **5.181**, **5.197** and **5.259**, as access to these bands by the mobile service is not feasible and could create the potential for harmful interference to important radionavigation systems used by aircraft at final approach and landing as well as the aeronautical mobile service introduced as a result of WRC-03 & 07.

To support deletion of No **5.330** as access to the band by the fixed and mobile services could potentially cause harmful interference to services used to support aircraft operations.

To support the deletion of Nos. **5.362B** and **5.362C** as of 2011 in order to remove harmful interference that can be caused by the fixed service to essential aeronautical radionavigation satellite functions in the band 1 559 – 1 610 MHz and to permit the full utilization of GNSS services to aircraft on a global basis.

To support the deletion of No. **5.363** from the band 1 590 – 1 610 MHz.

To support deletion of No. **5.439** as a measure to protect safety critical operation of radio altimeters in the band 4 200 – 4 400 MHz.

*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:*

<i>No. 5.72</i>	<i>Norway</i>
<i>No. 5.181</i>	<i>Egypt, Israel and Syrian Arab Republic</i>
<i>No. 5.197</i>	<i>Pakistan and Syrian Arab Republic</i>
<i>No. 5.259</i>	<i>Egypt, Israel, Japan and Syrian Arab Republic</i>
<i>No. 5.330</i>	<i>Angola, Saudi Arabia, Bahrain, Bangladesh, Cameroon, China, the United Arab Emirates, Eritrea, Ethiopia, Guyana, India, Indonesia, Iran (Islamic Republic of), Iraq, Israel, the Libyan Arab Jamahiriya, Japan, Jordan, Kuwait, Lebanon, Mozambique, Nepal, Pakistan, the Philippines, Qatar, the Syrian Arab Republic, Somalia, Sudan, Chad, Togo and Yemen</i>

- No. 5.362B*      *Algeria, Armenia, Azerbaijan, Belarus, Benin, Bulgaria, Cameroon, Democratic People's Republic of Korea, France, Gabon, Georgia, Germany, Guinea, Guinea-Bissau Jordan, Kazakhstan Lithuania, a Kyrgyzstan, , Libyan Arab Jamahiriya, Mali, Mauritania, Moldova, Nigeria, Pakistan, Poland, Romania, Russian Federation, Saudi Arabia, Senegal, Spain, Swaziland, Syrian Arab Republic, Tajikistan, Tunisia, Turkmenistan, Uganda, Ukraine, and Uzbekistan*
- No. 5.362C*      *, Chad, Congo, Egypt, Eritrea, Iraq, Israel, Jordan, Malta, Qatar, Somalia, Sudan, Syrian Arab Republic, Togo and Yemen*
- No. 5.439*      *Iran (Islamic Republic of) and Libyan Arab Jamahiriya*

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### WRC-07 Agenda Item 1.2

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#### **Agenda Item Title:**

Taking into account the ITU-R studies carried out in accordance with Resolution 951 (Rev.WRC-07), to take appropriate action with a view to enhancing the international regulatory framework;

#### **Discussion:**

The growing use of radiocommunications in modern society for applications from mobile communications, through item tracking to surveillance has lead to an increase in demand for spectrum. Whilst new and innovate technologies are increasing the efficiency with which these services are provided, demand has still outpaced the efficiencies made.

There is a view within a number of administrations that the current ITU processes for addressing additional spectrum needs are not flexible enough to meet the timescales demanded by industry. Resolution 951 seeks to review the way in which spectrum at the global level is managed with a view to adopting best practices which it is hoped will enable even greater efficiencies to be achieved in the way spectrum is assigned and used.

Aviation is reliant on spectrum for the provision of communications, navigation and surveillance functionality to enable aircraft to fly safely within the airspace above our various administrations. Given the safety criticality of the systems supporting this functionality they are designed to be robust and require an environment that is free from interference.

Resolution 951 potentially offers aviation an opportunity to improve the flexibility with which spectrum allocated to aeronautical services can be used as well as potentially tighten the regulatory provisions that ensure the protection of aviation systems. Conversely it also has the potential to reduce the protection afforded to aviation systems if the appropriate action is not taken to ensure that greater flexibility does not lead to greater risk of interference.

**ICAO Position:**

Support new provisions or modifications to existing provisions that improve the flexibility with which spectrum allocated to aeronautical safety services can be used by aviation or tighten regulatory provisions that enhance the protection of aviation systems.

Ensure that any other measures taken at WRC-11 under agenda item 1.2 do not have an adverse impact on the protection of aeronautical systems.

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**WRC-07 Agenda Item 1.3**

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**Agenda Item Title:**

**To consider spectrum requirements and possible regulatory actions, including allocations, in order to support the safe operation of unmanned aircraft systems (UAS), based on the results of ITU-R studies, in accordance with Resolution 421 (WRC-07);**

**Discussion:**

Unmanned aircraft systems (UASs) have proven the ability for an aircraft to be piloted remotely over significant distances, as well as work at shorter ranges either within or out-of-sight of the remote pilot. However, such flights have taken place in segregated airspace, ensuring the safety of both the air vehicle itself as well as other airspace users.

Based on the proven ability of UASs to operate reliably, a number of commercial applications have been identified from emergency services to high altitude communications platforms. Additionally, applications have been identified where UAS technology could provide a commercial and/or safety benefit by replacing either the pilot or co-pilot onboard a manned aircraft.

As a result, the deployment of UASs is expected to be significant, with a requirement for operation throughout the airspace structure. The current provisions of providing segregated airspace will therefore become impractical and hence a way must be found to allow these aircraft to integrate with the current airspace users in a safe and seamless manner.

This agenda item therefore seeks to identify the spectrum requirements necessary to support the safe operation of UASs in current and future airspace structures. UASs will require high integrity communications link(s) between the Unmanned Aircraft (UA) and remote control centres capable of relaying the necessary air traffic control messages as well as flight critical aircraft information. In addition, sense and avoid functions may require new sensors on the UA to provide situational awareness.

**Command & Control**

For UASs to safely integrate with existing airspace users the remote pilot must be able to reliably monitor the status of the UA, pass control instructions to that UA, and also interact with the relevant air traffic controller appropriate to the airspace within which the UA is flying. For UA flying/maneuvering in a localized area this might be provided by a line-of-sight link. However, for UA flying trans-horizon this may require the use of a combination of a terrestrial radio network or a satellite network.

#### **Relay of Air Traffic Control (ATC) communications**

Safe operation of aircraft manned or unmanned depends on the communication with ATC. The rules of air traffic rely on the fact that the pilot acts according to instructions received from ATC. If the pilot does not sit in the aircraft, this means for the ATC system operated today, that a voice channel has to be maintained to relay information from radio in the aircraft to the pilot on ground and back. Early concepts assume that this function could be part of the command and control links if the voice is digitized.

#### **Sense and Avoid**

The safe flight operation of UA necessitates advanced techniques to detect and track nearby aircraft, terrain and obstacles to navigation in order to ensure these unmanned aircraft avoid these objects in a manner equivalent to that achieved by manned aircraft. These advance techniques may require spectrum. The remote pilot will need to be aware of the environment within which the aircraft is operating and be able to identify the potential threats to the continued safe operation of the aircraft and take the relevant action. Given the scarcity of spectrum care must be taken to ensure that the spectrum requirements identified to meet such applications are kept to a minimum.

It should be noted that the aeronautical future communications system may be able to prove some capacity to meet the requirements for both command and control (including the relaying of ATC communications) as well as sense and avoid applications but care must be taken when dimensioning both systems to avoid double accounting. A number of existing allocations to the Aeronautical Mobile Satellite (Route) Service such as that in the frequency range 5000-5150 MHz might provide some of the capacity required although issues with existing and planned systems will need to be resolved.

#### **Payload**

The spectrum requirements to support the functionality of a payload are not critical to the safe operation of that aircraft. Therefore this agenda item whilst recognizing the need for spectrum to support the payload, specifically excludes the allocation of spectrum at WRC-11 under this agenda item for payload applications, however it does call for the development of an ITU-R Report or Recommendation on how to accommodate UAS payload requirements. Therefore ICAO would oppose the use of this agenda item to seek new spectrum allocations to meet payload requirements.

Spectrum for UAS for safety and regularity of flight, and in particular when the UAS operates in civil airspace, needs to be accommodated under an allocation to the Aeronautical Mobile (R) service, aeronautical mobile satellite (R) service, or the Aeronautical Radionavigation service, in order to receive the sufficient status and protection from harmful interference.

In addition to the safety communications detailed above, most UAS also need spectrum for the operation of a payload. Agenda item 1.3 requires no action by WRC-11 on this subject. Therefore ICAO would not support the use of this agenda item to seek new spectrum allocations to meet payload requirements.

Existing AM(R)S, AMS(R)S, ARNS allocations should be examined to check whether they can provide suitable bandwidth before new allocations to these services are considered.

**ICAO Position:**

To support, based on the results of studies identified in Resolution 421, any modification to existing allocations, or new allocations required to accommodate the safe operation of UAS.

To ensure that any allocation made as a result of the above does not adversely affect existing aeronautical systems

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**WRC-11 Agenda Item 1.4**

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**Agenda Item Title:**

**To consider, based on the results of ITU-R studies, any further regulatory measures to facilitate introduction of new aeronautical mobile (R) service (AM(R)S) systems in the bands 112-117.975 MHz, 960-1 164 MHz and 5 000-5 030 MHz in accordance with Resolutions 413 (Rev.WRC-07), 417 (WRC-07) and 420 (WRC-07);**

**Discussion:**

As a result of WRC-07 Aeronautical Mobile (Route) Service (AM(R)S) were either made or modified to support the aeronautical Future Communications System (FCS). In particular, an AM(R)S allocation in the bands 112 – 117.975 MHz was modified, and another was added to the band 960 – 1164 MHz, in accordance with Resolutions 413 and 417 respectively. The Resolutions in part specify regulatory restrictions on the operation of AM(R)S in those bands, including that systems are limited those meeting ICAO standards. (i.e., ‘systems operating in accordance with international aeronautical standards’). Compatibility of the AM(R)S with ICAO standardized systems will be addressed in ICAO. Compatibility with in-band and adjacent band non-ICAO systems identified in the Resolutions will be addressed in the ITU.

WRC-11 agenda item 1.4 allows aviation the opportunity to complete the studies necessary to answer questions raised in Resolutions 413 and 417 and propose to WRC-11 any additional regulatory measures that might be required to facilitate the introduction of new AM(R)S systems in the bands 112–117.975 and 960–1164 MHz. Additionally it allows, under Resolution 420, aviation to seek a new allocation to AM(R)S in the frequency band 5000-5030 MHz for surface applications at airports provided that requirements for that system cannot be satisfied in the 5091-5150 MHz band, and that it is compatible with RNSS in the 5000-5030 MHz band and the Radio Astronomy service (RAS) in the adjacent 4990-5000 MHz band.

ICAO will work with the ITU to provide the relevant data and technical expertise to allow the required compatibility studies between the FCS and non-ICAO standardized systems identified in the Resolutions to be undertaken in a timely manner. As agreed, any compatibility issues between ICAO standardized systems will be undertaken within ICAO.



It should be noted that the existing aeronautical mobile satellite (R) service allocation in the 5000-5030 MHz band may be considered for unmanned aircraft systems as part of WRC-11 Agenda Item 1.3 studies.

*(Editors note: Should we use “FCS” or “FCI”. When we decide we should be consistent throughout the ICAO Position)*

**ICAO Position:**

To support as required, based on the results of studies identified in Resolution 413, the inclusion in the Radio Regulations of further regulatory measures that will facilitate the introduction of future AM(R)S systems in the band 112-117.975 MHz.

To support as required, based on the results of studies identified in Resolution 417, the inclusion in the Radio Regulations of further regulatory measures that will facilitate the introduction of future AM(R)S systems in the band 960-1164 MHz.

If the spectrum requirements for surface applications at airports cannot be fully accommodated within the 5091-5150 MHz band, and based on the results of successful compatibility studies identified in Resolution 420, support a new allocation to the AM(R)S in the band 5000-5030 MHz.

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**WRC-07 Agenda Item 1.5**

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**Agenda Item Title:**

**To consider worldwide/regional harmonization of spectrum for electronic news gathering (ENG), taking into account the results of ITU-R studies, in accordance with Resolution 954 (WRC-07);**

**Discussion:**

The use of terrestrial portable radio equipment by services ancillary to broadcasting is an essential element to the way global news coverage meets the public expectation for instant images of internationally news worthy events such as natural disasters. This agenda item seeks to address the spectrum needs associated with such equipment. As the scope of this agenda item in terms of frequency bands is not limited within which studies can take place, except by the practicality of the ENG equipment, aeronautical bands could be targeted

**ICAO Position:**

To oppose any allocation that would adversely affect the interests of Aviation.

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### WRC-07 Agenda Item 1.7

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#### Agenda Item Title:

**To consider the results of ITU-R studies in accordance with Resolution 222 (Rev.WRC-07) in order to ensure long-term spectrum availability and access to spectrum necessary to meet requirements for the aeronautical mobile-satellite (R) service, and to take appropriate action on this subject, while retaining unchanged the generic allocation to the mobile-satellite service in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz;**

#### Discussion:

WRC-07 agreed on a future Conference Agenda Item 1.7 for WRC-11 to consider the results of ITU-R studies to ensure long-term spectrum availability and access to spectrum necessary to meet the requirements for aeronautical mobile-satellite (R) service (AMS(R)S) in accordance with Resolution 222 (Rev. WRC-07).

In 1995, the International Civil Aviation Organization (ICAO) standardized the use of the satellite frequencies in L-band (1 525-1 559 MHz (space-to-Earth) and 1 626.5-1 660.5 MHz(Earth-to-space)) as an essential element for the aeronautical safety communication service via satellite communication systems.

Up until 1997 the MSS sub-bands 1 545-1 555 MHz (space-to-Earth) and 1 646.5-1 656.5 MHz (Earth-to-space) were allocated exclusively to the AMS(R)S, for communications relating to safety and regularity of flights.

WRC-97 adopted a new generic MSS allocations in 1 525-1 559 MHz and 1 626.5-1 660.5 MHz bands. In replacement of the exclusive AMS(R)S allocation it adopted No 5.357A giving priority and protection to AMS(R)S providing transmission of messages with priority categories 1 to 6 in Article 44 in the MSS sub-bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz.

It should be noted that two additional Radio Regulation footnotes (No. 5.357 and No. 5.376) deal with the bands 1545-1555 and 1646.5-1656.5 MHz respectively. However, those footnotes provide additional allocations in the aeronautical mobile (R) service to those bands under specific conditions. Under the terms of this Agenda Item, there should be no change to those footnotes.

In WRC-2000 the subject was considered again and Resolution 222 (WRC-2000) was adopted, and stated (under its resolves) that:

- administrations shall ensure the spectrum needed for AMS(R)S communications within priority categories 1 to 6 of Article 44 of the ITU RR; and,
- administrations shall ensure that MSS operators carrying non-safety-related traffic yield capacity to accommodate the spectrum requirements for AMS(R)S communications.

It also stated (under its invites) “*to complete studies to determine the feasibility and practicality of prioritization and real-time pre-emptive access between different networks of mobile-satellite systems ...*”

The studies which were performed considered various elements, such as characteristics of the aeronautical safety communications and aeronautical traffic, applicability of real-time pre-emption and its practicality and effectiveness.

Their results are available from the ITU as Report M.2073 “Feasibility and practicality of prioritization and real-time pre-emptive access between different networks of mobile-satellite service in the bands 1 525– 1 559 MHz and 1 626.5–1 660.5 MHz”. They identified a number of significant technical, operational and economic issues that would have to be overcome to make prioritization and intersystem real-time *pre-emptive access between different networks* a reality. Accordingly the report concluded, *inter alia*, that “prioritization and intersystem real-time *pre-emptive access between different networks*” is not practical and, without significant advance in technology, it is unlikely to be feasible for technical, operational and economical reasons.

This means such an approach cannot be used as an effective method to ensure long-term spectrum availability and protection for the AMS(R)S communications in these bands.

Although No. 5.357A gives a clear priority status for AMS(R)S communications versus other MSS non-safety communications, the current regulatory conditions governing the AMS(R)S priority status may not be sufficient. Accordingly and considering the conclusions in the ITU-R Report M.2073, the WRC-07 adopted this Agenda Item, noting that the existing MSS allocation should be retained unchanged.

Also WRC-07 modified Resolution 222 calling for:

- (i) studies on existing and future spectrum requirements of AMS(R)S;
- (ii) the assessment of whether the long-term requirements of the AMS(R)S can be met within the existing allocations with respect to No. 5.357A, while retaining unchanged the generic allocation for the mobile-satellite service in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz;
- (iii) completion of studies to determine the feasibility and practicality of technical or regulatory means, other than the coordination process (see Resolves 1 of Res. 222 (WRC-2000) or the means considered in Report ITU-R M.2073;
- (iv) the studies of existing MSS allocations, or identification of new allocations, limited to the requirements of the AMS(R)S if these requirements (referred to above in (i)) cannot be met.

and “invites ICAO” to support the above studies within the ITU-R. It is extremely important to ensure that any new allocations to AMS(R)S should incorporate the strengthened regulatory provisions and technical means resulting from the studies under the invites (iii) above.

It should be noted that there are other WRC-11 Agenda Items that look at requirements for satellite spectrum, i.e. AI 1.3 and . AI 1.25.

**ICAO Position:**

Support as required, based upon the result of the studies, the adoption of the adequate technical and regulatory procedures to:

- a) ensure the long-term availability and access to spectrum in the bands 1 545– 1 555 MHz and 1 646.5–1 656.5 MHz for AMS(R)S;
- b) ensure that aeronautical communications in categories 1 to 6 of Article 44 are given priority and immediate access at all times.

Support, if required, changes to footnotes 5.357A and 5.362A, to strengthen the long-term access to the existing AMS(R)S spectrum.

No change to No. 5.357 and No. 5.376 as a result of WRC-11 Agenda Item 1.7

Support, if the studies identified by Res. 222 (WRC-07) indicate that the aeronautical mobile satellite (R) service (AMS(R)S) requirements cannot be met in the existing allocations as per No. 5.357A, any modification to existing MSS allocations, or possible new allocations limited to satisfying the AMS(R)S requirements .

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**WRC-07 Agenda Item 1.9**

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**Agenda Item Title:**

**To revise frequencies and channelling arrangements of Appendix 17 to the Radio Regulations, in accordance with Resolution 351 (Rev.WRC-07), in order to implement new digital technologies for the maritime mobile service;**

**Discussion:**

Within the frequency range 4 - 10 MHz, various frequency bands are allocated to the aeronautical mobile (R) service and the allotment plan for these frequency bands is in **Appendix 27** to the Radio Regulations. Aviation must be satisfied that the introduction by the maritime mobile service of any new modulation techniques, and or changes to the table contained in Appendix 17, must not cause harmful interference to the aeronautical mobile (R) service.

**Draft ICAO Position:**

Ensure that the introduction by the maritime mobile service of any new modulation techniques, and or changes to the table contained in Appendix 17, does not cause harmful interference to the aeronautical mobile (R) service.

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**WRC-07 Agenda Item 1.12**

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**Agenda Item Title:**

**To protect the primary services in the band 37-38 GHz from interference resulting from aeronautical mobile service operations, taking into account the results of ITU-R studies, in accordance with Resolution 754 (WRC-07);**

**Discussion:**

The frequency band 37-38 GHz is currently allocate on a primary basis to the fixed, mobile, space research (space-to-Earth) and the fixed-satellite (space-to-Earth) services. Aeronautical mobile services which are not excluded from the mobile service allocation have the potential to cause interference to the systems operating in this band. This agenda item, noting that there are currently no aeronautical systems deployed or planned to be deployed in the band seeks to ensure that the existing systems operating in the band continue to be able to operate without fear of interference from aeronautical mobile systems.

Currently there are studies underway in the ITU-R (Ref Question XX) to identify frequency bands to support a wireless network for use within aircraft. As planned such a system could be implemented in a manner that will be fully compatible with other co-primary users of the band 37-38 GHz. Therefore until those studies have shown that the band is not suitable for such a use ICAO opposes excluding aeronautical from the existing mobile service allocation. Alternatively technical protection limits for existing co-primary systems should be introduced such that AMS can be developed in a manner that ensures compatibility with those existing systems.

**ICAO Position:**

To oppose excluding aeronautical use of the existing mobile service allocation in the Band 37-38 GHz.

To support the use of technical protection limits to ensure that any future AMS system in the band 37-38 GHz will be compatible with other co-primary services.

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**WRC-07 Agenda Item 1.14**

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**Agenda Item Title:**

**To consider requirements for new applications in the radiolocation service and review allocations or regulatory provisions for implementation of the radiolocation service in the range 30-300 MHz, in accordance with Resolution 611 (WRC-07);**

**Discussion:**

The radiolocation service operating in the VHF frequency range is coming under increased pressure from co-frequency fixed and mobile services. There is therefore a need to allocate spectrum within the frequency range 30-300 MHz that can accommodate radars displaced by the fixed and mobile service and also meet emerging requirements for greater resolution and range for various space object detection applications. This agenda item seeks to identify a suitable spectrum allocation in the frequency range 30-300 MHz that can support the needs of the radiolocation service.

Aviation operates a number of services in various bands within the frequency range 30-300 MHz including the Instrument Landing System, VHF Omni-directional Ranging and air-ground-air communications. It is essential that these systems continue to be afforded the protection that they require to meet the demanding requirements of a safety of life service. In general, ICAO does not support the shared use of spectrum between aeronautical safety services like ARNS, AM(R)S and AMS(R)S and other (non-aeronautical) services. The frequency bands listed below are already heavily used and will continue to be heavily used with the implementation of new aeronautical systems:-

74.8-75.2 MHz	Marker Beacons
108-112 MHz	ILS Localisers, GBAS, VOR
112-117.975	VOR, GBAS, GRAS, Air Ground Communications
117.975-137 MHz	Air Ground Communications

In addition, due to the potential for high powered transmitters in the radiolocation service, compatibility studies should consider adjacent aeronautical bands, as well as those that could be impacted by spurious and harmonic emissions.

**ICAO Position:**

Oppose, under this agenda item, any change to the allocations in the 74.8-75.2 MHz, and/or 108-137 MHz bands.

Ensure that any allocation made as a result of this agenda item does not adversely affect the operation of existing and planned aeronautical systems.

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**WRC-07 Agenda Item 1.15**

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**Agenda Item Title:**

**To consider possible allocations in the range 3-50 MHz to the radiolocation service for oceanographic radar applications, taking into account the results of ITU-R studies, in accordance with Resolution 612 (WRC-07);**

**Discussion:**

There is an increasing interest, on a global basis, in the operation of high-frequency oceanographic radars for the measurement of coastal sea surface conditions to support environmental, oceanographic, meteorological, climatologically, maritime and disaster mitigation operations. Currently there are no HF radiolocation allocations in which to operate such radars. This agenda seeks to address this shortfall by making a suitable allocation in the frequency band 3-50 MHz that can operate in harmony with current services within the stated frequency range.

Within the frequency range 3-50 MHz there are a number of allocations to the aeronautical mobile (R) service. These allocations are used to provide long range, over the horizon air traffic control, flight information and operational control services over the oceans and remote areas of the world. Any new allocation must ensure that the protection currently afforded to the aeronautical mobile (R) service is not compromised.

**ICAO Position:**

Ensure that any allocation made as a result of this agenda item does not adversely affect the operation of existing and planned aeronautical systems that operate in or adjacent to the frequency band 3-50 MHz
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**WRC-07 Agenda Item 1.19**

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**Agenda Item Title:**

**To consider regulatory measures and their relevance, in order to enable the introduction of software-defined radio and cognitive radio systems, based on the results of ITU-R studies, in accordance with Resolution 956 (WRC-07);**

**Discussion:**

The advantages and disadvantages of software-defined and cognitive radio systems for aviation are discussed below:-

### **Software-Defined Radios**

Although aviation has a long history with Multi-mode radios where several functions (e.g. ILS, DME, MLS, VOR) are combined in a single unit, a Software-defined radio system is a radiocommunications system where components that have typically been implemented in hardware (i.e. mixers, filters, amplifiers, modulators/demodulators, detectors. etc.) are instead implemented using software on a computer or other embedded computing devices. This gives the capability for the radio to tune over a large frequency range and use any modulation scheme that can be implemented via software. Once produced a change of frequency or modulation scheme can be achieved through a simple software upload.

The flexibility these radios have means that they offer significant benefits to radio users as changes to the radio system can be achieved in a short space of time without having to purchase new hardware and is being studied as part of the flexible airborne architecture concept. However as a change in radio parameters can be achieved through a software upload, if the regulation of the use of these radios is not sufficiently robust they could be prone to misuse or computer viruses causing them to operate on frequencies that they were not originally intended to. It is therefore essential that the relevant measures are put in place to ensure that a software defined radio cannot operate in an aeronautical band unless certified and installed by a qualified manufacturer and similarly that aeronautical software defined radios cannot unintentionally change characteristics from those for which they have been certified.

### **Cognitive Radio Systems**

Cognitive radio systems are software defined radios that operate by automatically changing their transmission or reception parameters to communicate efficiently avoiding interference with licensed or unlicensed users. This alteration of parameters is based on the active monitoring of several factors in the external and internal radio environment, such as radio frequency spectrum, user behaviour and network state. These systems rely on being able detect all transmitters. Many aeronautical systems however are based on a ground based transmitter providing a service to airborne receivers. In that case it is very possible for a cognitive radio to be beyond line of sight of the transmitter but still within line of sight of the airborne receiver. This can result in interference to that receiver. It is therefore essential to ensure that the correct regulatory provisions are put in place to protect aeronautical services.

### **ICAO Position:**

To support the inclusion of regulatory measures in the Radio Regulations that preclude the operation of software defined radios in the bands allocated to aeronautical services unless they are intended and have been properly certified for use in an aeronautical application.

To support the inclusion of regulatory measures in the Radio Regulations that preclude the operation of cognitive radio systems in bands allocated to aeronautical services.



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**WRC-07 Agenda Item 1.21**

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**Agenda Item Title:**

**To consider a primary allocation to the radiolocation service in the band 15.4-15.7 GHz, taking into account the results of ITU-R studies, in accordance with Resolution 614 (WRC-07);**

**Discussion:**

Radars in the radiolocation service operate on a primary basis worldwide in the band 15.7-17.3 GHz. Emerging requirements for increased resolution and range accuracy necessitate wider emission bandwidths. This agenda item seeks to provide adequate spectrum for new radar systems by considering that the band 15.4-15.7 GHz be additionally allocated on a primary basis worldwide for the radiolocation service.

This band is used by aeronautical radar systems (ground and airborne) operating under the ARNS allocation. They cater for short-range surveillance and precision functions. In aviation, they find considerable application in precision monitoring, approach and surface detection functions as well as for airborne weather radar (AWR) systems where their shorter wavelength is suitable for the detection of storm clouds. One of the vital safety functions of AWR is to give warning of hazardous weather and ensure safe separation of aircraft from hazardous weather conditions. In most countries the carriage of AWR by aircraft is a mandatory requirement.

These aeronautical radars are to remain in service for many years into the future. The allocation of the radiolocation service in these bands needs to be based upon the results of studies in ITU-R, demonstrating that sharing with the radionavigation service on a primary basis is feasible. These studies should also result in ITU-R regulatory provisions and recommendations where necessary stipulating the conditions of the use of these bands by the radiolocation service. Any allocation to the radiolocation service on a primary basis should be considered with a condition indicating that the radiolocation service shall not cause harmful interference to nor claim protection from the (aeronautical) radionavigation service.

**ICAO Position:**

Accept the primary allocation of the radiolocation service in the band 15.4-15.7 GHz, on the basis of agreed studies showing compatibility which take into account the protection of the use of this band by aviation.

Any allocation to the radiolocation service in this band shall be made with the condition that no harmful interference is caused to the aeronautical radionavigation service and that no protection is required to the radiolocation service from the aeronautical radionavigation service.

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**WRC-07 Agenda Item 1.22**

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**Agenda Item Title:**

**To examine the effect of emissions from short-range devices on radiocommunication services, in accordance with Resolution 953 (WRC-07);**

**Discussion:**

This agenda item seeks to study emissions from Short-Range Devices(SRD)s, in particular RFIDs, inside and outside the frequency bands designated in the Radio Regulations for Industrial, Scientific and Medical (ISM) applications to ensure adequate protection of radiocommunication services. The scope of agenda item 1.22 appears to be very broad which is therefore of concern to aviation as it is not clear whether aeronautical bands will be affected. From the wording of the Resolution it is uncertain whether it seeks to find new non-ISM bands for SRDs, or to make regulatory provisions to protect other services including aeronautical services from SRDs. Furthermore, in ITU-R the term SRD is largely undefined. For example, Recommendation SM.1538-1, “for the purpose of the Recommendation” defines SRDs as “intended to cover radio transmitters which have low capability of causing interference to other radio equipment”. In Resolution 953 (WRC-07) they are defined as “radio transmitters or receivers, or both, and hence are not considered as ISM applications under No. **1.15**”. Neither definition, nor the wording of the agenda item or the Resolution, sufficiently constrain the actions that could occur.

The effect of some short range devices on existing radiocommunication systems has been studied by the ITU and various regional radio regulatory bodies. For example, ITU within TG1/8 has extensively studied the effect of a specific short range device technology, ultra wideband, on existing radiocommunication systems. The conclusion of that study is that without constraints, those short range devices have the potential to cause harmful interference to certain aviation systems.

SRDs normally operate on a licence exempt basis. Considering the mobility of aircraft and the large “viewing” area to which aircraft are exposed, together with the variability and uncertainty of a significant number of factors (such as SRD emitter density, signal characteristics, activity factors) necessary for the interference analysis of such devices with systems operating within aeronautical safety services, SRD devices should in general not be operated in frequency bands allocated to safety services. In those cases where such use cannot be avoided, administrations should take all steps necessary to ensure that SRD devices do not cause harmful interference to the reception by stations operating under a safety service allocation. The level of harmful interference into safety systems needs to be determined on a case-by-case basis in form of a safety analysis. This analysis would assess the use being made of the safety system and demonstrate that the required levels of integrity, reliability, and availability are still maintained under all operational conditions. Factors such as the impact on safety service link budget margins and measures to preclude interference from SRD devices that malfunction need to be considered.

Given the safety nature of the services provided by aeronautical systems, the broad scope of the agenda item, and based on studies currently conducted, it is essential that relevant regulatory provisions are included in the Radio Regulations to ensure that short range devices cannot cause harmful interference to aeronautical systems.

**ICAO Position:**

Oppose operation of short range devices in any bands allocated to aeronautical services.

Support the inclusion in the Radio Regulations of appropriate regulatory provisions to ensure that short range devices, operating outside of aeronautical bands, do not cause harmful interference to aeronautical systems operating in allocated aeronautical bands

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**WRC-07 Agenda Item 1.23**

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**Agenda Item Title:**

**To consider an allocation of about 15 kHz in parts of the band 415-526.5 kHz to the amateur service on a secondary basis, taking into account the need to protect existing services;**

**Discussion:**

Aeronautical Non-Directional Beacons (NDB) operate in parts of the band prescribed for study under this agenda item. Whilst the long term goal may be to remove NDB's from use, this is unlikely to be achieved in the near future. It is therefore essential to ensure that whatever action is taken under this agenda item does not adversely affect NDB operations.

**ICAO Position:**

To ensure that any allocation made to the amateur service cannot adversely affect the operation of aeronautical systems operating under allocations to the aeronautical radionavigation service.

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**WRC-07 Agenda Item 1.25**

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**Agenda Item Title:**

**To consider possible additional allocations to the mobile-satellite service, in accordance with Resolution 231 (WRC-07);**

**Discussion:**

This agenda item seeks to identify new allocations that can be made to the mobile satellite service in both the Earth-to-space and space-to-Earth directions with particular focus on the frequency range 4-16 GHz.

Report M.2077 already indicates a shortfall of spectrum available for the satellite component of IMT, however studies need to be done to identify additional spectrum for MSS systems which are not part of the satellite component of IMT.

It should be noted that WRC-11 agenda item 1.7 will include studies for AMS(R)S spectrum requirements, including those which may be required as a result of agenda item 1.3. If those requirements for AMS(R)S cannot be satisfied with the existing 1545-1555 MHz and 1646.5-1656.5 MHz bands, then it authorizes the study of existing MSS allocations, or identification of new allocations, limited to satisfying those AMS(R)S requirements. As a result, it is not expected that AMS(R)S allocations will be addressed under this agenda item.

Care must be taken however to ensure any regulatory action taken as a part of this agenda item does not impact existing AMS(R)S allocations, or any new allocations that may come as a result of studies under agenda item 1.3 or 1.7.

**ICAO Position:**

Ensure that regulatory actions taken under this agenda item do not affect current or future AMS(R)S spectrum

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**WRC-07 Agenda Item 4**

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**Agenda Item Title:**

**In accordance with Resolution 95 (Rev. WRC-03), to review the resolutions and recommendations of previous conferences with a view of possible revision, replacement or abrogation**

**ICAO Position:**

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