INTERNATIONAL CIVIL AVIATION ORGANIZATION

AFI PLANNING AND IMPLEMENTATION REGIONAL GROUP (APIRG)
COMMUNICATIONS, NAVIGATION AND SURVEILLANCE SUB-GROUP
SECOND MEETING
(CNS/SG/2)

(Dakar, Senegal 22 – 25 May 2007)

Agenda Item 8: Review of ICAO position and preparations for the ITU WRC - 2007

Amendments to the ICAO position for the ITU WRC-07

(Presented by the ICAO Secretariat)

1. Introduction

1.1 The Council approved the ICAO position for the World Radiocommunication Conference (2007) (WRC-07) on 14 June 2005. Thereafter, the Secretary General circulated the ICAO position to States and international organizations (State letter E 3/5-05/85 dated 12 August 2005 refers). The ICAO position which has been made available on the ICAO Website (**www.icao.int/icaonet**) was submitted to the Conference Preparatory Meeting (CPM) held in 2006.

2. Discussion

2.1 When the ICAO position for WRC-07 was established, studies, 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, were still ongoing in ICAO's Navigation Systems Panel (NSP) and Aeronautical Communications Panel (ACP), in ITU and in regional telecommunication organizations.

2.2 The ICAO studies have now been completed and were reviewed at a combined meeting of ACP Working Group F and the Spectrum Sub-group of the NSP in December 2006. This meeting agreed that amendments to the ICAO position were necessary particularly on WRC-07 Agenda items 1.5, 1.6, 1.20 and 7.2.

2.3 Appendix to this paper provides the CNS Sub-group with updates to the ICAO position in anticipation, in view of the preparatory work and coordination activities in progress throughout the Region.

3. Action by the meeting

3.1 The CNS Sub-group is particularly invited to request States to:

a) Ensure that ICAO position on issues of interest to international civil aviation to be discussed at WRC-07, are taken into consideration in a timely manner by their telecommunication authorities in your country CMR-07, in accordance with APIRG Conclusion 15/26;

b) Inform these authorities of Council approved amendments to ICAO position on WRC-07 Agenda items 1.5, 1.6, 1.20 and 7.2, based on the material provided at Appendix hereto; and

c) Provide the ICAO Regional Offices with the names and addresses (telephone, fax, electronic mail address) of their designated focal points of contact for ITU matters.

WRC-07 Agenda Item 1.5

Agenda Item Title:

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)

Discussion:

Non-Safety Related Aeronautical Telecommand and Telemetry

The development of modern aircraft requires a large test flight program. These programs are required to gather a large amount of data on the performance of the airframe under test. By providing a real-time link between the aircraft and the ground control centre, the amount of testing and the number of flights can be kept to a minimum. This will result in faster development programs and hence achieve a significant cost saving. This agenda item seeks to make provision for the required air-ground telemetry links.

The use of such telemetry links however must not adversely affect existing and planned aeronautical systems. Aeronautical telemetry, not being a safety service, can operate with allocations to the mobile or the aeronautical mobile services, either on a primary or secondary status. Aeronautical telemetry includes telemetry and associated telecommand assisting flight-testing of aircraft as well as any non-safety related telemetry and telecommand applications for unmanned aerial vehicles (UAV).

ICAO studies have demonstrated that the band 5 030 - 5 091 MHz is required for the aeronautical radionavigation service (MLS) and therefore the current allocations in this band should remain unchanged. In addition, since not all requirements for MLS can be met in the band 5 030 - 5 091 MHz, parts of the band 5 091 - 5 150 MHz may also be necessary for MLS in some geographical areas. In order to secure MLS operations it is of paramount importance that no modification should be made to provisions Nos. **5.444** and **5.444A** of the Radio Regulations, which provide priority access for MLS to the band 5 030 - 5 150 MHz. Studies in ICAO have further shown that an aggregate interference level of -130 dBm/150 kHz will ensure protection of MLS. This will result in very large separation distance with aeronautical telemetry, making co-frequency sharing in the same geographical area not practicable. The band 5 091 - 5 150 MHz is also required for the aeronautical mobile (R) service, to support communication related to safety and regularity of flight (ICAO position for WRC-07 Agenda Item 1.6 refers). Hence, additional allocations for the implementation of aeronautical telemetry can only be supported by ICAO if protection and priority access of MLS and AM(R)S is secured in the Radio Regulations.

ICAO Position:

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, in accordance with the provisions of Resolution 230 (WRC-03). 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.

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).

To support the continued use and protection of frequency bands currently allocated and used for aeronautical telemetry applications.

Note.— Current allocations designated for the use by aeronautical telemetry are:

*No. **5.342***	*1 429 - 1 535 MHz*	*Several countries in ITU Region 1 (Eastern Europe)*
*No. **5.343***	*1 435 - 1 535 MHz*	*ITU Region 2*
*No. **5.394***	*2 300 - 2 390 MHz*	*United States*
	2 300 - 2 483.5 MHz	*Canada*
*No. **5.395***	*2 310 - 2 360 MHz*	*France, Turkey*

WRC-07 Agenda Item 1.6

Agenda Item Title:

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)

Discussion:

Resolution 414 – Consideration of the frequency range between 108 MHz and 6 GHz for new aeronautical applications

In some regions, in particular in portions of Region 1 (Europe) and Region 2 (North America), the aeronautical VHF communications band 117.975 - 137 MHz is heavily congested. Assignable VHF spectrum for line-of-sight communications to support safety and regularity of flight has become increasingly limited, and in some cases non-existent, even after introduction of more spectrum efficient techniques.

In addition, new applications are foreseen to be globally implemented and mainly making use of data communication systems. These are needed to accommodate expected air traffic growth and to support

various new ATM, as well as aviation security requirements. In particular, aviation has identified the need for introducing aeronautical safety systems including those that would:

a) overcome limitations of conventional systems and allow ATM to further develop on a global scale;

b) provide increased information exchange between aircraft and ground systems as well as between aircraft (e.g. ATC centres, aircraft operating agencies, etc.); and

c) reduce runway incursions through the use of high integrity, wireless local area networks combined with connected grids of distributed sensors.

For aviation, these new applications support air navigation functions (i.e. communication, navigation or surveillance or a combination of these) through the transmission or exchange of data. However, within the terms of the ITU definitions, they require to operate under an allocation to the AM(R)S, thus requiring additional allocations to be made in the relevant bands between 108 MHz to 6 GHz.

The combination of VHF band spectrum congestion, growing air traffic and evolving aeronautical applications drive an urgent need for new AM(R)S allocations.

Furthermore, an increased use of short-range communication links on or around airports is expected to be required to support the transfer of safety critical information generated by systems such as air traffic control radar, wind-shear radar, remote control systems, automated weather information systems, runway lighting etc. between nodes of high integrity airport surface wireless local area networks.
Spectrum currently globally allocated to the aeronautical radionavigation service (ARNS) and having suitable propagation conditions to support air-ground communication systems has been considered in ICAO. ICAO supports additional allocations to the AM(R)S in the frequency bands 960 - 1 164 MHz, 5 000 - 5 030 MHz and 5 091 - 5 150 MHz. The introduction of an allocation to the AM(R)S in any of these bands needs to be limited to ICAO standardized systems ('... operating in accordance with international aeronautical standards'), preferably through an appropriate footnote. Compatibility with ICAO standardized systems will be addressed in ICAO. Compatibility with in-band and adjacent band non-aeronautical systems will be addressed in ITU, as required, when the technical characteristics of these aeronautical communication systems are being established. Special attention is required for appropriate provisions in the Radio Regulations to allow for the proposed use of the universal access transceiver (UAT) system which operates on the frequency 978 MHz.

ICAO studies have demonstrated that the band 5 030 - 5 091 MHz is required for the aeronautical radionavigation service (MLS) and therefore the current allocations in this band should remain unchanged. In addition, since not all requirements for MLS can be met in the band 5 030 - 5 091 MHz, parts of the band 5 091 - 5 150 MHz may also be necessary for MLS in some geographical areas, and thus its priority in this band must be maintained.

No change to the current allocations in the bands 108 - 112 MHz and 328.6 - 335.4 MHz since it is expected that these bands on a long-term basis (more than twenty years) would be required to accommodate the Instrument Landing System (ILS) (Localizer and Glide Path), including ILS Category I, Category II and Category III operations and other ICAO standardized systems covered under No. **5.197A** which support navigation and surveillance functions. However the current limitations to AM(R)S in the band 112 - 117.975 MHz as per No. **5.197A** can be removed.

Frequency bands allocated to the aeronautical radionavigation service or radionavigation service between 1 215 - 4 400 MHz and 5 350 - 5 470 MHz are considered to be not available for an allocation to the aeronautical mobile (R) service due to the extensive use of some of these bands by primary radar systems, introduction of aeronautical radionavigation systems supporting GNSS, by radio altimeters and airborne weather radar systems.

Resolution 415 - Study of current satellite frequency allocations that will support the modernization of civil aviation telecommunication systems

Resolution **415 (WRC-03)** is addressing possibilities of broadening the services and applications of the use of current satellite frequency allocations to allow the expansion of the ICAO communications, navigation, surveillance and air traffic management (CNS/ATM) systems through using, for aeronautical safety purposes, systems that can also support other, non-aeronautical services.

Ground-ground communications

Satellite communications provide a real possibility to meet the demands of the ICAO CNS/ATM system, especially in areas where a terrestrial communication infrastructure is lacking. The benefits of using in particular very small aperture terminals (VSAT) include the use of the most appropriate and cost-effective technology to improve aeronautical ground-ground communications. VSAT networks have been implemented in a number of ICAO regions and the operation of these networks is well under control. Potential shortcomings, such as interoperability issues between different networks, require a technical or administrative (with administrations and/or service providers) solution. In view of their role in aeronautical safety service communications, aeronautical VSAT systems can be used on a shared basis to offer telecommunication services to non-aeronautical users, subject to appropriate priorities being afforded to aeronautical telecommunications.

VSAT networks operate under an allocation to the fixed satellite service (FSS) which in the ITU is not recognized as a safety service. In this regard, it is necessary to consider in the ITU, preferably through the adoption of a new Recommendation at WRC-07, how to recognize the safety aspects of the aeronautical telecommunications element VSAT networks can carry. Such a Recommendation, however, should not impose additional constraints on the VSAT operators.

Air-ground communications

AMS(R)S:

Currently, special provisions in the Radio Regulations provide for priority to accommodate the spectrum requirements for the aeronautical mobile satellite (R) service (AMS(R)S) through No. **5.357A** and Resolution **222 (WRC-2000)** in the frequency bands 1 545 - 1 555 MHz and 1 646.5 - 1 656.5 MHz. Difficulties in coordinating adequate spectrum access for AMS(R)S have been experienced. ICAO supports a review of these allocations with the aim to securing long term spectrum availability and protection for AMS(R)S. The results of ITU-R studies show that real-time pre-emptive access between different networks of mobile-satellite service is not feasible and can no longer be seen as a method to ensure priority access and immediate availability for AMS(R)S. As a result of these developments, WRC-11 needs to consider the allocations in these bands and to provide an effective mechanism securing long-term access for aviation to these bands (ICAO position for WRC-07 Agenda Item 7.2 refers).

ICAO Position:

Resolution 414

To support global allocations to the aeronautical mobile (R) service in portions of the aeronautical radionavigation service (ARNS) frequency bands 960 - 1 164 MHz, 5 000 - 5 010 MHz, 5 010 - 5 030 MHz and 5 091 - 5 150 MHz. Use of the AM(R)S allocations shall be limited to systems which operate in accordance with recognized international aeronautical (ICAO) standards. Compatibility issues with regard to aeronautical radionavigation systems, operating in accordance with recognized international aeronautical (ICAO) standards will be addressed in ICAO and will be part of the development of relevant Standards and Recommended Practices (SARPs) for the communication systems. Compatibility issues with regard to other services to which the bands are allocated will be addressed in the ITU-R as appropriate.

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).

No change to the current regulatory provisions which secure priority access of MLS to the band 5 030 – 5 150 MHz.

To support appropriate regulatory provisions ensuring protection of RNSS in the bands 5 000 - 5 010 MHz and 5 010 - 5 030 MHz as well as protection of FSS in the band 5 091 - 5 150 MHz.

No change to the current allocations in the bands 108 - 112 MHz and 328.6 - 335.4 MHz.

To support removal of the current limitation on AM(R)S in the band 112 - 117.975 MHz.

Resolution 415

To support appropriate regulatory measure, preferably in the format of an ITU Recommendation in the Radio Regulations which recognizes that VSAT networks operating in the fixed satellite service can also be used for aeronautical safety applications. This includes provisions for the necessary priorities for aeronautical telecommunications when aeronautical VSAT networks are also being used to provide non-aeronautical telecommunications.

WRC-07 Agenda Item 1.20

Agenda Item Title:

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)

Discussion:

Resolution **738 (WRC-03)** resolved to invite ITU-R to initiate compatibility studies between stations in the Earth exploration-satellite service (EESS) (passive) receiving in the frequency band 1 400 - 1 427 MHz and stations of various other radio services transmitting in the adjacent frequency bands with a view to updating ITU-R Recommendation SM.1633. One of the spectrum engineering main considerations is to study the impact of unwanted emissions of active services in the out-of-band domain which fall in the 1 400 - 1 427 MHz band, allocated to the EESS. Studies in the ITU-R have shown that systems currently operating in the radiodetermination service in the band 1 215 - 1 400 MHz and conforming to the relevant ITU-R recommendations will not be able to meet the suggested maximum value of –28.9 dBW per 27 MHz for unwanted emissions. The application of suggested mitigation methods to help radar systems achieve compliance with the proposed unwanted emission limits will negatively impact radar system operational performance and as such represent a significant additional burden on the radiodetermination service.

Of particular concern to aviation is that the band below 1 400 MHz is used by the aeronautical radionavigation service (radar) through Nos. **5.334** and **5.338** and their operations should not be unduly constrained.

The use of the band 1 429 - 1 535 MHz for aeronautical telemetry is regulated through Nos. **5.342** and **5.343** for aeronautical telemetry and this usage should not be adversely affected by the wish to improve protection to the Earth exploration-satellite service.

ICAO Position:

Protection of the Earth exploration-satellite service in the band 1 400 - 1 427 MHz should not impose undue constraints to the use of the adjacent bands by aviation.

WRC-07 Agenda Item 7.2

Agenda Item Title:

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)

Discussion:

This agenda item addresses the preliminary agenda for WRC-11 which was established at WRC-03 and will be reviewed at WRC-07. The preliminary agenda for WRC-11 includes Agenda Item 2.3 *"to consider results of ITU-R studies in accordance with Resolution* ***222 (WRC-2000)*** *to ensure spectrum availability and protection for the aeronautical mobile-satellite (R) service, and to take appropriate action on this subject, while retaining the generic allocation for the mobile-satellite service;*". Resolution **222** was adopted at WRC-2000 and at the timing of WRC-03, the studies were not yet completed.

The introduction of new generic type allocations to the mobile-satellite service (MSS) in 1997, which replaced the exclusive allocations to the aeronautical, land and maritime mobile-satellite services, has not recognized the serious reservations by the international civil aviation community on compatibility of AMS(R)S with other non-aeronautical mobile-satellite services. Even though WRC-97 decided that prioritization and pre-emption were to be the basis for securing timely access to the satellite frequency band for aviation. This is stipulated in No. **5.357A**:

> ***5.357A*** *In applying the procedures of Section II of Article **9** to the mobile-satellite service in the bands 1 545 - 1 555 MHz and 1 646.5 - 1 656.5 MHz, priority shall be given to accommodating the spectrum requirements of the aeronautical mobile-satellite (R) service providing transmission of messages with priority 1 to 6 in Article **44**. Aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article **44** shall have **priority access and immediate availability, by pre-emption if necessary**, over all other mobile-satellite communications operating within a network. Mobile-satellite systems shall not cause unacceptable interference to, or claim protection from, aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article **44**. Account shall be taken of the priority of safety-related communications in the other mobile-satellite services. (The provisions of Resolution **222 (WRC-2000)** shall apply.) (WRC-2000)*

In 2005, ITU Report 2073 on the *"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"* was approved. This report concludes, *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 economical reasons. This means that "intersystem real-time pre-emption" cannot be used as an effective method to ensure long-term spectrum availability and protection for the AMS(R)S communications in these bands.

In addition, since 1997, the allotment of spectrum to mobile-satellite service providers has been organized under the provisions of various regional Memoranda of Understanding (MoU). The allotments agreed under the provisions of these MoUs are not available in the public domain and are not known to ICAO. This makes it virtually impossible for aviation to develop long-term planning for using this spectrum. ICAO has also been informed that the current provisions and procedures for AMS(R)S under these MoUs (which effectively bypass the open coordination process as is normal under the provisions of the ITU) are insufficient to satisfy future demand for AMS(R)S spectrum.

As demand for non-AMS(R)S communication over mobile-satellite service systems is anticipated to further increase, it is becoming more and more difficult to ensure adequate spectrum availability for AMS(R)S.

As a result of these developments, WRC-11 needs to consider the allocations in these bands and to provide an effective mechanism securing long-term access for aviation to these bands.

ICAO Position:

To support the inclusion of an agenda item for WRC-11 addressing the MSS 1.5/1.6 GHz bands with a view to ensure long-term spectrum availability and protection for the AMS(R)S communications in these bands, taking into account the results of the studies in ITU Report 2073.

— END —