Organización de Aviación Civil Internacional
Oficina para Norteamérica, Centroamérica y Caribe (NACC)
Séptima Reunión del Grupo de Trabajo del Caribe Central (C/CAR WG/7)
Ciudad de México, México, 13 al 16 de julio de 2009

Cuestión 2 del Orden del Día **Revisión de los asuntos sobre Navegación Aérea**
2.3 Actividades específicas de navegación aérea
2.3.2 Comunicaciones, Navegación y Vigilancia (CNS)

RESULTADOS DE LA CONFERENCIA MUNDIAL DE RADIOCOMUNICACIONES (2007) (CMR-2007) DE LA UIT Y POSTURA INICIAL DE LA OACI PARA LA CMR-2011

(Presentada por la Secretaría)

RESUMEN

Esta nota de estudio presenta los resultados de la Conferencia Mundial de Radiocomunicaciones (2007) (CMR-2007), la postura inicial de la OACI para la próxima CMR UIT programada para el 2011 y varias acciones sugeridas para el soporte de los Estados en las Reuniones afines a la UIT.

Referencias:

- Informe GREPECAS/15;
- Consejo – Sesión 184 – C-WP/13183;
- Reunión del Grupo de Trabajo F del Grupo de Expertos de Comunicaciones ACP (Montreal 18-22 de mayo 2008); y
- Carta a los Estados NE 24-4 – EMX0295, 1 de abril de 2009.

Objetivos Estratégicos	*Esta nota de estudio se relaciona con los Objetivos estratégicos A y D.*

1. Introducción

1.1 La disponibilidad del espectro necesario de radio frecuencias es un pre-requisito de seguridad operacional en la aviación civil y la implantación efectiva de las comunicaciones, navegación y vigilancia/sistemas de gestión de tránsito aéreo (CNS/ATM). Sin embargo, considerando que la demanda de espectro para los usuarios que no son de aviación está creciendo constantemente, la aviación está enfrentando una competencia creciente para el espectro limitado disponible, particularmente de servicios comerciales de telecomunicaciones. Los avanzados sistemas presentes en la aviónica moderna para las comunicaciones, radio-navegación, reporte automático de posición y enlaces de datos no podrían funcionar sin el acceso al espectro radioeléctrico. El **Apéndice A** a esta nota, contiene una ilustración que muestra estos requerimientos.

1.2 Por lo tanto, es esencial que los requisitos de la aviación para el espectro de radio frecuencias sea ampliamente apoyado por todos los Estados Contratantes de la OACI en todos los foros internacionales donde se trate el asunto de las adjudicaciones del espectro, con el fin de garantizar que todos los requisitos para los servicios vitales de seguridad operacional de la aviación sean debidamente presentados y entendidos.

2. Resultados de la Conferencia Mundial de Radiocomunicaciones (2007) (CMR-2007)

2.1 Las políticas y prácticas de la OACI relacionadas con los asuntos del espectro de radio frecuencias fueron tratados por la Resolución de la Asamblea A36-25 y la postura de la OACI para la CMR-2007, Ref. Circular a los Estados E 3/5-05/85 de fecha 12 de agosto de 2005, fue desarrollada en 2003/2004 por el Grupo de Expertos en Comunicaciones Aeronáuticas (ACP), revisada por la Comisión de Aeronavegación (167-1 y 167-2) y puesta para la consideración y comentarios de los Estados Contratantes de la OACI y las organizaciones internacionales y aprobada por el Consejo (175/14) el 14 de junio de 2005. Esta postura fue actualizada considerando los estudios posteriores realizados por la OACI, y finalmente fue aprobada por el Consejo (181/4) el 28 de mayo de 2007. Esta postura actualizada se circuló a los Estados a través de la carta Ref. E 3/5-07/49, de fecha 22 de junio de 2007 y entregada a la CMR-07 de la UIT el 13 de junio de 2007.

2.2 Los Estados/Territorios/Organizaciones Internacionales manifestaron su apoyo a la postura elaborada por la OACI, a través de las acciones reflejadas en las Conclusiones de Reuniones de Directores de Aviación Civil tales como la Conclusión NACC/DCA 2/13 – *Apoyo de los Estados de las Regiones NAM/CAR a la Postura de la OACI para la CMR-2007 de la UIT*, así como las Conclusiones del GREPECAS 12/33 – *Acciones regionales CAR/SAM para la preparación y apoyo a la postura de la OACI para la CMR-07 y* 13/89 – *Apoyo de los Estados de las Regiones CAR/SAM a la postura de la OACI para la CMR-2007 de la UIT*.

2.3 La Conferencia Mundial de Radiocomunicaciones (2007) (CMR-2007) de la UIT se llevó a cabo del 22 de octubre al 16 de noviembre en Ginebra, Suiza. 2800 delegados de 164 Estados Miembros de la UIT y 104 organizaciones internacionales participaron en el trabajo de la conferencia. En el **Apéndice B** de esta nota de estudio, se muestra un resumen de los resultados principales de la CMR-07 para la aviación civil internacional.

2.4 Durante la conferencia, tres reuniones de coordinación de aviación fueron organizadas por la Delegación de la OACI con la asistencia de aproximadamente 60 expertos en aviación. Las reuniones trataron todas las cuestiones relacionadas con la aviación, particularmente aquellas relacionadas con propuestas específicas que surgieron durante la conferencia. Durante dichas reuniones, el apoyo a la postura de la OACI fue coordinado de manera bilateral con individuos de administraciones de aviación, tomando en consideración los desarrollos durante la conferencia.

2.5 En general, los resultados de la conferencia cumplieron con la postura de la OACI. Un elemento significativo en las actividades preparatorias de la OACI para esta conferencia fue la conciencia temprana y la participación de los Estados Contratantes respecto al desarrollo de la postura de la OACI. Los factores principales para este logro incluyeron:

a) el desarrollo temprano y la divulgación de la postura preliminar de la OACI por parte de la Secretaría y la Comisión de Aeronavegación, asistidos por el ACP y el NSP;

b) la participación activa por parte de los expertos de la OACI en la labor preparatoria para la UIT;

c) el incremento en la participación de los expertos de la OACI en las reuniones de las organizaciones regionales de telecomunicaciones (APT, CEPT, CITEL, ATU). La participación de las oficinas regionales, con la asistencia de la Sede cuando fue requerida, fue importante para el apoyo del desarrollo de propuestas por parte de las organizaciones regionales de telecomunicaciones para la conferencia, las cuales estaban alineadas con la postura de la OACI;

d) la organización de reuniones de los grupos de trabajo del ACP y los seminarios de radio frecuencias de la OACI en las regiones;

e) la implantación de la Resolución de la Asamblea A32-13; y

f) la participación activa de la Delegación de la OACI en la conferencia misma.

3. Postura preliminar de la OACI para la UIT CMR 2011

3.1 El grupo de trabajo F del Grupo de Expertos de Comunicaciones Aeronáutica se reunió en Montreal del 12 al 22 de mayo de 2008 y elaboró la postura inicial de la OACI para la próxima reunión de la CMR que se realizará el 2011 (CMR/11). Esta propuesta preliminar fue revisada de nuevo por este Grupo de Expertos a fines del 2008 y se hizo circular la misma a través de la carta a los Estados Ref. E 3/5-08/69 del 28 de noviembre del 2008 para comentarios para a mas tardar febrero del 2009. Para mediados del 2009 está previsto finalizar la posición de la OACI ante la UIT y su distribución a los Estados contratantes de la OACI, las Organizaciones Internacionales y la Secretaría de la OACI. De igual forma se tiene previsto la actualización del Manual OACI sobre Espectro radioeléctrico, Doc 9718 con la revisión de la Política del Espectro Radioeléctrico. En el **Apéndice C** de esta nota de estudio se presenta la postura inicial de la OACI a la CMR 2011.

3.2 Los Estados y Organizaciones Internacionales de las Regiones CAR/SAM, con vista a la preparación y apoyo a la postura de la OACI para la Conferencia Mundial de Radiocomunicaciones – 2011 (CMR-11) de la UIT, han manifestado proporcionar apoyo y seguimiento a la preparación y actualización de la postura de la OACI para la CMR-11; tal y como se manifestó en la Tercera Reunión de Directores de Norteamérica, Centroamérica y el Caribe (NACC/DCA/3) a través de su Conclusión NACC/DCA/3/6 – *Apoyo de los Estados de las Regiones NAM/CAR a la postura de la OACI para la CMR-11 de la UIT* así como en la Reunión GREPECAS/15 a través de su Conclusión 15/46 – *Acciones Regionales CAR/SAM para la preparación y apoyo a la postura de la OACI para la CMR-11*.

3.3 Basados en el apoyo manifiesto por los Estados, la Oficina Regional NACC de la OACI ha solicitado a los Estados, Territorios y Organizaciones Internacionales la designación de la personas que fungirán como Punto de Contacto para este apoyo, a través de la carta Ref. NE 24-4 – EMX0295 fechada 1 de abril de 2009. Este punto de contacto estará en comunicación con la OACI y con la autoridad nacional de gestión del espectro de radiofrecuencias para la coordinación de las cuestiones relacionadas con la CMR-11. Asimismo, los puntos focales deberían seguir participado activamente en las reuniones CITEL de la Organización de Estados Americanos (OEA) sobre el trabajo preparatorio para la CMR-11, así como para participar de manera activa en las reuniones y seminarios que sean convocados por la OACI para explicar y analizar la postura de esta organización para la CMR-11 y participar en la CMR-11 de manera activa apoyando la postura de la OACI.

3.4 Basado en las actividades realizadas en preparación al apoyo de la postura de la OACI para la CMR-2007, y conscientes de la necesidad del seguimiento y participación activa de los Estados y Organizaciones Internacionales desde la etapa de la revisión de la postura inicial para la CMR-11 hasta la participación de la CMR-11, la comunicación y el entendimiento de la postura de la OACI para el apoyo de los Estados/ Territorios y organizaciones Internacionales es vital, por tal motivo, la realización de un seminario relativo a la gestión del espectro radioeléctrico para la aviación y los preparativos para la CMR-2011 podría ser beneficioso para este apoyo.

3. Acción Sugerida

3.1 Se invita a la Reunión a:

a) tomar nota de la información contenida en esta nota de estudio y sus apéndices;

b) que los Estados/Territorios nombren sus puntos de contactos según lo indicado en los párrafos 3.2 y 3.3;

c) consideren la necesidad de un seminario sobre la gestión del espectro radioeléctrico para la aviación y los preparativos para la CMR-2011; y

d) proponer cualquier otra acción que se estime adecuada.

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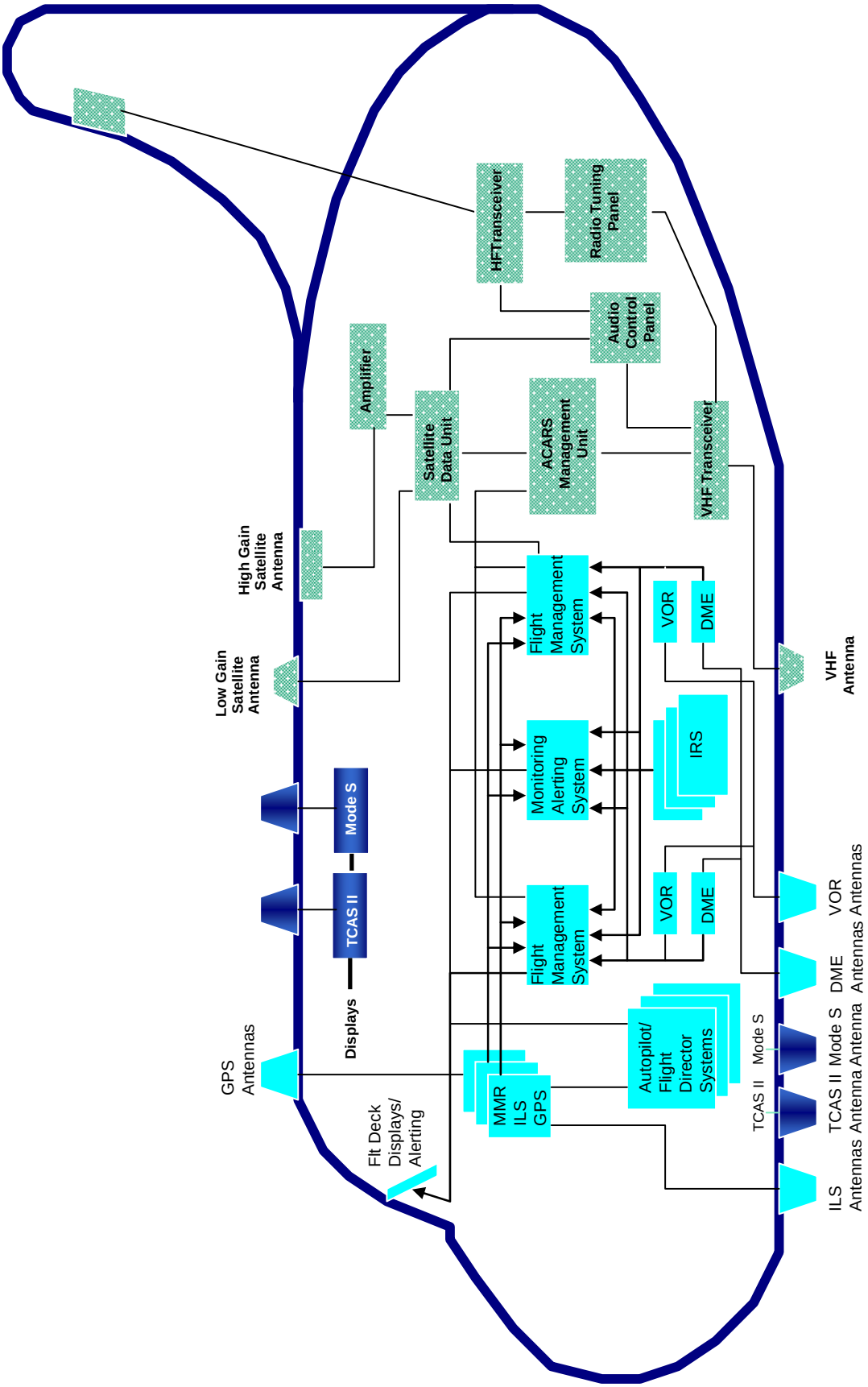
APÉNDICE A


HFTransceiver
Radio Tuning Panel
Audio Control Panel
Amplifier
Satellite Data Unit
ACARS Management Unit
VHF Transceiver
High Gain Satellite Antenna
Low Gain Satellite Antenna
Flight Management System
VOR
DME
VHF Antenna
Monitoring Alerting System
IRS
Mode S
TCAS II
Displays
Flight Management System
VOR
DME
VOR Antennas
DME Antennas
GPS Antennas
MMR ILS GPS
Autopilot/ Flight Director Systems
Mode S
TCAS II Antenna
Mode S Antenna
TCAS II Antennas
ILS Antennas
Flt Deck Displays/ Alerting

APÉNDICE B

RESUMEN DE LOS RESULTADOS PRINCIPALES DE LA CMR-07 PARA LA AVIACIÓN CIVIL INTERNACIONAL

1. Protección de las señales del sistema mundial de navegación por satélite (GNSS) en la banda 1559-1 610 MHz (sistema mundial de determinación de la posición [GPS], sistema mundial de navegación por satélite [GLONASS]) fue mejorado mediante la reducción del servicio fijo (FS) operando en esta banda en treinta y cuatro países a un estado secundario. Por consiguiente, la operación del FS en estos países tiene que proteger el GNSS. Hasta finales de 2009, esta banda estará asignada de manera principal en nueve países de África y el Medio Oriente. A pesar de que el uso de esta banda por parte del FS necesita finalizar a más tardar en el 2015, hasta el 2009 el servicio GNSS que opera en esta banda será protegido mundialmente. Además, la eliminación de la asignación de los servicios de radionavegación aeronáutica en Suecia (utilizados para los sistemas de radar) mejoraron aún más la protección del GNSS en Europa.

2. La conferencia acordó mejorar el servicio de radio localización (RLS) a un estado primario e introducir en el mismo estado, el servicio satelital de exploración de la tierra (EESS) (activo) y el servicio de investigación del espacio (SRS) (activo) en las bandas de 9 GHz a una asignación primaria. La conferencia acordó, después de un intenso debate, a proporcionar el servicio de radionavegación aeronáutica operando en estas bandas (radares basados en tierra y radares de clima de a bordo) bajo la protección de reglamentación necesaria, de acuerdo con la postura de la OACI.

3. Se acordó fijar las asignaciones al servicio (de ruta) móvil aeronáutico (AM(R)S) en las bandas 112-117.975 MHz, 960-1164 MHz y 5091-5150 MHz . Esto satisface la postura de la OACI, la cual se basó en los requisitos de ancho de banda identificados en el Estudio de Comunicaciones Futuras que realizó el Grupo de Expertos de Comunicaciones Aeronáuticas, con la excepción de la banda de 5 GHz, donde podría necesitarse más ancho de banda. Las nuevas asignaciones AM(R)S están en bandas que también se han asignado al servicio de radionavegación aeronáutica (ARNS) y utilizados (o planean ser utilizados) por el VOR, DME, SSR, UAT y MLS. Las asignaciones están sujetas a no causar interferencia dañina, ni a tener el derecho de protección por parte de estaciones operando en el ARNS. Las asignaciones están limitadas a las operaciones de superficie aeroportuaria y son compartidas con asignaciones para la telemetría móvil aeronáutica (AMT) y con las transmisiones de seguridad aeronáutica (AS). AS es una aplicación que proporciona un enlace de ancho de banda amplio de una aeronave a tierra, por ejemplo, la transmisión de un video, en caso de una intervención ilícita.

4. Para satisfacer las necesidades de la telemetría móvil aeronáutica (AMT) para pruebas de vuelo, la conferencia acordó tener una asignación mundial en la banda 5091-5150 MHz (banda de extensión MLS). Un número de frecuencias de banda, que actualmente no son usados con fines de seguridad aeronáutica, en el rango de 4 y 6 GHz, así como la banda 5091-5 150 MHz, fueron también asignados para AMT de manera regional o subregional.

5. La conferencia acordó eliminar la disposición que brindaba la precedencia al MLS sobre cualquier otro uso en la banda 5 091-5 150 MHz (banda de extensión MLS). La fecha después de la cual no se podrán realizar nuevas asignaciones al servicio fijo satelital (FSS) en la banda de extensión MLS fue extendida de 2012 a 2016.

6 Se reconoce que las redes VSAT que operen en el servicio fijo satelital puede ser utilizado para aplicaciones de seguridad aeronáutica. A este respecto, la CMR 07 formuló una recomendación.

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APPENDIX C / APÉNDICE 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[1] 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.*

[1] 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).

WRC-07 Agenda Item 1.1

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:

*No. **5.72***	*Norway*
*No. **5.181***	*Egypt, Israel and Syrian Arab Republic*
*No. **5.197***	*Pakistan and Syrian Arab Republic*
*No. **5.259***	*Egypt, Israel, Japan and Syrian Arab Republic*
*No. **5.330***	*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*

*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 Lithuani,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*

WRC-07 Agenda Item 1.2

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.

WRC-07 Agenda Item 1.3

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

WRC-11 Agenda Item 1.4

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.

WRC-07 Agenda Item 1.5

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.

WRC-07 Agenda Item 1.7

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 .

WRC-07 Agenda Item 1.9

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.

WRC-07 Agenda Item 1.12

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.

WRC-07 Agenda Item 1.14

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.

WRC-07 Agenda Item 1.15

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

WRC-07 Agenda Item 1.19

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.

WRC-07 Agenda Item 1.21

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.

WRC-07 Agenda Item 1.22

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

WRC-07 Agenda Item 1.23

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.

WRC-07 Agenda Item 1.25

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

WRC-07 Agenda Item 4

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:

— END —