INTERNATIONAL CIVIL AVIATION ORGANIZATION

ASIA AND PACIFIC OFFICE

REPORT OF THE SECOND REGIONAL PREPARATORY GROUP (RPG) MEETING FOR ITU WORLD RADIOCOMMUNICATION CONFERENCE (WRC-2007)

15-17 January 2007
Bangkok, Thailand

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1. Introduction

1.1 The Second Regional Preparatory Group (RPG) Meeting for ITU World Radiocommunication Conference 2007 (WRC-2007) was held in Bangkok, Thailand, from 15-17 January 2007. The meeting was organized in accordance with Conclusion 17/30 of the Seventeenth Meeting of the ASIA/PAC Air Navigation Planning and Implementation Regional Group (APANPIRG/17). The objective of the meeting was to provide necessary support to aviation experts in the Asia/Pacific region in preparation for the Fifth APT Preparatory Group Meeting for WRC-2007 (APG-2007-5) scheduled to be held from 16 to 21 July 2007 and also to finalize preparation for WRC-2007.

2. Attendance and Election of Chairperson

2.1 The meeting was attended by 20 participants from 13 States. The list of participants is at **Attachment 1**.

2.2 Mr. Jim Weller, Spectrum Manager of Airservices Australia, proposed by Thailand, seconded by Malaysia and supported by Japan and Bhutan, was unanimously elected as the Chairperson of the meeting.

3. Opening of the Meeting

3.1 Mr. L. B. Shah, ICAO Regional Director for the Asia and Pacific Office, opened the meeting. In his opening address, Mr. Shah welcomed the participants and stated that the preparatory work for WRC-2007 has been given high priority by the ICAO Regional Office. He stated that the Asia and Pacific DGCA Conferences and APANPIRG meetings had fully supported the initiatives and had adopted Conclusions and Action Items urging States to provide continuous support to ICAO position at the national and regional levels. He pointed out that potential high demand for the aeronautical bands as its global allocation and the protection of aeronautical spectrum from harmful interference is one of the key priorities and regional performance objectives established in the region. He emphasized the importance for the States to provide documents to their Radio Regulators supporting aviation position on all relevant WRC-2007 agenda items in order to enable them to include aviation position in the State's position paper to be submitted to APT for APG-2007-5 meeting and to the ITU WRC-2007.

3.2 Mr. Jim Weller, Chairperson of the meeting, in his opening remarks highlighted the Output and achievements of APT APG-2007-4 held in the previous week and identified the need for further efforts by aviation community at the Fifth and final APT APG meeting. He stated that it was encouraging to note the increasing number of aviation representatives at the APG meetings. He also thanked the ICAO Regional Office for the excellent arrangements made for the meeting.

3.3 Mr. Robert Witzen, Technical Officer CNS of ICAO Headquarters provided introductory remarks. He informed the meeting that the updates to the ICAO position on certain items, based on the outcome of recent ACP Working Group F meeting had been provided to APT APG-2007-4. It will be presented to the CPM meeting and subsequently to the ANC in February and the ICAO Council for approval in May. He further informed the meeting that the Fourth Edition of Spectrum Handbook has been finalized and will be made available within 3 to 4 weeks from now.

3.4 Mr. Li Peng, Regional Officer CNS of the ICAO Asia and Pacific Office welcomed the participants and provided an overview of the proceedings of the meeting and encouraged participants to seek clarification on any of the issues.

4. Officer and Secretariat

4.1 Mr. Jim Weller as Chairperson of the meeting presided over the meeting. Mr. Robert Witzen, Technical Officer CNS of ICAO Headquarters and Mr. Li Peng, Regional Officer CNS, Asia and Pacific Office acted as the Secretaries of the meeting.

5. Agenda of the meeting

5.1 The Agenda adopted by the meeting was as follows:

Agenda Item 1: Review outcome of APANPIRG/17 on preparatory activities for ITU World Radiocommunication Conference 2007 (WRC-2007) and spectrum management;

Agenda Item 2: Review of ICAO position for WRC-2007 and outcome of ACP WG F on proposed changes to the ICAO position including;

a) WRC-07 agenda items 1.1, 1.3, 1.4, 1.5, 1.16, 1.17, 1.20, 1.21 and 2;

b) WRC-07 agenda item 1.6;
i) Resolution 414
ii) Resolution 415

c) WRC-07 agenda item 4
Review of ITU Resolutions and Recommendations as listed in the current ICAO position and;

d) WRC-07 agenda item 7.1
WRC-07 agenda item 7.2
(agenda for future ITU conferences)

Agenda Item 3: Review outcome of the Fourth Asia Pacific Telecommunity (APT) Preparatory Group Meeting for WRC-2007 (APG 2007-4) and developments in regional telecommunication bodies such as CITEL, CEPT from an aeronautical perspective;

Agenda Item 4: Role of aviation sector in the preparation of APT/APG-5 and WRC- 2007. States preparatory work for WRC-2007; and

Agenda Item 5: Any other business

6. Organization, Working arrangement, Language and Documentation

6.1 The Meeting met as a single body. The working language was English inclusive of all documentation and this report. A list of working and information papers presented at the meeting is at **Attachment 2.**

Agenda Item 1: Review outcome of APANPIRG/17 on preparatory activities for ITU World Radiocommunication Conference 2007 (WRC-2007) and spectrum management

1.1 The meeting reviewed the regional preparatory activities for WRC-2007 as introduced by a paper presented by the Secretariat.

ICAO Position for WRC-2007

1.2 The ICAO position against relevant agenda items of ITU WRC-2007 was transmitted to States by State Letter E3/5-05/85 dated 12 August 2005. States were requested to consider the ICAO position when developing their national position for WRC-2007 and to support the ICAO position at regional forum and at WRC-2007.

1.3 Draft updates to ICAO Position for WRC-07 on issues of interest for international civil aviation were developed by ACP WG-F/16 and the Secretariat in December 2006. The draft updates were provided to APT APG/4 meeting held 8-12 January 2007. The draft updates to ICAO Position for WRC-07 will be reviewed by Air Navigation Commission in February 2007 and the result of review is expected to be approved by ICAO Council in May 2007. The updated ICAO position approved by the Council will be submitted to ITU for the WRC-2007.

Action taken by DGCA Conference for WRC-2007

1.4 The 43rd Conference of DGCAs held in early December 2006 in Indonesia strongly urged States to accord high priority to ensuring support to the ICAO Position at the APT meetings as well as at the WRC-2007. The Conference adopted the following action item:

ACTION ITEM 43/7 Preparation for WRC 2007

Recognizing the crucial importance of protecting the aeronautical frequency spectrum at the World Radiocommunication Conference in 2007 (WRC-2007), the Conference:

a) Strongly urged Asia Pacific States to participate in the Asia-Pacific Telecommunity (APT) Preparatory Meetings and the Regional Preparatory Group Meeting for WRC-2007 in Bangkok in early 2007;

b) Urged Civil Aviation Administrations to work closely with the relevant national authorities to ensure support to the ICAO position at the WRC-2007.

Actions by APANPIRG for WRC-2007

1.5 APANPIRG/14 held in 2003 adopted Conclusion 14/24 to assign high priority to the spectrum management and initiate actions for preparation for WRC-2007.

1.6 APANPIRG/15 held in 2004 recognized that the two ICAO Regional Preparatory Group (RPG) meetings conducted for WRC-2003 were found to be very helpful and highly productive and supported the needs for organizing such meetings for WRC-2007.

1.7 APANPIRG/16 held in August 2005 reviewed recent regional activities of preparation for WRC-2007.

1.8 APANPIRG/17 meeting held in August 2006 noted preparatory activities for WRC-2007 in Australia, Japan, New Zealand, and USA. The meeting also noted that IATA strongly supported the need for stronger participation by States to represent aviation interests and to provide protection to the aviation spectrum at national level discussions and at the regional preparatory meetings for WRC-2007. States were urged to finalize their position in support of the ICAO position and take timely actions to have the aviation position included in the States position paper. The APANPIRG/17 adopted Conclusion 17/30 for organizing a Regional Preparatory Group Meeting for WRC-2007 in early 2007.

Asia-Pacific Telecommunity (APT) Conference Preparatory Group Meetings for WRC-2007

1.9 The Asia-Pacific Telecommunity (APT) is developing the regional Position for WRC-2007. To achieve this goal, APT has planned to convene 5 APG meetings. The First APT APG 2007-1 Meeting was held in Bangkok from 11 to 12 November 2003. The objective of the meeting was to establish the APG new structure and plan for the preparatory work for WRC-2007. ICAO Observer presented an information paper on the areas of critical concern to aviation at WRC-2007. The new APG structure and plan for the preparatory works were established by the meeting.

1.10 The Second Meeting APG2007-2 was held in Bangkok from 28 February to 3 March 2005. The meeting was attended by 260 participants. The objectives of the meeting were to consider results of ITU-R studies available and develop APT preliminary views on WRC-2007 agenda items. ICAO Observer presented an information paper on the draft ICAO Position for WRC 2007. Several members of the ACP WG F attended this meeting, in addition to representatives from the several civil aviation administrations in the ASIA/PAC region. There was a general support to the draft ICAO Position.

1.11 The Third APT Meeting (APG 2007-3) was held in Kuala Lumpur, Malaysia from 13 to 16 February 2006. The meeting was attended by 360 participants. The meeting updated APT Preliminary Views on each agenda item of WRC-2007. The ICAO Position for WRC-2007 as approved by the Council was presented to the meeting. In addition, ICAO submitted an information paper on the future use of the frequency band 5 000-5 150 MHz. There was a general support to the ICAO Position.

1.12 The Fourth APG Meeting (APG 2007-4) was held in Bangkok, Thailand, from 8 to 12 January 2007 to further update the APT Preliminary Views on WRC-2007 agenda items. The meeting was attended by 308 participants among which 15 from 7 civil aviation administrations. ICAO Observers presented proposed updates of ICAO position in 7 information papers. The detailed output of APG 2007-4 can be found in this report under agenda item 3.

1.13 The APT position will be finalized at the Fifth Meeting to be held on 16-21 July 2007 in Busan, Republic of Korea.

First Meeting of the Regional Preparatory Group for WRC-2007

1.14 The meeting recalled that the First Meeting of the Regional Preparatory Group for WRC-2007 (RPG/1 WRC-2007) was held in Bangkok from 17 to 25 February 2005 in conjunction with Working Groups F and B of the Aeronautical Communications Panel (ACP) and the Spectrum Sub-Group of the Navigation Systems Panel (NSP). The meeting reviewed the draft ICAO Position for WRC-2007 in light of comments received from States and International Organizations on WRC agenda items 1.1, 1.3, 1.4, 1.5, 1.6, 1.13, 1.16, 1.17, 1.20, 1.21 and 2.

Agenda Item 2: Review of ICAO position for WRC-2007 and outcome of ACP WG F on proposed changes to the ICAO position

2.1 Under this agenda item, the meeting reviewed several working papers presented by the Secretariat. The proposed changes to the ICAO positions on WRC-07 agenda items 1.5, 1.6, 1.20 and 7.2 were identified in the papers. During the discussions, clarifications were provided to some the questions raised. The major changes to the ICAO positions for some of the WRC-2007 agenda items interested to aviation are listed in the following paragraphs:

WRC-07 Agenda Item 1.5

2.1.1 Under this agenda item, allocations for the purpose of aeronautical telemetry are being considered. Of importance to aviation are proposals by some (European) Administrations to allocate the MLS band 5 030-5 091 MHz for aeronautical telemetry. ICAO (Aeronautical Communications Panel and Navigation Systems Panel) have considered the protection requirements for MLS and concluded that the maximum level of aggregate interference into an MLS receiver must not exceed -130 dBm/150 kHz. This will reduce the level of a single interferer to below -142 dBm/150 kHz and will significantly increase the separation distances required between MLS and (airborne) aeronautical telemetry transmitters with the result that co-frequency sharing between the two applications is not feasible.

2.1.2 As a result, the ICAO position has been amended with the view to secure that no allocation for aeronautical telemetry be made in the MLS band 5 030-5 091 MHz, which is required on a global basis. In certain areas, where a high density of MLS can be expected, also part of the band 5 091-5 150 MHz is required to satisfy MLS requirements. These requirements however, are not global and may only materialize in the future. As a result, aeronautical telemetry can be accommodated on the band 5 091-5 150 as long as MLS has precedence over other uses of this band.

2.2 **WRC-07 Agenda item 1.6**

2.2.1 Under this agenda item, additional allocations for the aeronautical mobile (R) service (AM(R)S are identified in the frequency range 108 MHz to 6 GHz. Studies in ICAO (ACP and NSP) as well as in ITU have concluded that allocations to AM(R)S in the following frequency bands can be made:

a) 112-117.975 MHz ;
b) 960-1164 MHz ;
c) 5 000-5 030 MHz (surface applications); and
d) 5 091-5 150 MHz (surface applications and around airports)

In this regard it was in particular noted that such allocations can adequately protect the aeronautical radionavigation service operating in these bands (VOR, DME, SSR as well as the radionavigation satellite service (RNSS) in the band 5 000-5 030 MHz).

2.2.2 The meeting noted that with regard to the band 112-117.975 MHz, during further work carried out in ACP since the ICAO position was originally drafted, it was recognized the frequency band 116-117.975 MHz would not provide for enough capacity to accommodate AM(R)S requirements. As a result a proposal to increase the bandwidth, the frequency range 112-117.975 MHz was approved by the ICAO Council (Ref. ICAO position 2005, State Letter E 3/5-05/85). Protection to VOR systems will be provided, both when developing ICAO SARPs for these systems and when implementing them.

2.2.3 Similarly additional spectrum to satisfy requirements for AMS(R)S, in particular to accommodate requirements for new communication systems, was identified in the band 1144-1164 MHz. Accordingly to Annex 10, Volume I, most of the DME channels in this band may be used for national purposes on a secondary basis, with the view to provide protection of SSR on 1090 MHz. Use of this band by AM(R)S systems will not interfere with the SSR system, nor reduce the overall availability of the paired DME channels. It was further noted that any AM(R)S systems operating throughout the frequency band will be designed and implemented by ICAO in a manner that no harmful interference is caused to DME or SSR.

2.3 **WRC-07 Agenda item 1.20**

2.3.1 Under this agenda item issues relating to the operation of the Earth exploration satellite service (passive) (EESS) operating in the band 1400-1427 MHz were addressed. Studies in ITU-R have demonstrated that the protection requirements for EESS will place constraints on the radionavigation service operating below 1400 MHz which can not be met. The amendments to the discussion section in the ICAO position highlight this.

2.4 **WRC-07 Agenda item 7.2**

2.4.1 This agenda item proposes items for the agenda of the next WRC (WRC-11).

2.4.2 In 1997, the exclusive allocation to the aeronautical mobile satellite (R) service (AMS(R)S) was converted into a generic allocation to the mobile satellite service. Protection of aeronautical requirements were provided through intersystem priority and pre-emption. Studies in ITU-R have however concluded that these techniques are not feasible. As a result of these studies, it is necessary to review at WRC-11 measures to secure long term availability on satellite spectrum for aviation.

2.4.3 The proposed updates to the ICAO position for WRC-2007 were further revised and are reproduced in **Appendix A** to this Report. These amendments will be reviewed by the Air Navigation Commission in February 2007 and most likely approved by Council in May 2007. After approval by Council, the amended ICAO position will be submitted to the ITU WRC-07.

2.5 A presentation on the updates to all relevant agenda items of ICAO position for WRC-2007 together with background information was presented to the meeting by the Secretariat.

Agenda Item 3: Review outcome of the Fourth Asia Pacific Telecommunity (APT) Preparatory Group Meeting for WRC-2007 (APG 2007-4) and developments in regional telecommunication bodies such as CITEL, CEPT from an aeronautical perspective

3.1 Under this agenda item the meeting reviewed Draft Proposals from CITEL, CEPT and in particular the APT provisional views on WRC 2007 agenda items of interest to civil aviation which was developed by the APG-2007-4 meeting held in Bangkok, Thailand from 8 to 12 January 2007.

3.2 Mr. John Taylor, Transport Canada presented the Draft Inter-American Proposals (DIAPs) for WRC-07 agenda items 1.3 (WP/11), 1.5 (WP/12) and 1.6 (WP/13) from CITEL.

3.3 For agenda items 1.3, CITEL is supporting Method A1 of the draft CPM Report which is to allow a primary allocation to the radiolocation service (RLS) in the bands 9 000-9 200 & 9 300-9 500 MHz with a Radio Regulatory footnote protection and priority for the aeronautical radionavigation service/radionavigation service (ARNS/RNS) in these bands. It was noted that this is also the APT preliminary view and ICAO's Position. CITEL is also supporting Method B1 of the draft CPM Report which is to allow a primary allocation to EESS (active) and SRS (active) in the 9300-9500 MHz band. It was noted that the majority of APT members support this view but some countries (included in RR footnote No. 5.477) support Method B2 which is to allow a primary allocation to EESS (active) and SRS (active) in the 9 800-10 000 MHz band. In either case regulatory text is proposed to ensure the protection and priority of ARNS/RNS, which is the important issue for aviation. ICAO supports Method B2 but would not oppose Method B1.

3.4 For agenda items 1.5, only the bands and issues relevant to international civil aviation systems were discussed. CITEL is of the view that:

a) additional spectrum designated for aeronautical mobile telemetry may be utilized for the flight testing of unmanned aerial vehicles (UAVs) through Agenda Item 1.5 as testing is expected to occur at designated test centers on a coordinated basis with incumbent services. CITEL considers that the spectrum needs of UAVs operating in national airspace should not be considered under Agenda Item 1.5. It was noted that the safe control of UAV (flight) operations is supported by APT provided this does not adversely affect existing or planned services. It is assumed this is under an AM(R)S allocation through Agenda Item 1.6 since the APT proposed AMS allocation in the 5091-5150 MHz is designated for "aeronautical telemetry and aeronautical security transmissions.";

b) formal definitions are not needed for the terms "aeronautical telemetry" and "aeronautical telecommand"since aeronautical mobile telemetry (AMT) has been conducted for many years internationally without special definitions.;

c) the band 5 091-5 150 MHz should be allocated to the aeronautical mobile service, limited to flight test telemetry transmissions by aircraft stations; and

d) the band 5150-5 250 MHz should not be allocated for AMS.

3.5 In relation to agenda items 1.6, the CITEL is of the view that:

a) the band 960 - 1 024 MHz should be allocated to AM(R)S limited to systems operating in accordance with recognized international aeronautical standards. This is Method 2a of the draft CPM Report;

b) the band 5 091-5 150 MHz should be allocated to the AM(R)S limited to surface applications at airports by systems operating in accordance with recognized international aeronautical standards. This is Method 4b of the draft CPM Report;

c) no change is required for the 5 030-5 091 MHz band allocated to ARNS;

d) no change is required to Resolution 413 which relates to the 108-117.975 MHz band; and

e) no change to the FSS frequency allocations 10.7 – 12.75 GHz in response to the Resolution 415 studies.

3.6 It was further informed that during the next CITEL meeting, the use of the bands 5 000-5 010 MHz and 5 010-5 030 MHz for AM(R)S with regulatory protection and priority for RNSS would be considered (i.e. Method 3b).

3.7 Mr. Robert Witzen presented the Draft European Common Proposals regarding WRC-07 Agenda Item 1.5 (WP/14) and 1.6 (WP/15) from CEPT.

3.8 For agenda items 1.5, only the bands and issues relevant to international civil aviation systems were discussed. CEPT is of the view that:

a) the band 5 000-5 030 MHz should not be allocated to the aeronautical mobile service;

b) the band 5 030-5 150 MHz should be allocated to the aeronauticalmobile service, limited to flight test telemetry transmissions by aircraft stations. The priority to MLS in the 5091-5150 MHz is proposed to be removed. Both the use of 5030-5091 MHz for AMS and the removal of the priority to MLS in the 5091-5150 MHz band is opposed by ICAO; and

c) the band 5150-5 250 MHz should be allocated for AMS, limited to flight test telemetry transmissions by aircraft stations.

3.9 In relation to agenda items 1.6, CEPT is of the view that:

a) the band 112-117.975 MHz can be allocated to AM(R)S but not to extend the analogue VHF voice communication system operating in the band 117.975 – 137 MHz;

b) the band 960 - 1 164 MHz should be allocated to AM(R)S limited to systems operating in accordance with recognized international aeronautical standards. This is Method 2b of the draft CPM Report;

c) the band 5 000-5 030 MHz should not be allocated to AM(R)S since sharing studies between systems of the Radionavigation Satellite Service (RNSS) and AM(R)S have not been conducted;

d) the band 5 091-5 150 MHz should be allocated to the AM(R)S limited to applications around airports by systems operating in accordance with recognized international aeronautical standards. This is Method 4b of the draft CPM Report. However AM(R)S does not have protection or priority with regard to the AMS;

e) the band 5 091-5 150 MHz should also be allocated to the AMS for aeronautical security transmissions; and

f) that these allocations cannot be used for operational service until the relevant sharing studies have been completed and reviewed in the ITU-R. This would create difficulties in bands where only ICAO standard systems operate.

3.10 It was noted that there are significant difficulties for civil aviation with many of the current CEPT views for Agenda Item 1.5 and 1.6.

3.11 Mr. Jim Weller, Airservices Australia presented the Preliminary Views for WRC-07 agenda items 1.3 (WP/16 Att1), 1.5 (WP/16 Att2 and Att4) and 1.6 (WP/16 Att3 and Att4) from the APT meeting held 8-12 Jan 2007.

3.12 For agenda items 1.3, APT is supporting Method A1 of the draft CPM Report which is to allow a primary allocation to the radiolocation service (RLS) in the bands 9000-9200 & 9300-9500 MHz with a Radio Regulatory footnote protection and priority for the aeronautical radionavigation service/radionavigation service (ARNS/RNS) in these bands. The majority of APT members support Method B1 of the draft CPM Report which is to allow a primary allocation to EESS (active) and SRS (active) in the 9300-9500 MHz band. Some countries (included in RR footnote No. 5.477) support Method B2 which is to allow a primary allocation to EESS (active) and SRS (active) in the 9800-10 000 MHz band.

3.13 For agenda items 1.5, only the bands and issues relevant to international civil aviation systems were discussed. APT is of the view that:

a) the safe control of UAV (flight) operations is supported provided this does not adversely affect existing or planned services. It is assumed this is under an AM(R)S allocation through Agenda Item 1.6 since the APT proposed AMS allocation in the 5091-5150 MHz is designated for “aeronautical telemetry and aeronautical security transmissions.”;

b) the band 5 091-5 150 MHz should be allocated to the aeronautical mobile service, limited to flight test telemetry transmissions by aircraft stations. Protection and priority should be provided to the ARNS and AM(R)S allocations. Method C2a is opposed and C2b is supported;

c) no change is required for the 5 030-5 091 MHz band allocated to ARNS for MLS requirements. Method C1 is opposed; and

d) the band 5150-5 250 MHz should not be allocated for AMS.

3.14 With reference to the various opinions identified by APT Members in the table on page 2 of WP/16 Att2, it was noted that there is significant work required by the Civil Aviation Administrations to communicate the views of the civil aviation community to their Radio Regulators before APG2007-5 and WRC-07.

3.15 In relation to agenda items 1.6, Resolution 414 APT is of the view that:

a) conditions on the use of the band 116-117.975 MHz for AM(R)S can be removed;

b) the band 960 - 1 024 (or 1164) MHz should be allocated to AM(R)S limited to systems operating in accordance with recognized international aeronautical standards. This is Method 2a (or 2b) of the draft CPM Report;

There were some administrations that had expressed concerns on the AM(R)S allocations in the bands of 1024-1164 MHz which being heavily used by DME and SSR. This will be further considered at APT APG2007-5;

c) they have no common opinion in regard to the allocation of 5000-5030 MHz. However, one APT Administration could only support an allocation under the condition that no harmful interference is caused to, and no protection is claimed from RNSS feeder and service links in this band. Another APT Administration supports no change to this band since these services should be protected completely;

d) the band 5 091-5 150 MHz should be allocated to the AM(R)S limited to systems at or around airports and operating in accordance with recognized international aeronautical standards. This is Method 4b of the draft CPM Report; and

e) no change is required for the 5 030-5 091 MHz band allocated to ARNS for MLS requirements.

3.16 Mr. Mike Biggs, Federal Aviation Administration USA provided some information on the studies related to the compatibility between RNSS and AM(R)S in the 5000-5030 MHz band. The band 5000-5010 MHz is allocated for RNSS for E-s feeder links. In this case the 'victim' would be the RNSS satellite receivers. This situation is similar to the FSS satellite receivers in the 5091-5150 MHz and no compatibility issues are anticipated. For the 5010-5030 MHz there are two applications for RNSS – s-E feeder links and s-E service links. In the s-E feeder links case, the 'victim' would be the satellite earth stations and separation of a few kms seemed adequate to ensure compatibility. In the s-E service links due to the ubiquitous nature of RNSS terminals compatibility was not as clear cut. A final determination on compatibility can not be made until the RNSS system is designed, so in all cases protection would be ensured through regulatory protection and priority to the RNSS.

3.17 In relation to agenda items 1.6, Resolution 415 APT is of the view that:

a) "guidance material in the form of an ITU-R Recommendation or handbook should be prepared detailing the spectrum management issues associated with using VSAT networks for aeronautical telecommunication applications, noting that this spectrum may also support other non-aviation users.";

b) "with regard to long-term spectrum availability for aeronautical satellite communications for safety purposes (AMS(R)S) in 1.6/1.5 GHz bands, it is understood that, as most of these sub-bands are already used for non-safety communications, current spectrum requirements of AMS(R)S have not been satisfied in practice. The ITU-R has also examined the potential for the 1 525 to 1 559 MHz and 1 626.5 to 1 660.5 MHz MSS bands to meet the future requirements for aeronautical CNS/ATM communications, taking into account recent developments in MSS systems. These ITU-R studies concluded 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. As a result APT Administrations support a future Agenda item to determine how future long-term stable spectrum availability for AMS(R)S in these bands can be met. This issue is to be considered under WRC-07 Agenda Item 7.2 and Resolution 803, item 2.3 and not through WRC-07 Agenda Item 1.6."; and

c) it does not see a need for a secondary aeronautical mobile-satellite service (AMSS) downlink allocations to complement the secondary 14 GHz uplink allocation to AMSS adopted by WRC-03.

3.18 Mr. Yoshio Suzuki, Japan Radio Air Navigation Systems Association presented the Preliminary Views for WRC-07 agenda items 7.2 (WP/16 Attachment6) from the APT meeting held 8-12 Jan 2007. A contribution from Japan proposing to modify Preliminary Agenda Item 2.3 of WRC-2011 as included in Resolution 803 (WRC-03) was noted by the APT. The proposed modification to this item is as follow:

"2.3 to consider results of ITU-R studies in accordance with Resolution XXX (WRC-07) on the methods to ensure long-term spectrum availability and protection for the aeronautical mobile-satellite (R) service in the bands 1545 - 1555 MHz (space-to-Earth) and 1646.5 - 1656.5 MHz (Earth-to-space), and to take appropriate action on this subject;" The Draft new Resolution XXX is contained in Annex 1 to WP/16 Attachment 6. Changes proposed to the draft CPM Report is contained in Annex 2 to WP/16 Attachment 6.

3.19 A table comparing the views of ICAO, APT, CITEL and CEPT in relation to the draft CPM Methods proposed for agenda items 1.3, 1.5 and 1.6 was developed by the meeting and is provided in **Appendix B** to this Report.

Agenda Item 4: Role of aviation sector in the preparation of APT/APG-5 and WRC-2007 States preparatory work for WRC-2007

4.1 Under this agenda item, the meeting discussed the role of aviation sector in the preparation of APT APG2007-5 and ITU WRC-2007.

4.2 The Secretariat informed the meeting that 32nd Assembly in 1998 adopted Resolution A32-13 - Support of the ICAO policy on radio frequency spectrum matters and the development and approval by Council in 2000 of the strategy for establishing and promoting the ICAO position for future ITU World Radiocommunicaion Conferences

4.3 The meeting recalled action items developed by the Conferences of Directors General of Civil Aviation in the Asia and Pacific Region in particular Action Item 43/7 on the importance of frequency spectrum allocations and protection for the use of aviation. States have been strongly urged to accord high priority to ensuring support to the ICAO Position at the APT meetings as well as at the WRC-2007. The meeting also recalled that APANPIRG had formulated Conclusions on the preparation for the World Radiocommunication Conference 2007.

Aviation View included in the National Position for APG2007-5 and WRC-07

4.4 The meeting recognized that the most important element in preparation for WRC-2007 is the need for the aviation community to secure, at a national level, support to the ICAO position so that States proposals to the final APT Conference Preparatory Group (APG2007-5) and at the WRC-2007 should reflect States' support. The meeting therefore encouraged States that had not provided preliminary viewed at previous APG meetings, to provide their support to ICAO positions on various agenda items in particular WRC-07 agenda item 1.1, 1.3, 1.5, 1.6 and 7.2.

Participation in APT APG2007-5 and ITU WRC-2007 by Aviation Community

4.5 The meeting considered it very important for the designated contact persons for WRC-2007 and aviation representatives to actively participate the final meeting of APT Conference Preparatory Group meeting (APG2007/5) as the APT common views/proposal will be finalized at that meeting.

4.6 The meeting requested ICAO Asia and Pacific Regional Office, in following up the Action Item 43/7 of 43rd Asia/ Pacific DGCA Conference to issue a State letter encouraging all States to make necessary arrangements for their designated contact persons and other aviation experts to be included in their national delegation for the meeting as well as for WRC-2007 Conference. It was noted that the scheduled dates for APT AGP2007-5 (16-21 July 2007) will fall in the same week planned for CNS/MET Sub-group of APANPIRG. Accordingly, the meeting developed the following recommendation.

Recommendation 1 – Participation in APT APG2007-5 and ITU WRC-2007

That, ICAO be requested to issue a State Letter encouraging States to make necessary arrangements for their participation in APT APG2007-5 meeting and WRC-2007 Conference to protect aviation interest.

4.7 The meeting reviewed and updated the list of designated contact persons for preparation of World Radiocommuniation Conference (WRC-2007) (WP18). States were requested to provide further changes to the ICAO Asia and Pacific Regional Office. It was informed that the updated list of designated contact point of States in the Asia and Pacific regions for WRC-2007 is posted in the following ICAO ASIA/PAC website:

http://www.icao.int/icao/en/ro/apac/contact_person2007.pdf

Development of Proposals for APG 2007-5 meeting

4.8 The meeting considered that the APT provisional views on WRC-2007 agenda items of interest to civil aviation as provided in the output documents of APT APG2007-4 were generally acceptable as they were consistent with ICAO positions. However, some of the APT preliminary views were not found to be complete and some of them are slightly different with updates of ICAO position developed by the ACP Working Group F in December 2006. It was therefore considered necessary to provide additional information to States and to include some updated information in line with updates of ICAO Position. The meeting developed recommendations and proposals on the APT provisional views of agenda items of WRC-2007 relevant to aviation for input to CPM for consideration which are provided in **Appendix C** to this report. In order to assist States to provide aviation views to their respective Radio Regulators for consideration and submission to APG 2007-5 meeting, further material based on Appendix C was prepared which is included in **Appendix D** to this Report.

4.9 In view of the foregoing, the meeting formulated the following recommendation.

Recommendation 2 - Development of Proposals for APG 2007-5 meeting

That, States utilize the proposals as contained in the **Appendix D** during consultation with their respective Radio Regulators for their adoption and submission to APG2007-5 meeting and WRC-2007.

4.10 The meeting reviewed ICAO position for removal footnotes and/or removal countries names from footnotes which will be addressed under WRC-07 agenda item 1.1 (WP/17). It was noted that, the deletion of country names from footnotes in the Radio Regulations is a matter requiring proposals to the WRC-2007 from concerned States. The First RPG meeting held in February 2005 identified that in the ASIA/PAC Region, Japan (footnotes 5.197 and 5.259), Pakistan (footnote 5.197), Mongolia, Pakistan and the Democratic Peoples Republic of Korea (Footnote 5.362B) and Bangladesh (footnote 5.362C) were expected to review the relevant footnotes and initiate actions to remove their country names from these footnotes.

4.10.1 Japan informed the meeting that Japan is considering if it is possible to remove its country name from the above footnotes however it has not been completed at this stage. Japan was requested to provide their proposal at WRC-2007.

4.10.2 Pakistan indicated that it is being considered from technical aspect and it will be brought attention to the Administration concerned for further action.

Agenda Item 5: Any other business

Presentation on in-flight use of mobile phone

5.1 A presentation on in-flight use of mobile phones was received from AeroMobile, Telenor. The concept and feasibility studies on a non-interference basis as well as tests and trials conducted in individual countries were introduced. AeroMobile is seeking international coordination and harmonization to enable a comprehensive and consistent global solution. It was concluded that ICAO may have an important role to play in facilitating safety and security standards and establishing a cooperative framework with radio regulatory bodies. Explanations to the several questions on technical and operation concerns were provided.

Use of Radio Transmitting Equipment on Board Aircraft

5.2 The Secretariat presented a paper on the recent considerations and concerns relating to the use of radio transmitting equipment on board an aircraft for non-safety purposes by passengers (WP/10).

5.2.1 The use of mobile phones by passengers on board an aircraft, while in flight, has become an urgent issue where the role of ICAO requires further clarification. Some technical and legal aspects on the use of such equipment were discussed. Results of review by the ICAO European Air Navigation Planning Groups were noted by the meeting. EANPG invited States to withhold certification of the new system until all potential effects of the mobile phones (GSM) on the safety of the aircraft have been studied and safety requirements are confirmed to be met. Currently, the only ICAO provision on the use of mobile phones on-board aircraft is a recommendation to aircraft operators to include in their operators manual provisions securing that no mobile phones be used on board an aircraft.

5.2.2. ICAO is concerned about developments taking place in CEPT where a Decision, permitting the use of mobile phones on board an aircraft has been approved without proper coordination with ICAO. The use of cellular phones on board an aircraft is a complex issue, involving legal, medical, technical and operational issues. Addressing these issues in full would need a multidisciplinary and harmonized approach, involving radio regulators, ITU and aviation. The conditions for using of such systems should be established in cooperation with ICAO.

Communications Operating Concept and Requirements

5.3 A short discussion was held regarding studies being accomplished within ACP WGC on the future communication system. In particular it was noted that the US FAA and Eurocontrol had developed a document ("Communications Operating Concept and Requirements (COCR)") outlining expected advances in aeronautical operations, and the resultant required advances in aeronautical communications. It was suggested that this document could be used by aviation experts in dealings with their administration radio regulators, providing reference material regarding the need for additional AM(R)S spectrum under WRC-07 agenda item 1.6.

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UPDATES OF ICAO POSITION FOR ITU WRC-07
on Agenda Items 1.5, 1.6, 1.20 and 7.2

WRC-07 Agenda Item 1.5

Studies completed in the NSP and ACP have concluded that an aggregate interference power level of -130 dBm/150 kHz will protect MLS from harmful interference including those from non-aeronautical sources. It was also determined that not all envisaged spectrum requirements for MLS could be met within the band 5 030 - 5 091 MHz and therefore parts of the band 5 091 - 5 150 MHz may also be required for future implementation of MLS. Hence, sharing the band 5 030 - 5 091 MHz with other radio services is considered not feasible. Continued exclusive availability of this frequency band is necessary in order to satisfy the requirements for MLS as standardized in Annex 10. Use of the band 5 091 - 5 150 MHz by other radio services would be possible, on the basis of frequency band segmentation and under the provision that, as and when parts of this band are required for MLS, it will have precedence over other radio services.

WRC-07 Agenda Item 1.6

Resolution 414

Amendments to the ICAO position reflect the results of studies completed in ICAO on the spectrum required for air-ground communications to support safety and regularity of flight, including those for systems being considered under the future communication study in ACP Working Group C. Amendments include proposals for global allocations to the aeronautical mobile (R) service (AM(R)S) in the frequency bands 960 - 1 164 MHz, 5 000 - 5 030 MHz and 5 091 - 5 150 MHz. Since no specific requirements for unmanned aerial vehicle (UAV) communications have been developed, the relevant material has been removed from the ICAO position.

Resolution 415

Amendments include the results of completed studies in ITU-R on the availability of spectrum for mobile-satellite communications in the frequency bands 1 545 - 1 555 MHz and 1 646.5 - 1 656.5 MHz. Prior to ITU WRC-97 these frequency bands were allocated to the aeronautical mobile-satellite (R) service (AMS(R)S) on an exclusive basis. At WRC-97, these bands were allocated to the (generic) mobile-satellite service, with the intention to make additional spectrum available for land and maritime mobile-satellite services applications. The current provisions in the Radio Regulations, which were supposed to guarantee aviation adequate access to these frequency bands, have been demonstrated to be not feasible.

In addition, material relating to an aeronautical mobile-satellite system for non-safety communications has been deleted since this system is no longer planned to be operated.

WRC-07Agenda Item 1.20

Amendments to the ICAO position reflect the result of studies, completed in ITU-R with regard to the protection required for the Earth-exploration satellite service (passive) (EESS) operating in the band 1 400 – 1 427 MHz, in particular from out-of-band emissions generated by aeronautical primary radar stations operating below 1 400 MHz.

Appendix A

WRC-07 Agenda Item 7.2

Studies completed in ITU-R (as indicated in paragraph 2.3.2 above) require the next World Radiocommunication Conference in 2011 to review the allocations in the frequency bands 1 545 - 1 555 MHz and 1 646.5 - 1 656.5 MHz and, in particular, the regulatory provisions necessary to provide aviation appropriate access to these bands.

Draft revisions to the ICAO position are contained in the annex to this Appendix.

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Annex

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.

Appendix A

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. either 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.

Appendix A

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 —

Comparison between ICAO Position and APG2007-4/CITEL/CEPT Views related to the draft CPM Report Methods for WRC-07 Agenda Items 1.3, 1.5 and 1.6 Resolution 414

	ICAO	APG/4	CITEL	CEPT	
Agenda Item 1.3	ICAO Position Doc E315-05185	ICAO RPG2 WP16_att_01 (APG2007-4/OUT-01 Rev.1)	ICAO RPG2 WP11		
Method A1 – Primary allocation to RLS in 9000-9200 & 9300-9500 MHz with footnote protection of ARNS/RNS	Supported	Supported	Supported		
Method A2 – Primary allocation to RLS in 9000-9200 & 9300-9500 MHz with no footnote protection of ARNS/RNS					
Method B1 - Primary allocation to EESS/SRS (active) in 9300-9500 MHz	Would not oppose	Majority support	Supported		
Method B2 - Primary allocation to EESS/SRS (active) in 9800-10000 MHz	Supported	Some support			
Agenda Item 1.5	ICAO RPG2 WRC-07 WP/3	RPG2 WRC-07 WP16_att02 (APG2007-4/OUT-02)	ICAO RPG2 WP 12	ICAO RPG2 WP14	

Appendix B

	ICAO	APG/4	CITEL	CEPT	
Method C1 - AMS allocation in 5 030- 5 091 MHz limited to telemetry to support testing of aircraft	Strongly oppose	Oppose	Oppose	Conditional support	
Method C2a - AMS allocation in 5 091- 5 150 MHz with no protection and priority to AM(R)S through a footnote	Oppose	Oppose	Oppose	Conditional support	
Method C2b - AMS allocation in 5 091- 5 150 MHz with protection and priority to AM(R)S through a footnote	Support	Support	Support		
Method C2c - AMS allocation in 5 091- 5 150 MHz with protection to AM(R)S through a Recommendation	Not support	Support	No support		
Agenda Item 1.6 Resolution 414	ICAO RPG2 WRC-07 WP/3	RPG2 WRC-07 WP16_att03 (APG2007-4/OUT-08 Rev. 2)	ICAO RPG 2 WP 13		
Method 1a – Remove limitations on use of AM(R)S allocation in 112- 117.975 MHz	Support		No support	Conditional support	
Method 1b – Remove limitations on use of AM(R)S allocation in 116- 117.975 MHz		Support	No support		
Method 2a - Add an AM(R)S allocation to the band 960-1 024 MHz		Support	Support		

	ICAO	APG/4	CITEL	CEPT	
Method 2b - Add an AM(R)S allocation to the band 960-1 164 MHz	Support	Support		Conditional support	
Method 3a - Add AM(R)S allocations in the bands 5 000-5 010 MHz and 5 010-5 030 MHz to support surface applications at airports through footnote with protection and priority to RNSS	Support	No position	TBD	Oppose	
Method 3b - Add AM(R)S allocations in the bands 5 000-5 010 MHz and 5 010-5 030 MHz to support surface applications at airports through footnote with protection and priority to RNSS through a Resolution	Support	No position	TBD		
Method 4a - Add an AM(R)S allocation to the band 5 030-5 150 MHz	Oppose	Oppose	Oppose		
Method 4b - Add an AM(R)S allocation to the band 5 091-5 150 MHz	Support	Support	Support	Conditional support	
Method 5 - Add an AMS allocation in the band 5 091-5 150 MHz limited to aeronautical security applications	Support	Support	TBD	Conditional support	

ICAO COMMENTS AND PROPOSED MODIFICATIONS ON CHAPTER 1 (AGENDA ITEM 1.3) OF THE DRAFT CPM REPORT TO WRC-07

1 Introduction

1.1 This agenda item seeks an upgrading of the radiolocation service in the frequency bands 9 000-9 200 MHz and 9 300-9 500 MHz to a primary status (issue A) as well as an extension of the EESS (active) and SRS (active) of 200 MHz to the current band 9 500-9 800 MHz (Issue B).

2. Re. Issue A – upgrading of the radiolocation service to a primary status in the bands 9 000-9 200 MHz and 9 300-9 500 MHz without placing undue constraint to the services to which the bands are allocated.

2.1 ICAO agrees with the conclusions in paragraph 1/1.3/1.3 that test results show compatibility between the aeronautical radionavigation service and the radiolocation service in the band 9 000-9 200 MHz as well as between the radionavigation service and the radiolocation service in the band 9 300-9 500 MHz. It is noted that in certain cases, compatibility can only be achieved by introducing specific interference mitigation techniques. However, upgrading of the radiolocation service in these bands to a primary status can be supported by ICAO.

2.2 In order to secure protection of the (aeronautical) radionavigation service in these bands under all circumstances, an upgrading of the radiolocation service needs the be subject to an additional provision (footnote) in the Radio Regulations that the radiolocation service shall not cause harmful interference to nor claim protection from the (aeronautical) radionavigation service. This provision will also secure that future developments in the (aeronautical) radionavigation service will not be unduly constrained by the radiolocation service.

2.3 With regard to the methods in the draft CPM report to satisfy the agenda item, Method A1 (upgrade the radiolocation service to a primary status in the bands 9 000-9200 MHz and 9 300-9 500 MHz with the addition of a footnote to protect existing services) is supported by ICAO. Method B (upgrade the radiolocation service to a primary status **without** the addition of a footnote to protect existing services is not supported by ICAO (paragraph 1/1.3/7.1 of the draft CPM report refers).

3. Re. Issue B – extending of the allocations to the Earth-exploration satellite service (active) and the space research service (active) in the band 9 500-9 800 MHz with 200 MHz without placing undue constraints to which the bands are allocated.

3.1 It has been noted in the draft CPM report that, should an extension of the Earth exploration satellite service (active) and the space research service (active) in the band 9 300 – 9 500 MHz be considered, that narrow band space systems provide for a greater potential for interference to the radionavigation service. Provided that the extension of the allocation is restricted to systems with a bandwidth greater than 300 MHz, the CPM concluded that sharing with radiolocation and radionavigation would be feasible.

3.2 In order to secure protection of the radionavigation service, the addition of a footnote with an allocation that stipulates that the Earth-exploration satellite service (active) and the space research service (active) shall not cause harmful interference to nor claim protection from the radionavigation service is necessary to secure that the radionavigation service will not be unduly constrained. Also, a

footnote should be added restricting the use of the band 9 300-9 500 MHz to space systems requiring a bandwidth larger than 300 MHz.

3.3 With regard to the methods in the draft CPM report to satisfy the agenda item, ICAO would prefer Method B2 (extension of the Earth-exploration satellite service and the space research service (active) in the band 9 800-10 000 MHz). ICAO would, however, not object to extend these services into the band 9 300-9 500 MHz, subject to extending the frequency band covered by footnote No. **5.476A** and the addition of a provision in the Radio Regulations restricting the use of the band 9 300-9 500 MHz to space systems requiring a bandwidth larger than 300 MHz.

4. Specific proposals for amending the text in the draft CPM Report are contained in the Annex to this document.

— — — — — — — —

Annex

Agenda item 1.3

AGENDA ITEM 1.3

in accordance with Resolution 747 (WRC-03), to consider upgrading the radiolocation service to primary allocation status in the bands 9 000-9 200 MHz and 9 300-9 500 MHz and extending by up to 200 MHz the existing primary allocations to the Earth exploration-satellite service (active) and the space research service (active) in the band 9 500-9 800 MHz without placing undue constraint on the services to which the bands are allocated;

……

1/1.3/8 Regulatory and procedural considerations

Where appropriate, changes to the Table of Frequency Allocations in RR Article **5** will be required, consistent with each method.

1/1.3/8.1*further resolves* 1 of Resolution 747 (WRC-03)

Method A1 – An example of a possible new footnote for RR Article **5** suggested by Method A1 is given below:

8 500-10 000 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
9 000-9 200	AERONAUTICAL RADIONAVIGATION 5.337 RADIOLOCATION ~~Radiolocation~~ 5.471 **ADD** 5.RAD	
9 200-9 300	RADIOLOCATION MARITIME RADIONAVIGATION 5.472 5.473 5.474	
9 300-9 500	RADIONAVIGATION 5.476 RADIOLOCATION ~~Radiolocation~~ EARTH EXPLORATION SATELLITE SERVICE (active) SPACE RESEARCH SERVICE (active) **ADD** 5.EESS 5.427 5.474 **MOD** 5.475 **ADD** 5.RAD **MOD** 5.476A	

Appendix C1

ADD

5.RAD In the bands 9 000-9 200 MHz ~~and 9 300-9 500 MHz~~, stations operating in the radiolocation service shall not cause harmful interference to, nor claim protection from systems operating in the aeronautical radionavigation service ~~(9 000-9 200 MHz)~~. In the band 9 300-9 500 MHz, stations operating in the radiolocation service shall not cause harmful interference to, nor claim protection from systems operating ~~or~~ in the radionavigation service~~(9 300-9 500 MHz)~~. In the band 9 300-9 500 MHz, ground-based radars used for meteorological purposes have priority over other radiolocation devices.

An example of possible modification to footnote RR No. **5.475** of Article **5** suggested by Method A1 is given below:

MOD

5.475 The use of the band 9 300-9 500 MHz by the aeronautical radionavigation service is limited to airborne weather radars and ground-based radars. In addition, ground-based radar beacons in the aeronautical radionavigation service are permitted in the band 9 300-9 320 MHz on condition that harmful interference is not caused to the maritime radionavigation service. ~~In the band 9 300-9 500 MHz, ground-based radars used for meteorological purposes have priority over other radiolocation devices.~~

1/1.3/8.2 *further resolves* 2 of Resolution 747 (WRC-03)

Method B1 – An example of a possible new footnote for RR Article **5** suggested by Method B1 is given below (See also Table 8 500-10 000 MHz under Method A1):

ADD

5.EESS The use of the band 9 300-9 500 MHz by Earth exploration-satellite service (active) and space research service (active) is limited to systems that cannot be accommodated within the 9 500-9 800 MHz band and that require bandwidths larger than 300 MHz.

An example of possible modification to footnote RR No. 5.476A of Article 5 suggested by Method B1 is given below:

MOD

5.476A In the band 9 3~~5~~00-9 800 MHz, stations in the Earth exploration-satellite service (active) and space research service (active) shall not cause harmful interference to~~, or constrain the use and development of,~~ stations of the radionavigation and radiolocation services.

Method B2 – An example of possible modification to footnote RR No. **5.476A** of Article **5** suggested by Method B2 is given below:

MOD

5.476A In the band 9 500~~-9 8~~10 000 MHz, stations in the Earth exploration-satellite service (active) and space research service (active) shall not cause harmful interference to~~, or constrain the use and development of,~~ stations of the radionavigation and radiolocation services.

— END —

ICAO COMMENTS AND PROPOSED MODIFICATIONS ON CHAPTER 1 (AGENDA ITEM 1.5) OF THE DRAFT CPM REPORT TO WRC-07

1. Introduction

1.1 This agenda item considers spectrum requirements and possible additional allocations for aeronautical mobile telemetry (AMT) and associated telecommand, in accordance with Resolution **230 (WRC-03)**. The draft CPM report addresses a number of frequency bands that may be used for AMT. This paper concentrates on material in the draft CPM Report with regard to the use of the 5 GHz band for AMT.

2. With regard to the use of frequency bands in the 5 GHz range, the draft CPM Report identifies the following methods:

2.1 Method C1 – use of the band 5 030-5 091 MHz for aeronautical mobile telemetry. This method is strongly opposed by ICAO, since this band is required for the aeronautical radionavigation service (MLS) and cannot be shared with telemetry applications.

2.2. Method C2 – use of the band 5 091-5 150 MHz for aeronautical mobile telemetry. This method is supported by ICAO, subject to providing precedence to satisfying the requirements for MLS and AM(R)S. The draft CPM report identifies two slightly different methods:

2.2.1 Method C2a – add an allocation through a footnote with a new ITU Resolution that establishes the condition on how the new allocation would be implemented. Method C2a is not supported since the proposed regulatory provisions of such Resolution that is part of this method (Re. ADD 5.AT4) may not adequately protect MLS.

2.2.2 Method C2b – add an allocation to the mobile service, including aeronautical mobile service, in the band 5 091-5 150 MHz, limited to generic aeronautical telemetry applications and under the condition that, if an allocation is made to the aeronautical mobile (route) service in this band (AM(R)S), the AM(R)S shall have precedence over the use of the band by aeronautical mobile telemetry. Method C2b is supported by ICAO. RR No. **5.444** together with the suggested regulatory provisions in the draft CPM Report are adequate to protect spectrum requirements for MLS and AM(R)S.

2.2.3 Method C2c – add an allocation limited to telemetry to support flight testing. A specific footnote will incorporate PDNR ITU-R M.[AMT 5030-5150 MHz]. This method cannot be supported by ICAO since the PDNR, as currently developed by ITU-R WP 8B requires significant modification.

3. Specific proposals for amending the text in the draft CPM Report are contained in the Annex to this document.

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Appendix C2

Annex

Agenda item 1.5

AGENDA ITEM 1.5

to consider spectrum requirements and possible additional spectrum allocations for aeronautical telecommand and high bit-rate aeronautical telemetry, in accordance with Resolution 230 (WRC-03);

Note ICAO: Most of the listed new Recommendations/Reports in paragraph 1/1.5/1.2 are not complete and may not be completed in time for WRC-07. Much of this material is considered by ICAO not adequate for protecting in particular MLS and, in its existing form, cannot be supported by ICAO. As a result, should reference to these new Recommendations/Reports be maintained in the CPM Report, significant work may need to be undertaken at WRC to accommodate any decision of ITU-R WP8B in not progressing this material at its next meeting.

…….

1/1.5/3.3 Analysis of the results of studies

1/1.5/3.3.1 Additional allocations for aeronautical mobile telemetry for testing of aircraft between 3 and 16 GHz

Studies with ARNS indicate that there would be a requirement for large distance separation between the AMT transmitters and the MLS receiving stations when operating in the same frequency band. . Operation of AMT in a frequency band adjacent to the MLS band could reduce that distance. Taking into account the protection necessary to avoid harmful interference into MLS (a maximum aggregate interference level from all potential interference sources has been identified by ICAO) sharing of AMT the same frequency band with ARNS/MLS is not feasible in the same geographical area.

Note ICAO: Studies in ICAO have demonstrated that an aggregate interference power level of minus 130 dBm/150 kHz will ensure protection of MLS. Some analyses presented and reviewed by ITU-R WP8B were based on the (incorrect) understanding that this would be a single entry limit. The maximum tolerable interference power level from a single interferer should not exceed minus 142 dBm/150 kHz. This will increase the geographical separation between an interfering AMT transmitter and a MLS receiver considerably.

……

1/1.5/5.3 Issue C

1/1.5/5.3.1 Method C1 (5 030-5 091 MHz)

Note ICAO: This method is opposed as this band is not suitable for an additional allocation to either AMS. References to ITU-R M.[AMT 5030-5250 MHz] as well as the Resolution should be removed.

The addition in RR Article 5 of new AMS allocations limited to telemetry to support testing of aircraft in the band 5 030- 5 091 MHz in the table of Frequency Allocations and additions or modifications of associated footnotes.

Advantages:

- New table of frequency allocations and new or modified footnotes in RR Article **5** that identify frequency bands for the AMS will facilitate worldwide harmonized approach to

implementation of new aeronautical telemetry systems in the identified bands to support testing of aircraft.

- .
- Including limits in the RR identifies to AMT operators clear operating guidelines relative to other services.

Disadvantages:

- In order to protect airborne MLS receivers from harmful interference generated by stations using co –frequency airborne transmissions, large geographical separation distances of several hundred kilometres are required making sharing of the same frequency band with AMT in the same geographical area not feasible, due to the expected density of the MLS systems.
- Recently, ICAO SARPs for MLS were amended, including the need for larger separation distances between MLS facilities than originally assumed. Therefore, at least the whole of the band 5 030-5 091 MHz is required in areas with a high density of airports using or planning to use MLS, to satisfy requirements for MLS. Aircraft and airport installations of MLS are in progress.
- Appropriate geographical separation distances to protect the MLS from non-aeronautical interference are still under study within the ITU-R.
- In order to protect AM(R)S receivers (if allocated by WRC-07 in this band under AI 1.6) from harmful interference generated by stations using airborne transmissions, significant geographical separation distances are required making sharing of the band with AMT not feasible under co-frequency conditions in the same geographical area.

…….

1/1.5/5.3.2.2 Method C2b

The addition in RR Article **5** of new MS, including AMS allocation in the band 5 091-5 150 MHz limited to aeronautical mobile telemetry for flight testing under the condition that if an allocation to AM(R)S is made under agenda item 1.6 in the same band that the AM(R)S allocation shall take precedence over the use of the band by aeronautical mobile telemetry.

Note ICAO: This method is supported by ICAO. It has no disadvantages identified.

……

1/1.5/5.3.2.3 Method C2c

The addition in RR Article 5 of new AMS allocations limited to telemetry to support testing of aircraft in the band 5 091- 5 150 MHz in the table of Frequency Allocations and additions or modifications of associated footnotes.

Note ICAO: The contents of Working Documents towards PDNRs ITU-R M.[AMT 5030-5150 MHz] and PDNR ITU-R M.[AMS-MLS] require significant further work within Study Group 8 and may not be approved prior to the WRC-07. As a consequence, Method C2c may require significant revision when considered by WRC 07.

.....

Appendix C2

1/1.5/6.1Method A

Example of regulatory provisions that would need to be included in an appropriate resolution, Resolution [AMT4-6GHz] (WRC-07):

resolves

1 that administrations take into account that the bands 4 400-4 950 MHz and 5 925-6 700 MHz are suitable for the implementation of aeronautical mobile telemetry applications for flight testing;

2 that administrations implementing aeronautical mobile telemetry for flight test purposes, shall utilize the criteria set forth below:

– transmissions limited to those from aircraft stations only, see No. **1.83**;

…

1/1.5/6.2Method C1

…

Example of regulatory provisions that would need to be included in an appropriate resolution, Resolution [AMT 5 GHz] (WRC-07):

resolves

1 that administrations choosing to implement aeronautical mobile telemetry for flight test purposes in the band 5 030-5 150 MHz shall utilize the criteria set forth below:

– limit transmissions to those from aircraft stations only, see No. **1.83**;

…

1/1.5/6.3.1 Method C2a

…

Example of regulatory provisions that would need to be included in an appropriate resolution, Resolution [AMT5GHz] (WRC-07):

resolves

1 that administrations take account that the band 5 091-5 150 MHz has been allocated to AMS, limited to implementation of aeronautical mobile telemetry applications for flight test purposes, based on the ITU studies referred to in *noting a)* and *b)* above;

2 that administrations choosing to implement aeronautical mobile telemetry for flight test purposes in the band 5 091-5 150 MHz shall utilize the criteria set forth below:

– limit transmissions to those from aircraft stations only, see No. **1.83**;

…….

1/1.5/6.3Method C2 (5 091-5 150 MHz)

1/1.5/6.3.1 Method C2a

ADD

5.AT4 The band 5 091-5 150 MHz is also allocated to the aeronautical mobile service limited to flight test telemetry transmissions by aircraft stations. Any such use shall not cause harmful interference to or claim protection from other services to which this band is allocated to on a co-primary basis Resolution **[AMT5GHz] (WRC-07)** shall apply.

Example of regulatory provisions that would need to be included in an appropriate resolution, Resolution [AMT5GHz] (WRC-07):

Note ICAO: This example is not complete; it should include the "considerings" and the need for further studies in ITU-R. Because studies in ITU-R are not complete and may not be completed prior to WRC-07, technical details should at this stage be removed from this example.

resolves

1 that administrations take account that the band 5 091-5 150 MHz has been allocated to AMS, limited to implementation of aeronautical mobile telemetry applications for flight test purposes, based on the ITU studies referred to in *notings a) and b)* above;

2 that administrations choosing to implement aeronautical mobile telemetry for flight test purposes in the band 5 091-5 150 MHz shall utilize the criteria set forth below:

– limit transmissions to aircraft stations only, see No**. 1.83**;

– transmissions limited to designated flight test areas, where flight test areas are airspace designated by Administrations for flight test within their territories;

– limit the aggregate of any interference from all AMS including AMT aircraft stations transmissions to the fixed-satellite service spacecraft receivers to no more than 3% delta $T_{satellite}/T_{satellite}$;

– bi-laterally coordinate with administrations operating or planning to operate Microwave Landing Systems that can be subject to harmful interference.

1/1.5/6.3.2 Method C2b

ADD

5.AT5 The use of the band 5 091-5 150 MHz by the mobile, including aeronautical mobile, service is limited to aeronautical telemetry and shall not cause harmful interference nor claim protection from the aeronautical mobile (R) service. The requirements of the aeronautical mobile (R) service shall take precedence over the use of this band by the mobile, including aeronautical mobile, service.

Appendix C2

1/1.5/6.3.3 Method C2c

In the band 5 091-5 150 MHz:

Add footnotes RR Nos. **5.AT2** & **5.AT3** as detailed in Method C1
Example regulatory provisions as per Method C1
…….

— END —

ICAO COMMENTS AND PROPOSED MODIFICATIONS ON CHAPTER 1 (AGENDA ITEM 1.6 - RESOLUTION 414 (WRC-03) OF THE DRAFT CPM REPORT TO WRC-07

1. Introduction

1.1 This agenda item considers additional spectrum requirements for the aeronautical mobile (R) service (AM(R)S) in the frequency range 108 MHz to 6 GHz.

1.2. This document concentrates on Issues A and C of the draft CPM Report. Issue A is addressing additional allocations to AM(R)S in parts of the frequency bands which are currently available for use by aeronautical systems in the frequency range between 108 MHz and 6 GHz. Issue C relates to the accommodation of aviation security requirements in the band 5091-5150 MHz.

1.3 Comments on Issue D on the use of current satellite frequency allocations, both for air-to-ground and ground-to-ground radiocommunications, which will support modernization of civil aviation telecommunications as requested by Resolution 415, are addressed in a separate paper.

2 Under Issue A four methods have been identified.

2.1 Method 1 is seeking and allocation to AM(R)S in portions of the band 108-117.975 MHz.

2.1.1 Method 1a is removing the current limitations through RR No. **5.197A** for AM(R)S in the band 112-117.975 MHz and is supported by ICAO. Method 1b is removing these limitations only from the band 116-117.975 MHz, and is not supported by ICAO.

2.2 Method 2 is adding an allocation to AM(R)S in the band 960-1 164 MHz.

2.2.1 Method 2a is adding the AM(R)S allocation only to the sub-band 960-1 024 MHz. Method 2b, supported by ICAO, is adding an AM(R)S allocation to the entire band 960-1 164 MHz.

2.3 Method 3 is adding an allocation to AM(R)S limited to surface applications to the band 5 000-5 010 MHz and 5 010-5 030 MHz. Both Method 3a and Method 3b in the draft CPM Report can be supported by ICAO.

2.4 Method 4 is allocating portions of the band 5 030-5 150 MHz to the AM(R)S. Method 4a is suggesting an allocation to the band 5 030-5 150 MHz and is strongly opposed by ICAO. Method 3b is suggesting an AM(R)S allocation to the band 5 091-5 150 MHz which is supported by ICAO.

3. Under Issue C an allocation to the AMS for aeronautical security applications is addressed. ICAO supports the proposed method for an AMS allocation in the band 5 091-5 150 MHz limited to aeronautical security applications.

4. Specific proposals for amending the text in the draft CPM Report are contained in the Annex to this document.

— — — — — — — —

Appendix C3

Annex

Agenda item 1.6 (Resolution 414)

AGENDA ITEM 1.6

to consider additional allocations for the aeronautical mobile (R) service in parts of the bands between 108 MHz and 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);

Note ICAO: Many of the new ITU-R Recommendations/Reports as listed in paragraph 1/1.5/1.2 are not complete and may not be finalized in time for WRC-07. Much of this material is considered by ICAO as not adequate for protecting in particular MLS and, in its existing form, cannot be supported by ICAO. As a result, should reference to these new Recommendations/Reports be maintained in the CPM Report, significant work may need to be undertaken at WRC to accommodate any decision of ITU-R WP8B in not progressing this material at its next meeting.

……..

1/1.6/1.3 Analysis of the results of studies

Current aviation communication bands are severely congested and further pressured by introduction of new aviation applications and security requirements. In addition, recent experience has shown that evolving technology for navigation and surveillance may necessitate allocations that are more encompassing than simply aeronautical radionavigation service (ARNS).

Based on available studies, two distinct categories of AM(R)S spectrum are required. The first – for surface applications at or around airports including data links, – is distinguished by a high data throughput, however only moderate transmission distances and it is expected that ~~a~~ single frequency resources can be shared at multiple geographic locations. The second category, like the current Very High Frequency (VHF) AM(R)S, will require longer propagation distances (e.g. out to radio line-of-sight), moderate bandwidth, and a number of distinct channels to allow for sector-to-sector assignments. Initial estimates of potential spectrum requirements have been determined taking into account evolving aeronautical applications, and integration of a new system on an aircraft. The estimates are: approximately 60 MHz in some portion of the 960-1 164 MHz band, and approximately 60-100 MHz in some portion of the 5 000-5 150 MHz band. Studies have also shown a need for the second category in some portion of the band ~~112~~108-117.975 MHz.

Although specific spectrum requirements have yet to be fully assessed, material has been received regarding UAV integration into non-segregated civil airspace. Because the pilot is located remotely from the UAV, bandwidth will be required to support, among other things, each UAV relaying ATC instructions to its respective pilot, additional operational data, encryption and interference resilience. These applications will require ~~additional~~ safety communication links in addition to those identified above. While it is expected that limited short term requirements may be accommodated in either existing aeronautical bands allocated to ~~(~~AM(R)S or AMS(R)S~~)~~ or in the new AM(R)S allocations made under this agenda item, given the longer term plans for large-scale deployment of UAVs, further additional spectrum may be required in the future. Such additional spectrum has not been addressed in this Report.

From the investigation on the bands currently available for use by aeronautical systems in the frequency range between 108 MHz and 6 GHz, the following frequency bands are those that have been considered:

1) The band ~~higher part of the~~ 108-117.975 MHz ~~VHF navigation band which~~ is allocated to the ARNS, and to the AM(R)S (limited to support of air navigation and surveillance functions~~;~~ as per RR No. **5.197A**), in all Regions on a primary basis. ~~In this case, t~~The limitation of AM(R)S to systems that transmit navigational information in support of air navigation and surveillance functions as specified in RR No. **5.197A** should be removed from the appropriate part of the band. This band is being considered to support AM(R)S radio line-of-sight applications.

This band could be considered as a natural extension for accommodating the legacy VHF communication system. Within the existing European radionavigation plan the decommissioning of some ARNS systems is foreseen by 2015. This date however is under review and is likely to be extended. Dates currently being discussed are beyond 2020. No such plans have been developed for areas outside Europe. Compatibility of AM(R)S with existing or planned aeronautical systems operating in accordance with international aeronautical standards will be ensured by ICAO. Out-of-band compatibility with frequency modulation (FM) broadcasting~~ers~~ will be ensured by incorporating reference to Resolution **413 (WRC-03)** in the new allocation, as well as by developing ~~similar~~ FM immunity requirements similar to those for already existing systems operating in the band ~~for~~ 108-117.975 MHz (ILS/VOR) ~~band avionics~~. It should be noted that modifications to Resolution **413 (WRC-03)** may be required in order to address new AM(R)S communications allocations.

2) ~~All or portions of t~~The 960-1 164 MHz band ~~that~~ is already allocated to ARNS in all Regions on a primary basis. This band is being considered to support AM(R)S for radio line-of-sight applications.

Even though in the band 960-1 164 MHz the usage is generally high, in the sub-band 960-977 MHz usage is relatively low. The band 960-1 164 MHz is also occupied by different systems that are either operated on a nationally coordinated or on a non-interference basis. The frequency 978 MHz is ~~frequency defined~~ designated by ~~for the~~ ICAO for the Standard Universal Access Transceiver (UAT) system ~~operation~~ and is part of the necessary allocation to AM(R)S. Compatibility with existing or planned aeronautical systems in accordance with international aeronautical standards will be ensured by ICAO.

In some countries in Region 1, the frequency band 960-1 164 MHz is also used by systems in aeronautical radionavigation service for which no ICAO S~~s~~tandards and R~~r~~ecommended P~~p~~ractices (SARPs) have been developed ~~and published by ICAO~~. Studies regarding compatibility between AM(R)S and this system need to be undertaken in the ITU-R.

…….

5) ~~All or portions of t~~The 5 030-5 150 MHz band ~~which~~ is already allocated to the ARNS on a primary basis in all Regions. ~~and which, in t~~The 5 091-5 150 MHz band ~~portion~~, is also allocated to the fixed-satellite service (FSS) (Earth-to-space) on a primary basis. The~~is~~ FSS allocation is limited to feeder links of non-GSO mobile-satellite systems in the mobile-satellite service (MSS)~~,~~ and is subject to coordination under RR No. **9.11A**, and RR No. **5.444A** conditions apply.

With respect to AM(R)S, all or portions of the 5 030-5 150 MHz band are being considered ~~to support surface applications at airports~~. Studies have concluded that compatibility can be ensured through the following provisions:

a) Use of the AM(R)S allocations shall be limited to the band 5091-5150 MHz and to systems ~~on the surface of airports and~~ operating in accordance with international (ICAO) standards, and compatibility with other existing or planned aeronautical systems operating in accordance with international aviation standards will be ensured by ICAO.

b) Consistent with RR No. **5.444** MLS will continue to receive priority over other users of the band, and studies have shown that planned AM(R)S can be precluded from interfering with MLS through the use of adequate frequency separation.

c) Co-frequency sharing between existing FSS users of the band and a new airport surface radio local area network (RLAN), based on the IEEE standard 802.16e in Annex 3 to DN Recommendation ITU-R M.[8/167], is feasible and can be confirmed following the methodology of preliminary draft new Report ITU-R M.[AMS-FSS] and PDN Recommendation ITU-R M.[AM(R)S/AS 5 091-5 150 MHz].

~~Prior to operating in the frequency band 5 091-5 150 MHz any~~ AM(R)S systems operating in the band 5091-5150 MHz shall meet ICAO SARPs requirements which ~~and those requirements~~ will ensure, consistent with appropriate ITU-R Recommendations, compatibility with FSS systems operating in that band. In addition, studies of the band 5 091-5 150 MHz must be undertaken by ITU-R regarding the (the need for) apportioning of the FSS 3% $\Delta T/T$ aggregate interference limit between any new AMS system, with the task of developing or revising PDN Recommendation ITU-R M.[AM(R)S/AS 5 091-5 150 MHz] to ensure that aggregate limit is not exceeded. Until those studies are completed, a provisional limit for the AM(R)S of less than xx%[1] $\Delta T/T$ will be applied. That value should be reviewed at a future Conference, preferably WRC-11~~0~~.

d) A regulatory element should be developed to ensure that AM(R)S and aeronautical security applications shall not operate co-frequency within the footprint of the FSS satellite.

e) The band 5 091~~30~~-5 150 MHz has~~is~~ also be~~ing~~ studied in response to WRC-07 Agenda item 1.5, and studies have shown that protection of aeronautical telemetry can be ensured via sufficient separation distances between airports using AM(R)S and aeronautical mobile telemetry ground stations.

……..

1/1.6/3.2 Summary of technical and operational studies and list of relevant ITU-R Recommendations and Reports

Relevant ITU-R Recommendations and Reports: PDN Recommendation ITU-R M.[AM(R)S/AS 5 091-5 150 MHz]; PDN Report ITU-R M.[AMS-FSS]

Consistent with *considerings d), f)* and *g)* of Resolution **414 (WRC-03)**, the 5 091-5 150 MHz band is also being considered to support new aviation security requirements. Aeronautical security transmissions ensure confidential and secure communications between aircraft and ground, principally during unlawful disruption, hijacking or subversion of flight. Security requirements could include video and voice monitoring and download of security data. These applications will necessitate a complementary aeronautical mobile service (AMS) allocation.

Studies have been performed considering the use of code division multiple access (CDMA) technology. Flight trials conducted by Eurocontrol have proven successful operation beyond the 100 km range. It has been shown that this range will be reduced by precipitation, however this is still considered sufficient for security and ~~airport network~~ operations on and around airports. Studies have indicated that sharing between FSS, AM(R)S and AMS is achievable although the FSS may itself cause occasional interference to the AMS.

Studies regarding compatibility of the AMS (aeronautical security system) with the ARNS, AM(R)S and AMS(aeronautical mobile telemetry) have not been completed and are necessary before any usage of this band by aeronautical security applications.

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[1] xx equals 2% if the Conference allocates aeronautical mobile telemetry under agenda item 1.5, and 3% otherwise.

1/1.6/3.3 Analysis of the results of studies

With respect to protection of FSS, studies (see PDN Report ITU-R M.[AMS-FSS] and PDNR ITU-R M.[AM(R)S/AS 5 091-5 150 MHz]) also show the feasibility of co-frequency sharing between existing FSS users of the band and aeronautical security applications. It must be noted that the above result of studies is only valid if the AMS aeronautical security applications stations will not operate co-frequency with AM(R)S surface applications at airports within the footprint of an FSS satellite. Regulation implementation needs to be studied in respect with this coordination.

In the case of non co-frequency usage between aeronautical security applications and AM(R)S ~~surface~~ applications, results of the interference analysis have concluded that studies of the band 5 091-5 150 MHz must be undertaken regarding the apportioning of the FSS 3% $\Delta T/T$ aggregate interference limit between any new AMS, with the task of developing or revising PDN Recommendation ITU-R M.[AM(R)S/AS 5 091-5 150 MHz] to ensure that aggregate limit is not exceeded. Until those studies are completed, stations in the AMS, limited to aeronautical security applications, should be designed in such a manner that the transmitter power flux-density is limited to –140.25 dBW/(m^2 ·1.23 MHz) at an FSS satellite using full Earth coverage receive antennas with an orbit of 1 414 km. This value should be reviewed at a future Conference, preferably WRC-10.

Sharing studies with the other services (e.g., ARNS, aeronautical telemetry, AM(R)S) of this band will need to be completed before any usage of this band by aeronautical security applications.

…….

1/1.6/5 Methods to satisfy the agenda item

Satisfaction of this agenda item will likely require several Methods as each deals with a different frequency band, a different regulatory approach and/or a different service. Each Method described below is independent from, but could be complementary to, ~~each~~ others. Therefore selection of any Method should not be taken to imply other Methods should not be selected. All Methods address additions in RR Article **5** of new AM(R)S allocations in the Table of Frequency Allocations and additions or modifications of footnotes and Resolution(s) to support:

1/1.6/5.1 Method 1 (Issue A)

……..

1/1.6/5.4 Method 4 (Issue A)

~~Add an AM(R)S allocation in all or a portion of the band 5 030-5 150 MHz to support surface applications at airports~~.

~~**1/1.6/5.4.1 Method 4a**~~

~~Add an AM(R)S allocation to the band 5 030-5 150 MHz.~~

~~*This method is not supported by ICAO as co-frequency sharing in the same geographical area between AM(R)S and MLS is not feasible and should be removed from the CPM Report.*~~

~~**Advantages:**~~

- ~~The allocation in the whole band (5 030-5 150 MHz) will give more flexibility for implementation.~~
- ~~As studies show that sharing is possible based on frequency separation from the ARNS, an AM(R)S allocation may provide a more efficient use of spectrum in this band.~~

~~– By having a frequency in the core band (5 030-5 091 MHz) compatibility will be required only with ARNS.~~

~~**Disadvantages:**~~

~~– Recently, ICAO SARPs for MLS were amended, including the need for larger separation distances between MLS facilities than originally assumed. Therefore, the whole of the band 5 030-5 091 MHz is required to satisfy requirements for MLS, and aircraft and airport installations are in progress in some countries. Co-frequency MLS/AM(R)S would require large geographic separations. In addition, viability of the frequency management necessary for frequency separation has not yet been studied. As a result, AM(R)S deployment in the band 5 030-5 091 MHz may not be possible.~~

~~– ICAO currently has no plans to standardize an AM(R)S system in the 5 030-5 091 MHz band.~~

~~**1/1.6/5.4.2 Method 4b**~~

Add an AM(R)S allocation to the band 5 091-5 150 MHz.

Advantages:

– ITU-R studies show that planned AM(R)S can be precluded from interfering with MLS through the use of adequate frequency separation. Due to the expected lower density use of this band for MLS, provision of that frequency separation should be simpler.

– Recently, ICAO SARPs for MLS were amended, including the need for larger separation distances between MLS facilities than originally assumed. Therefore, the whole of the band 5 030-5 091 MHz is required to satisfy requirements for MLS, and aircraft and airport installations are in progress in some countries. Co-frequency MLS/AM(R)S would require large geographic separations. In addition, viability of the frequency management necessary for frequency separation has not yet been studied. As a result, it may only be possible to deploy AM(R)S in the band 5 091-5 150 MHz.

– ICAO currently has plans to standardize an AM(R)S system in the 5 030-5 091 MHz band.

Disadvantages:

No disadvantages were identified.

~~If the AM(R)S requirement exceeds 60 MHz the AM(R)S requirement cannot be met with this allocation alone.~~

……

1/1.6/6 Regulatory and procedural considerations

In the Methods below it is proposed that the modifications to the provisions and Resolutions would apply from the date of the end of WRC-07.

1/1.6/6.1 Method 1: The band 108-117.975 MHz

In the following examples of regulatory text, XVB is to be replaced by values appropriate to each Method. For Method 1a XVB = 112 MHz; for Method 1b XVB = 116 MHz.

MOD

108-117.975 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
108-117.975	AERONAUTICAL RADIONAVIGATION 5.197 **MOD** 5.197A	

MOD

5.197A The band 108-117.975 MHz ~~may also be used by~~ is also allocated to the aeronautical mobile (R) service on a primary basis, limited to systems that ~~transmit navigational information in support of air navigation and surveillance functions~~ operate in accordance with recognized international ~~aviation~~ aeronautical standards. Such use shall be in accordance with Resolution **413 (Rev.WRC-07~~3~~)** ~~and shall not cause harmful interference to nor claim protection from stations operating in the aeronautical radionavigation service which operate in accordance with international aeronautical standards.~~ Moreover, use of the band 108-112 ~~XVB~~ MHz by the aeronautical mobile (R) service is limited to systems that transmit navigational information in support of air navigation and surveillance functions in accordance with recognized international aeronautical standards. (WRC-07~~3~~)

MOD

RESOLUTION 413 (REV. **WRC-0~~3~~7)**

Use of the band 108-117.975 MHz by aeronautical services

The World Radiocommunication Conference (Geneva, 2007~~3~~),

considering

NOC *a) to e)*

f) the need for the aeronautical community to provide additional services for communications relating to safety and regularity of flight in the band 108~~XVB~~-117.975 MHz,

NOC *recognizing*

NOC *noting*

resolves

~~1 that the provisions of this Resolution and of No. **5.197A** shall enter into force on 5 July 2003;~~

1 that any AM(R)S systems operating in the band 108-117.975 MHz shall not cause harmful interference to, nor claim protection from aeronautical radionavigation service systems operating in accordance with international aeronautical standards;

2 that any ~~additional~~ aeronautical mobile (R) service systems~~1~~ planned to operate in the frequency band 108-117.975 MHz shall, as a minimum, meet the FM broadcasting immunity requirements contained in Annex 10 of the ICAO Convention on International Civil Aviation for existing aeronautical radionavigation systems operating in this frequency band;

3 that ~~additional~~ aeronautical mobile (R) service systems operating in the band 108-117.975 MHz shall place no additional constraints on the broadcasting service or cause harmful interference to stations operating in the bands allocated to the broadcasting service in the frequency band 87-108 MHz and No. **5.43** does not apply to systems identified in *recognizing d)*;

4 that frequencies below 112 MHz shall not be used for ~~these additional~~ aeronautical mobile (R) service systems excluding the ICAO systems identified in *recognizing d)* until all potential compatibility issues with the lower adjacent frequency band 87-108 MHz have been resolved,

NOC *invites ITU-R*

NOC *instructs the Secretary-General*

~~1 In the context of this Resolution, the term "additional aeronautical systems" refers to systems that transmit navigational information in support of air navigation and surveillance functions in accordance with recognized international aviation standards.~~

1/1.6/6.2Method 2 AM(R)S allocation in the band 960-1 164 MHz

~~In the following examples of regulatory text, XLB is to be replaced by values appropriate to each Method. For Method 2a XLB = 1 024 MHz; Method 2b XLB = 1 164 MHz.~~

MOD

960-1 164 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
960-1 164	AERONAUTICAL RADIONAVIGATION 5.328 **ADD** 5.AM1	

ADD

5.AM1 The band 960-1164 ~~XLB~~ MHz is also allocated to the aeronautical mobile (R) service on a primary basis, limited to systems that operate in accordance with recognized international aeronautical standards. Such use shall be in accordance with Resolution **[AM(R)S 960] (WRC-07)**. (WRC-07)

ADD

RESOLUTION [AM(R)S 960] (WRC-07)

Use of the band 960-1164~~XLB~~ MHz by aeronautical services

The World Radiocommunication Conference (Geneva, 2007),

considering

a) the current allocation of the frequency band 960-1 164 MHz to the aeronautical radionavigation service (ARNS);

b) the use of the band 960-1 215 MHz by the ARNS is reserved on a worldwide basis for the operation and development of airborne electronic aids to air navigation and any directly associated ground-based facilities per No. **5.328**;

c) that new technologies are being developed to support communications and air navigation, including airborne and ground surveillance applications;

d) that new applications and concepts in air traffic management which are data intensive are being developed;

e) that in countries listed in No. **5.312** the frequency band 960-1 164 MHz is also used by systems in aeronautical radionavigation service for which no standards and recommended practices (SARPs) have been developed and published by the International Civil Aviation Organization (ICAO),

recognizing

a) that precedence must be given to the ARNS operating in the frequency band 960-1 164 MHz;

b) that Annex 10 of the Convention of the ICAO contains standards and recommended practices (SARPs) for aeronautical radionavigation and radiocommunication systems used by international civil aviation;

c) that all compatibility issues between the ICAO standard Universal Access Transceiver (UAT) and other systems which operate in the same frequency range, excluding the system identified in *considering e)*, have been addressed within ICAO,

noting

that excluding the system identified in *recognizing c)*, no compatibility criteria currently exist between aeronautical mobile (R) service (AM(R)S) systems proposed for operations in the frequency band 960-1164 ~~XLB~~ MHz and the existing aeronautical systems in the band,

resolves

1 that prior to operating in the frequency band 960-1164~~XLB~~ MHz any AM(R)S systems shall have SARPs requirements published in Annex 10 of the ICAO Convention on International Civil Aviation, and that those requirements will ensure compatibility with ARNS systems operating in accordance with international (ICAO) standards;

2 that any AM(R)S systems operating in the band 960-1164~~XLB~~ MHz shall not cause harmful interference to, nor claim protection from, and shall not impose constraints on the operation and planned development of aeronautical radionavigation systems operating in accordance with international (ICAO) standards in the same band;

3 that any AM(R)S systems operating in the band 960-1164~~XLB~~ MHz shall not cause harmful interference to, nor claim protection from, and shall not impose constraints on the operation and planned development of aeronautical radionavigation systems operating in the countries identified in *considering e)*;

4 that ITU-R compatibility studies between AM(R)S systems operating in the band 960-1164~~XLB~~ MHz and ARNS systems operating in the countries identified in *considering e)* need to be conducted to develop sharing conditions to ensure that the conditions of resolves 3 are satisfied;

5 that the result of the *resolves 4* studies shall be reported to WRC-10 and the decisions should be taken by WRC-10 to review, if appropriate, regulatory provisions in *resolves 3* taking into account protection requirements of ARNS systems operating in the countries identified in *considering e)* and the need for global facilitation of AM(R)S operating in accordance with ICAO standards;

6 to encourage administrations listed in *considering e)* and ICAO, for the purposes of conducting the ITU-R studies mentioned in *resolves* 4, to provide to ITU-R the technical and operational characteristics of systems involved,

invites the ITU-R

1 to conduct studies on operational and technical means to facilitate sharing between AM(R)S systems operating in the band 960-1164~~XLB~~ MHz and ARNS systems identified in *considering e)*;

2 to report the results of the studies to WRC-10,

instructs the Secretary-General

to bring this Resolution to the attention of ICAO.

1/1.6/6.3Method 3: AM(R)S allocation in the bands 5 000-5 010 MHz and 5 010-5 030 MHz

MOD

5 000-5 030 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 000-5 010	AERONAUTICAL RADIONAVIGATION AERONAUTICAL MOBILE (R) **ADD** 5.AMR RADIONAVIGATION-SATELLITE (Earth-space) 5.367	
5 010-5 030	AERONAUTICAL RADIONAVIGATION AERONAUTICAL MOBILE (R) **ADD** 5.AMR RADIONAVIGATION-SATELLITE (space-Earth) (space-space) 5.328B 5.443B 5.367	

The following footnote would be added if Method 3a is selected:

ADD

5.AMR The bands 5 000-5 010 MHz and 5 010-5 030 MHz are also allocated to the aeronautical mobile (R) service on a primary basis. Stations in the aeronautical mobile (R) service operating in the 5 000-5 010 MHz and 5 010-5 030 MHz bands shall be subject to the condition that no harmful interference

is caused to, and no protection is claimed from, the radionavigation-satellite service and such use shall be limited to stations operating on the surface of the Earth.

The following footnote and Resolution would be added if Method 3b is selected:

ADD

5.AMR The bands 5 000-5 010 MHz and 5 010- 5 030 MHz are also allocated to the aeronautical mobile (R) service on a primary basis, limited to systems operating in accordance with recognized international aeronautical standards. Such use shall be in accordance with Resolution **[AM(R)S-RNSS] (WRC-07)**. (WRC 07)

……..

1/1.6/6.4Method 4: AM(R)S allocation in the band ~~5 030~~5 091-5 150 MHz

~~In the following examples of regulatory text, XCB is to be replaced by values appropriate to each Method. For Method 4a XCB = 5 030 MHz; for Method 4b XCB = 5 091 MHz.~~

MOD

5 030-5 150 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 030-5 150	AERONAUTICAL RADIONAVIGATION 5.367 5.444 5.444A **ADD** 5.AM2	

ADD

5.AM2 The band 5091~~XCB~~-5 150 MHz is also allocated to the aeronautical mobile (R) service on a primary basis, limited to ~~surface~~ applications at and around airports by systems operating in accordance with recognized international aeronautical standards. Such use shall be in accordance with Resolution **[AM(R)S-5 GHz] (WRC-07)**. (WRC 07)

……..

1/1.6/6.5Method 5: AMS allocation limited to aeronautical security applications in the band 5 091-5 150 MHz

MOD

Appendix C3

5 030-5 150 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 030-5 150	AERONAUTICAL RADIONAVIGATION 5.367 5.444 5.444A	

ADD

5.XAS *Additional allocation:* The band 5 091-5 150 MHz is also allocated to the aeronautical mobile service, on a primary basis, in accordance with Resolution **[AMS(AS) 5 GHz] (WRC-07)**. (WRC 07)

ADD

RESOLUTION [AMS(AS) 5 GHz] (WRC-07)

Considerations for sharing the band 5 091 -5 150 MHz by the aeronautical mobile service for aeronautical security applications and fixed-satellite service

The World Radiocommunication Conference (Geneva, 2007),

considering

……

c) this conference has allocated the 5 091~~XCB~~-5 150 MHz band for the aeronautical mobile (R) service (AM(R)S);

d) this conference has also allocated the 5 091-5 150 MHz band for the aeronautical mobile service (AMS) limited to secure and confidential communications between aircraft and ground, principally during unlawful interference to aircraft,

……

— END —

ICAO COMMENTS AND PROPOSED MODIFICATIONS ON CHAPTER 1 (AGENDA ITEM 1.6 - RESOLUTION 415 (WRC-03) OF THE DRAFT CPM REPORT TO WRC-07

1. Introduction

1.1 This agenda item considers studies regarding the use of current satellite frequency allocations that will support the modernization of civil aviation telecommunication systems (Issue D in the draft CPM Report).

2. Under issue D, two aspects are addressed in the draft CPM Report.

2.1 Air-to-ground radiocommunications: 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. Hence amendments to the draft CPM report with regard to the conclusions on the availability of these bands to ensure long-term spectrum availability and protection for AMS(R)S are required.

2.2 Ground-to-ground radiocommunications: VSAT networks operate under an allocation to the fixed satellite service (FSS) which is not recognized as a safety service. In this regard, it is necessary to consider, 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.

3. Specific proposals for amending the text in the draft CPM Report are contained in the Annex to this document.

— — — — — — — —

Appendix C4

Annex

Agenda item 1.6 (Resolution 415)

AGENDA ITEM 1.6

to consider additional allocations for the aeronautical mobile (R) service in parts of the bands between 108 MHz and 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);

…….

1/1.6/4 Issue D*invites ITU-R*

1 to study, as a matter of urgency, the current satellite frequency allocations that could meet aeronautical requirements to support the modernization of civil aviation telecommunication systems, especially those in developing countries, and to study in particular those radio frequencies that could be used to support both ICAO CNS/ATM systems and other non-aeronautical telecommunication services.

….

1/1.6/4.2.2 Air-to-ground radiocommunications

WRC-03 under agenda item 1.11 adopted RR Nos. **5.504A**, **5.504B** and **5.504C** allocating the band 14-14.5 GHz to aeronautical mobile-satellite service (AMSS) (Earth-to-space) on a secondary basis under the conditions mentioned in these footnotes. Also, WRC-03, in the Summary Records of the 14th Plenary Meeting, noted that certain bands in the 10/11/12 GHz range could be used for downlinks for the AMSS under the provisions of RR No. **4.4**. These uplink and downlink bands are currently in use by the AMSS and can be used to support non-aeronautical telecommunication services having priority levels 7 through 10. No further regulatory measures are required to provide this non-safety service.

Studies with regard to the use of the 1.5/1.6 GHz MSS bands

In accordance with RR No. **5.357A**, in the bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz the priority shall be given to accommodate spectrum requirements of the aeronautical mobile-satellite service (AMS(R)S) providing transmission of messages with priority 1 to 6 in RR Article **44**. This was reinforced by WRC-2000 which adopted Resolution **222 (WRC-2000)** and also requested studies on intersystem pre-emption.

However, as most of these sub-bands are already used for non-safety communications, current and new spectrum requirements of AMS(R)S have not been satisfied in practice. Since 1997, the allotment of spectrum to mobile-satellite service providers has been organized under the provisions of various regional Memoranda of Understanding (MoU) which are in general not available in the public domain. This makes it virtually impossible to develop long-term planning for using this spectrum on a global basis. The current provisions and procedures for AMS(R)S under these MoUs are considered insufficient to satisfy future demand for AMS(R)S spectrum. Therefore, in light of the current difficulties being experienced by at least one administration in Region 3 in satisfying long-term spectrum availability and protection of AMS(R)S in these bands, it is likely that in the future these difficulties will increase unless the relevant provisions of the Radio Regulations are revised.

The ITU-R has examined the potential for the 1 525 to 1 559 MHz and 1 626.5 to 1 660.5 MHz MSS bands to meet the future requirements for aeronautical CNS/ATM communications taking into account recent developments in MSS systems. Studies were conducted under Resolution **222 (WRC-2000)** and the results can be found in Report ITU-R M.2073.

1/1.6/4.3 Analysis of the results of studies relating to the possible methods of satisfying the agenda item

The use of large reflector satellite antennas for MSS systems in the 1 525 to 1 559 MHz and 1 626.5 to 1 660.5 MHz bands has allowed the introduction of higher data rate MESs and also allows more efficient re-use of MSS spectrum. To date, the 1.5/1.6 GHz MSS systems/networks have had ~~been~~ difficulty~~able to~~ in meeting the demand for AMS(R)S ~~services~~ communications due to heavy congestion in these bands. ~~Furthermore, WRC-03 provided for additional allocations to the MSS in the bands 1 518-1 525 MHz and 1 668-1 675 MHz[1]. This may allow for the development of new satellites operating in the new bands thus providing access to additional spectrum.~~

Future CNS/ATM services may require higher data rate carriers than is currently the case. Studies to indicate whether or not MSS systems in the 1.5/1.6 GHz range bands will be able to meet spectrum demands have not been conducted.

……

1/1.6/5.6 Method for Issue D

With respect to the ground-to-ground aspect, there does not appear to be any need to make amendments to the Table of Frequency Allocations or any other part of the Radio Regulations. However, if technical guidance is required, it would be best produced in the form of an ITU ~~R document such as a~~ Recommendation in the Radio Regulations detailing the issues listed above and other aspects that may be deemed appropriate during the course of further studies.

In examining the air-to-ground scenario:

With respect to the existing MSS allocations in the bands 1 525 to 1 559 MHz and 1 626.5 to 1 660.5 MHz, further studies would be required to ensure long term spectrum availability and protection for AMS(R)S communications~~the current provisions of the Radio Regulations do not need to be changed to satisfy this agenda item~~.

Regarding the use of the 14-14.5 GHz AMSS secondary allocation and the associated downlink bands at 10/11/12 GHz for non-safety communications, no further regulatory action is necessary.

A proposal for a Recommendation, which was reviewed by WP 8D, is given below.

RECOMMENDATION XXXX (WRC-07)

Use of frequency allocations to the Fixed Satellite Service by civil aviation

~~[1] The part of this band 1 668-1 670 MHz is also allocated to the radio astronomy service (RAS). Emissions from airborne stations can be particularly serious sources of interference to the radio astronomy service (see RR Nos **5.149** and 5.**379C**). To avoid interference from AMSS (E-s) systems to RAS large coordination areas (up to some hundred kilometres) around the radio astronomy sites are required.~~

Appendix C4

The World Radiocommunication Conference (Geneva, 2007),

considering

a) that remote and rural areas often still lack a terrestrial based communication infrastructure that meets the evolving requirements of modern civil aviation;

b) that the cost of providing and maintaining such an infrastructure is increasingly expensive, particularly in remote regions;

c) that satellite communication systems operating in the fixed satellite service provide a real possibility to meet the demands of the International Civil Aviation Organization (ICAO) communication, navigation, surveillance and air traffic management (CNS/ATM), especially in the areas where a terrestrial communication infrastructure is not available;

d) that the use of VSAT terminals, operating in the fixed satellite service and are being deployed on a large scale in aeronautical communications, has the potential to significantly enhance communications between air traffic control centres as well as with remote aeronautical stations;

e) the fixed satellite service is not a safety service as … ;

f) that the benefits of establishing and utilizing satellite communication systems for civil aviation would also bring additional benefits for developing and sparsely populated countries by enabling the use of aeronautical VSAT systems also for non-aeronautical communications;

g) that there is a need in cases identified in *considering f)* to draw attention to the safety aspects of aeronautical communications with regard to the non-aeronautical communications,

noting

1 that Recommendation **34 (WRC-95)** states that future world radiocommunication conferences, whenever possible, should allocate frequency bands to the most broadly defined services with a view to providing maximum flexibility in spectrum use;

2 that Resolution **20 (Rev.WRC-2000)** *resolves to instruct the Secretary-General* "to encourage ICAO to continue its assistance to developing countries which are endeavouring to improve their aeronautical telecommunications",

recommends

1 that Administrations, in particular in developing countries and in remote and rural areas, encourage the implementation of VSAT terminals that, as required, could support both aeronautical and other communication requirements;

2 that Administrations, to the maximum extent possible and as necessary, give priority to aeronautical communications where VSAT terminals are being used for both aeronautical and non-aeronautical communication;

3 to encourage Administrations and service providers to provide for priority service restoration or alternative routing in case of breakdown of a VSAT link;

4 that Administrations provide their support to resolve issues related to interconnectivity between different VSAT networks and efficient and timely implementation of VSAT terminals;

5 to invite ICAO, noting **Resolution 20 (Rev. WRC-2000)**, to continue its assistance to developing countries to improve their aeronautical telecommunications,

requests the Secretary-General

to bring this Recommendation to the attention of ICAO.

— END —

ICAO COMMENTS AND PROPOSED MODIFICATIONS ON CHAPTER 7 (AGENDA ITEM 7.2) OF THE DRAFT CPM REPORT TO WRC-07

1. Introduction

1.1 This agenda item addresses the preliminary agenda for WRC-11 which was established at WRC-03 and will be reviewed at WRC-07.

2. Review of results under Resolution **222 (WRC-2000)**

2.1 According to RR No. **5.357A**, and Resolution **222 (WRC-2000)**, administrations shall ensure that priority is given to accommodating the spectrum requirements of the aeronautical mobile-satellite (R) service (AMS(R)S) providing transmission of messages with priority 1 to 6 of Article **44** in the bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz. However, these frequency bands are already fully used and thus it is difficult to accommodate required spectrum for new aeronautical safety communications, although it is prioritized and protected by the above provisions.

2.2 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.

2.3 As demand for AMS(R)S communication to support ICAO communications, navigation, and surveillance/air traffic management (CNS/ATM) systems is increasing, it is urged to study alternative methods to ensure long-term spectrum availability and protection for AMS(R)S in these bands, and to provide appropriate regulatory and operational provisions. Therefore, preliminary agenda item 2.3 as contained in Resolution **803 (WRC-03)** should be maintained with appropriate modifications in the agenda of WRC-11.

2.4 It would be useful for WRC-07 to have appropriate background information on some preliminary WRC-11 agenda items as listed in section 2 of the Resolution **803(WRC-03)**. Since the draft CPM Report (Chapter 7, section 7/7.2/1 "Preliminary agenda items for WRC-11" refers) does not provide any text, it is proposed to add background information on the preliminary WRC-11 agenda item 2.3.

3. Specific proposals for amending the text in the draft CPM Report are contained in the Annex to this document.

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Appendix C5

Annex

Agenda item 7.2

AGENDA ITEM 7.2

to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, taking into account Resolution 803 (WRC 03),

7/7.2/1 Preliminary agenda item for WRC-~~10~~11

….

*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;*

Reasons:

The International Civil Aviation Organization (ICAO) standardized the use of the 1.5/1.6 GHz bands in 1995 as an essential element of aeronautical mobile satellite systems to enable communications related to safety and regularity of flight, and spectrum demand will increase for the next generation of aeronautical satellite communication systems.

According to RR No. **5.357A**, and Resolution **222 (WRC-2000)**, administrations shall ensure that priority is given to accommodating the spectrum requirements of the aeronautical mobile-satellite (R) service (AMS(R)S) providing transmission of messages with priority 1 to 6 of Article **44** in the bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz. However, these frequency bands are already fully used and thus it is difficult to accommodate required spectrum for new aeronautical safety communications, although it is prioritized and protected by the above provisions. Resolution **222 (WRC-2000)** invited ITU-R to complete studies to determine the feasibility and practicality of prioritization and real-time pre-emptive access between different networks of mobile satellite systems, which is considered to be one of the key method to ensure required spectrum for safety services, while taking into account the latest technical advances in order to maximize spectral efficiency.

Based on studies on this subject carried out in the ITU-R since the year 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.

As demand for AMS(R)S communication to support ICAO communications, navigation, and surveillance/air traffic management (CNS/ATM) systems is increasing, it is urged to study alternative methods to ensure long-term spectrum availability and protection for AMS(R)S in these bands, and to provide appropriate regulatory and operational provisions.

Therefore, preliminary agenda item as shown in Resolution **803 (WRC-03)**, item 2.3 should be maintained in the agenda of WRC-11 with appropriate modifications.

— END —

PROPOSED SUBMISSION TO REGIONAL TELECOMMUNICATION ORGANIZATIONS FOR FINAL MEETINGS WHEN DEVELOPING REGIONAL COMMON PROPOSALS (AMENDMENTS TO THE RADIO REGULATIONS)

Agenda Item 1.3: in accordance with Resolution 747 (WRC-03), consider upgrading the radiolocation service to primary allocation status in the bands 9 000-9 200 MHz and 9 300-9 500 MHz, and extending by up to 200 MHz the existing primary allocations to the Earth exploration-satellite service (active) and the space research service (active) in the band 9 500-9 800 without placing undue constraint on the services to which the bands are allocated.

1. Introduction

1.1 This agenda item addresses two issues as follows:

a. Upgrading of the radiolocation service to a primary status in the and 9000-9200 MHz and 9300-9500 MHz without placing undue constraint to the services to which the bands are allocated (Issue A in CPM report); and

b. Extending of the allocations to the Earth-exploration satellite service (active) and the space research service (active) in the band 9500-9800 MHz with 200 MHz without placing undue constraints to which the bands are allocated (issue B in CPM report).

2. Upgrading of the radiolocation service to a primary status in the bands 900-9200 MHz and 9300-9500 MHz.

2.1 ICAO agrees with the conclusions in paragraph 1/1.3/1.3 that test results show compatibility between the aeronautical radionavigation service and the radiolocation service in the band 9000-9200 MHz as well as between the radionavigation service and the radiolocation service in the band 9300-9500 MHz. In certain cases, compatibility can only be achieved by introducing specific mitigation measures. However, upgrading of the radiolocation service to a primary status can be supported by ICAO.

2.2 In order to secure protection of the (aeronautical) radionavigation service in these bands under all circumstances, an upgrading of the radiolocation service needs the be subject to an additional provision (footnote) in the Radio Regulations that the radiolocation service shall not cause harmful interference to nor claim protection from the (aeronautical) radionavigation service. This provision will also secure that future developments in the (aeronautical) radionavigation service will not be unduly constrained by the Radiolocation service.

2.3 With regard to the methods in the CPM report to satisfy the agenda item, method A1 (upgrade the radiolocation service to a primary status in the bands 9000-9200 MHz and 9300-9500 MHz with the addition of a footnote to protect existing services) is supported by ICAO. Method B (upgrade the radiolocation service to a primary status **without** the addition of a footnote to protect existing services is cannot be supported by ICAO. (Re. paragraph 1/1.3/7. of the CPM report)

3. Extending of the allocations to the Earth-exploration satellite service EESS (active) and the SRS space research service (active).

3.1 It has been noted in the draft CPM report that, should an extension of the Earth exploration satellite service (active) and the space research service (active) in the band 9300 – 9500 MHz be considered, that narrow band space systems provide for a greater potential for interference to the radionavigation service. Provided that the extension of the allocation is restricted to systems with

a bandwidth greater than 300 MHz, the CPM concluded that sharing with radiolocation and radionavigation would be feasible

3.2 In order to secure protection of the radionavigation service, the addition of a footnote with an allocation that stipulates that the Earth-exploration satellite service (active) and the space research service (active) shall not cause harmful interference to nor claim protection from the radionavigation service is necessary to secure that the radionavigation service will not be unduly constrained. Also, a footnote should be added restricting the use of the band 9300-9500 MHz to space systems requiring a bandwidth larger than 300 MHz.

3.3 With regard to the methods in the draft CPM report to satisfy the agenda item, ICAO method B2 (extension of the Earth-exploration satellite service in the band 9800-10000 MHz) would be preferred, ICAO would not object to extend these services in the band 9300-9500 MHz, subject to the extension of footnote 5.476A into this band and the addition of a footnote restricting the use of the band 9300-9500 MHz to space systems requiring a bandwidth larger than 300 MHz.

4. Proposed amendments to the Radio Regulations.

Article 5
8 500-10 000 MHz
MOD

Allocation to services		
Region 1	Region 2	Region 3
9 000-9 200	AERONAUTICAL RADIONAVIGATION 5.337 RADIOLOCATION ~~Radiolocation~~ 5.471 **ADD 5.RAD**	
9 200-9 300	RADIOLOCATION MARITIME RADIONAVIGATION 5.472 5.473 5.474	
9 300-9 500	RADIONAVIGATION 5.476 ~~RADIOLOCATION Radiolocation~~ EARTH EXPLORATION SATELLITE (active) SPACE RESEARCH (active) 5.427 5.474 **MOD 5.475 ADD 5.RAD ADD (MOD)5.476A ADD 5.EESS**	

ADD
5.RAD In the bands 9 000-9 200 MHz stations operating in the radiolocation service shall not cause harmful interference to, nor claim protection from systems operating in the aeronautical radionavigation service. In the band 9 300-9 500 MHz, stations operating in the radiolocation service shall not cause harmful interference to, nor claim protection from systems operating in the radionavigation service. In the band 9 300-9 500 MHz, ground-based radars used for meteorological purposes have priority over other radiolocation devices.

Reasons: To provide continued protection of the (aeronautical) radionavigation service.

MOD
5.475 The use of the band 9 300-9 500 MHz by the aeronautical radionavigation service is limited to airborne weather radars and ground-based radars. In addition, ground-based radar beacons in the aeronautical radionavigation service are permitted in the band 9 300-9 320 MHz on condition that harmful interference is not caused to the maritime radionavigation service~~. In the band 9 300-9 500~~

~~MHz, ground-based radars used for meteorological purposes have priority over other radiolocation devices.~~

Reasons: Recognizing the importance to protect the existing primary RLS having allocations in these bands, a footnote to protect future operational use of radionavigation systems is needed.

ADD 5.EESS The use of the band 9 300-9 500 MHz by Earth exploration-satellite service (active) and space research service (active) is limited to systems that cannot be accommodated within the 9 500-9 800 MHz band and that require bandwidths larger than 300 MHz.

MOD
5.476A In the band 9 300-9 800 MHz, stations in the Earth exploration-satellite service (active) and space research service (active) shall not cause harmful interference to stations of the radionavigation and radiolocation services.

Reasons: To provide continued protection of the radionavigation service in the band 9300-9500 MHz.

_____

PROPOSED SUBMISSION TO REGIONAL TELECOMMUNICATION ORGANIZATIONS

1. Introduction

1.1 This agenda item considers spectrum requirements and possible additional allocations for aeronautical telecommand and telemetry, in accordance with Resolution 230. The draft CPM report addresses a number of frequency bands that may be used for AMT. This paper concentrates on material in the draft CPM Report with regard to the use of the 5 GHz band for AMT.

2.1 ICAO strongly opposes the use of the band 5030-5091 MHz for aeronautical telemetry, since this band is required for MLS and cannot be shared with telemetry applications (Method C1 in the CPM report).

2.2. Use of the band 5091-5150 MHz for telemetry is supported by ICAO, subject to providing precedence to satisfying the requirements for MLS and AM(R)S over other uses of this band (e.g. fixed satellite service, aeronautical mobile (R) or telemetry).

2.2.2 ICAO supports the addition of an allocation to the mobile service, including aeronautical mobile service in the band 5091-5150 MHz, for generic aeronautical telemetry application and under the condition that, if an allocation is made to the aeronautical mobile satellite (R) service in this band (AM(R)S, the AM(R)S shall have precedence over the use of the band by aeronautical telemetry. (Method C2b in the CPM Report). Method C2b is supported by ICAO. The proposed regulatory provisions are considered adequate to protect future requirements for MLS and AM(R)S in this band.

2.2.3 Add an allocation limited to telemetry to support flight testing. A specific footnote will incorporate PDNR ITU-R M.[AMT 5030-5150 MHz]. This method cannot be supported by ICAO since the PDNR, as currently developed by ITU-R WP 8B requires significant modification, in particular with regard to the methodology to calculate separation distance aimed at protecting MLS. (Method C2c in the CPM report).

3. Specific proposals for amending the Radio Regulations and which are supported by ICAO are given below.

Appendix D2

Agenda item 1.5

to consider spectrum requirements and possible additional spectrum allocations for aeronautical telecommand and high bit-rate aeronautical telemetry, in accordance with Resolution 230 (WRC-03);

4 800-5 570 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
…….		
5 030-5 150	AERONAUTICAL RADIONAVIGATION 5.367 5.444 5.444A ADD 5.AT5	
…….		

NOC **5.367** *Additional allocation*: The bands 1 610-1 626.5 MHz and 5 000-5 150 MHz are also allocated to the aeronautical mobile-satellite (R) service on a primary basis, subject to agreement obtained under No. **9.21**.

NOC **5.444** The band 5 030-5 150 MHz is to be used for the operation of the international standard system (microwave landing system) for precision approach and landing. The requirements of this system shall take precedence over other uses of this band. For the use of this band, No. **5.444A** and Resolution **114 (Rev.WRC-03)** apply. (WRC-03)

NOC **5.444A** *Additional allocation:* the band 5 091-5 150 MHz is also allocated to the fixed-satellite service (Earth-to-space) on a primary basis. This allocation is limited to feeder links of non-geostationary mobile-satellite systems in the mobile-satellite service and is subject to coordination under No. **9.11A**.

In the band 5 091-5 150 MHz, the following conditions also apply:

– prior to 1 January 2018, the use of the band 5 091-5 150 MHz by feeder links of non-geostationary-satellite systems in the mobile-satellite service shall be made in accordance with Resolution **114 (Rev.WRC-03)**;

– prior to 1 January 2018, the requirements of existing and planned international standard systems for the aeronautical radionavigation service which cannot be met in the 5 000-5 091 MHz band, shall take precedence over other uses of this band;

– after 1 January 2012, no new assignments shall be made to earth stations providing feeder links of non-geostationary mobile-satellite systems;

– after 1 January 2018, the fixed-satellite service will become secondary to the aeronautical radionavigation service. (WRC-03)

ADD 5.AT5ICAO *Additional allocation* – The band 5091-5150 MHz is also allocated to the mobile, including aeronautical mobile service exclusively for the purpose of aeronautical telemetry. The use of this band by the mobile, including aeronautical mobile, service shall not cause harmful interference nor claim protection from the aeronautical mobile (R) service. The requirements of the aeronautical mobile (R) service shall take precedence over the use of this band by the mobile, including aeronautical mobile, service.

Editorial note: amendments in **ADD 5.AT5** are relative to the text for this footnote provided in the CPM Report

Reasons: No further regulatory provisions are required since protection of MLS and AM(R)S is provided through **NOC 5.444** and **ADD 5.AT5**. This leaves maximum flexibility to introduce under the new allocation various applications for aeronautical telemetry, including those for flight testing. **ADD 5.AT5** is added in case an allocation to AM(R)S is made in the band 5091-5150 MHz under agenda item 1.6. Further guidance concerning the use of this band for aeronautical telemetry can be developed in ITU-R

PROPOSED SUBMISSION TO REGIONAL TELECOMMUNICATION ORGANIZATIONS
PROPOSED MODIFICATIONS TO THE RADIO REGULATIONS
(WRC-07 AGENDA ITEMS 1.6 – RESOLUTIONS 414 AND 415)

to consider additional allocations for the aeronautical mobile (R) service in parts of the bands between 108 MHz and 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);

1. Introduction

1.1 This agenda item considers additional spectrum requirements for the aeronautical mobile (R) service in the frequency range 108 MHz to 6 GHz (Resolution 414) as well as the study on current satellite frequency allocations that will support the modernization of civil aviation telecommunication systems (Resolution 415).

2. This paper is addressing allocations to AM(R)S in the frequency range between 108 MHz 6 GHz (Issue A in the CPM Report), the accommodation of aviation security requirements in the band 5091-5150 MHz. (issue C in the CPM Report) and the modernization of civil aviation telecommunications systems (issue D in the CPM Report)

3. The CPM Report (issue A) identifies four frequency bands, currently allocated to aeronautical services, as potential candidates for an allocation to AM(R)S:

108-117.975 MHz
960-1164 MHz
5000-5030 MHz
5091-5150 MHz

3.1 ICAO supports an allocation to AM(R)S in the band 112-117.975 MHz. This can be achieved through amendments to RR 5.197A. Adding an allocation to the band 116-117.975 MHz only will not provide a significant capacity increase for AM(R)S, in particular in already heavily congested areas (Issue A method 1a in the CPM Report).

3.2 ICAO also supports an allocation to AM(R)S in the band 960-1164 MHz. This will enable to also use the upper part of this band, which is currently only available for DME on a national or secondary basis (Re. Annex 10 to the Convention on International Civil Aviation) (Issue A, method 2b in the CPM report).

3.3 The frequency band 5000-5030 MHz is considered by ICAO to support surface applications at airports. Studies on the feasibility of sharing AM(R)S with RNSS feeder links (Earth-to-space in the band 5000-5010 MHz and space-to-Earth in the band 5010-5030 MHz, as well as a potential service link (space-to-Earth) in the band 5010-5030 MHz are ongoing. An allocation to AM(R)S in these bands with regulatory provisions for protecting RNSS is proposed (Issue A, method 3a/3b).

3.4 In order to provide capacity for new AM(R)S system for data intensive communications with aircraft, in particular on and around airports, ICAO supports an allocation to AM(R)S in the band 5091-5150 MHz. This allocation needs to give priority to MLS, operating in this band as well as to protect FSS from harmful interference. The CPM Report indicates that surface applications for AM(R)S can be compatible with the FSS; the additional airborne use around airports is expected to slightly increase the interference levels into FSS but within acceptable limits. The CPM report has

addressed this matter under issue C. The sharing capabilities of FSS with AMS (security applications) are similar to those of AM(R)S. Further work is necessary in ITU-R (Issue A, method 4b, amended)

4. ICAO is supporting an allocation to AMS for security applications in the band 5091-5150 MHz. Compatibility with FSS can be achieved, as indicated in the CPM Report (issue C). Regulatory provisions are necessary, to secure protection of ARNS (MLS) and FSS.

5. No allocation to AM(R)S or AMS can be supported in the band 5030-5091 MHz. This bands needs to be retained for exclusive use for MLS, a primary radio navigation aid for approach and landing of aircraft under all weather conditions.

6. Modernization of civil aviation telecommunication systems (res. 415; issue D in the CPM report)

6.1 ICAO is of the view that the current provisions in the Radio Regulations for the use of the bands 1545-1555MHz and 1646.5-1656.5 MHz need to be considered at WRC-11, on the basis of studies completed in ITU-R, with the view to securing long term and stable AMS(R)S spectrum availability. This is further to be addressed under WRC agenda item 7.2

6.2 In remote and rural areas it is beneficial to use VSAT links to support both aeronautical and non-aeronautical communications. Since the FSS, under which allocation VSAT links operate, is not a safety service *per se*, it would be necessary to, through an ITU Recommendation in the Radio Regulations, draw the attention of administrations to the fact that VSAT systems are also used for aeronautical safety communications and to take that into consideration, in coordination with VSAT operators. An example for such a Recommendation it given below.

7. Amendments to the Proposed amendments of the ITU Radio Regulations are contained in the Appendix to this paper.

MOD 75.2-137.175 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
……		
100-108	BROADCASTING 5.192 5.194	
108-117.975	AERONAUTICAL RADIONAVIGATION 5.197 **MOD 5.197A**	
117.975-137	AERONAUTICAL MOBILE (R) 5.111 5.198 5.199 5.200 5.201 5.202 5.203 5.203A 5.203B	
……		

MOD

5.197A *Additional allocation:* The band 108-117.975 MHz ~~may also be used by~~ is also allocated on a primary basis to the aeronautical mobile (R) service ~~on a primary basis, limited to systems that transmit navigational information in support of air navigation and surveillance functions~~ operating in accordance with recognized international ~~aviation~~ aeronautical standards. Such use shall be in accordance with Resolution **413 (Rev.WRC-07~~3~~)** ~~and shall not cause harmful interference to nor claim protection from stations operating in the aeronautical radionavigation service which operate in accordance with international aeronautical standards.~~ Moreover, use of the band 108-112 ~~XVB~~ MHz by the aeronautical mobile (R) service is limited to systems that transmit navigational information in support of air navigation and surveillance functions in accordance with recognized international aeronautical standards. (WRC-07~~3~~)

Amendments to Resolution **413**, consequential to the changes in **MOD 5.197A** are given below.

MOD

RESOLUTION 413 (REV. WRC-03~~7~~)

Use of the band 108-117.975 MHz by aeronautical services

The World Radiocommunication Conference (Geneva, 2007~~3~~),

considering

NOC *a) to e)*

f) the need for the aeronautical community to provide additional services for communications relating to safety and regularity of flight in the band 108~~XVB~~-117.975 MHz,

NOC *recognizing*

NOC *noting*

resolves

~~1 that the provisions of this Resolution and of No. **5.197A** shall enter into force on 5 July 2003;~~

1 that any AM(R)S systems operating in the band 108-117.975 MHz shall not cause harmful interference to, nor claim protection from aeronautical radionavigation service systems operating in accordance with international aeronautical standards;

2 that any ~~additional~~ aeronautical mobile (R) service systems~~1~~ planned to operate in the frequency band 108-117.975 MHz shall, as a minimum, meet the FM broadcasting immunity requirements contained in Annex 10 of the ICAO Convention on International Civil Aviation for existing aeronautical radionavigation systems operating in this frequency band;

3 that ~~additional~~ aeronautical mobile (R) service systems operating in the band 108-117.975 MHz shall place no additional constraints on the broadcasting service or cause harmful interference to stations operating in the bands allocated to the broadcasting service in the frequency band 87-108 MHz and No. **5.43** does not apply to systems identified in *recognizing d)*;

4 that frequencies below 112 MHz shall not be used for ~~these additional~~ aeronautical mobile (R) service systems excluding the ICAO systems identified in *recognizing d)* until all potential compatibility issues with the lower adjacent frequency band 87-108 MHz have been resolved,

NOC *invites ITU-R*

NOC *instructs the Secretary-General*

~~1 In the context of this Resolution, the term "additional aeronautical systems" refers to systems that transmit navigational information in support of air navigation and surveillance functions in accordance with recognized international aviation standards.~~

MOD

960-1 164 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
960-1 164	AERONAUTICAL RADIONAVIGATION 5.328 **ADD** 5.AM1	

ADD

5.AM1 The band 960-1164 ~~XLB~~ MHz is also allocated to the aeronautical mobile (R) service on a primary basis, limited to systems that operate in accordance with recognized international aeronautical standards. Such use shall be in accordance with Resolution **[AM(R)S 960] (WRC-07)**. (WRC-07)

ADD

RESOLUTION [AM(R)S 960] (WRC-07)

Use of the band 960-1164~~XLB~~ MHz by aeronautical services

The World Radiocommunication Conference (Geneva, 2007),

considering

a) the current allocation of the frequency band 960-1 164 MHz to the aeronautical radionavigation service (ARNS);

b) the use of the band 960-1 215 MHz by the ARNS is reserved on a worldwide basis for the operation and development of airborne electronic aids to air navigation and any directly associated ground-based facilities per No. **5.328**;

c) that new technologies are being developed to support communications and air navigation, including airborne and ground surveillance applications;

d) that new applications and concepts in air traffic management which are data intensive are being developed;

e) that in countries listed in No. **5.312** the frequency band 960-1 164 MHz is also used by systems in aeronautical radionavigation service for which no standards and recommended practices (SARPs) have been developed and published by the International Civil Aviation Organization (ICAO),

recognizing

a) that precedence must be given to the ARNS operating in the frequency band 960-1 164 MHz;

b) that Annex 10 of the Convention of the ICAO contains standards and recommended practices (SARPs) for aeronautical radionavigation and radiocommunication systems used by international civil aviation;

c) that all compatibility issues between the ICAO standard Universal Access Transceiver (UAT) and other systems which operate in the same frequency range, excluding the system identified in *considering e)*, have been addressed within ICAO,

noting

that excluding the system identified in *recognizing c)*, no compatibility criteria currently exist between aeronautical mobile (R) service (AM(R)S) systems proposed for operations in the frequency band 960-1164 ~~XLB~~ MHz and the existing aeronautical systems in the band,

resolves

1 that prior to operating in the frequency band 960-1164~~XLB~~ MHz any AM(R)S systems shall have SARPs requirements published in Annex 10 of the ICAO Convention on International Civil Aviation, and that those requirements will ensure compatibility with ARNS systems operating in accordance with international (ICAO) standards;

2 that any AM(R)S systems operating in the band 960-1164~~XLB~~ MHz shall not cause harmful interference to, nor claim protection from, and shall not impose constraints on the operation and planned development of aeronautical radionavigation systems operating in accordance with international (ICAO) standards in the same band;

3 that any AM(R)S systems operating in the band 960-1164~~XLB~~ MHz shall not cause harmful interference to, nor claim protection from, and shall not impose constraints on the operation and planned development of aeronautical radionavigation systems operating in the countries identified in *considering e)*;

4 that ITU-R compatibility studies between AM(R)S systems operating in the band 960-1164~~XLB~~ MHz and ARNS systems operating in the countries identified in *considering e)* need to be conducted to develop sharing conditions to ensure that the conditions of resolves 3 are satisfied;

5 that the result of the *resolves 4* studies shall be reported to WRC-10 and the decisions should be taken by WRC-10 to review, if appropriate, regulatory provisions in *resolves 3* taking into account protection requirements of ARNS systems operating in the countries identified in *considering e)* and the need for global facilitation of AM(R)S operating in accordance with ICAO standards;

6 to encourage administrations listed in *considering e)* and ICAO, for the purposes of conducting the ITU-R studies mentioned in *resolves* 4, to provide to ITU-R the technical and operational characteristics of systems involved,

invites the ITU-R

1 to conduct studies on operational and technical means to facilitate sharing between AM(R)S systems operating in the band 960-1164~~XLB~~ MHz and ARNS systems identified in *considering e)*;

2 to report the results of the studies to WRC-10,

instructs the Secretary-General

to bring this Resolution to the attention of ICAO.

MOD

5 000-5 030 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 000-5 010	AERONAUTICAL RADIONAVIGATION ~~AERONAUTICAL MOBILE (R) **ADD** 5.AMR~~ RADIONAVIGATION-SATELLITE (Earth-space) 5.367 **ADD 5.AMR**	
5 010-5 030	AERONAUTICAL RADIONAVIGATION ~~AERONAUTICAL MOBILE (R) **ADD** 5.AMR~~ RADIONAVIGATION-SATELLITE (space-Earth) (space-space) 5.328B 5.443B 5.367 ADD 5.AMR	

ADD

5.AMR *Additional allocation:* The bands 5 000-5 010 MHz and 5 010-5 030 MHz are also allocated to the aeronautical mobile (R) service on a primary basis. Stations in the aeronautical mobile (R) service operating in the 5 000-5 010 MHz and 5 010-5 030 MHz bands shall be subject to the condition that no harmful interference is caused to, and no protection is claimed from, the radionavigation-satellite service and such use shall be limited to stations operating on the surface of the Earth.

Editorial note: The addition of this footnote would not require Resolution [AM(R)S-RNSS]

Alternatively, the following footnote and a Resolution could be added as follows:

ADD

5.AMR *Additional allocation:* The bands 5 000-5 010 MHz and 5 010- 5 030 MHz are also allocated to the aeronautical mobile (R) service on a primary basis, limited to systems operating in accordance with recognized international aeronautical standards. Such use shall be in accordance with Resolution **[AM(R)S-RNSS] (WRC-07)**. (WRC 07)

ADD

RESOLUTION [AM(R)S-RNSS] (WRC-07)

Compatibility between the aeronautical mobile (R) service and the radionavigation-satellite service in the frequency bands 5 000-5 010 MHz and 5 010-5 030 MHz

The World Radiocommunication Conference (Geneva, 2007),

considering

a) the current allocation of the frequency band 5 000-5 010 MHz to the aeronautical mobile satellite (R) service (AMS(R)S) subject to agreement obtained under No. **9.21**, the aeronautical radionavigation service (ARNS) and the radionavigation satellite service (RNSS) (Earth-to-space);

b) the current allocation of the frequency band 5 010-5 030 MHz to the AMS(R)S subject to agreement obtained under No. **9.21**, the ARNS and the RNSS (space-to-Earth and space-space);

c) that the WRC-07 has made allocations to the aeronautical mobile (R) service (AM(R)S) in the bands 5 000-5 010 MHz and 5 010-5 030 MHz limited to systems operating in accordance with recognized international aeronautical standards;

d) that ICAO is in the process of identifying the technical and operating characteristics of new systems operating in the AM(R)S in the bands 5 000-5 010 MHz and 5 010-5 030 MHz;

e) that compatibility between systems operating in accordance with international aeronautical standards will be ensured by ICAO,

recognizing

a) that the International Civil Aviation Organization publishes recognized international aeronautical standards for AM(R)S;

b) that preliminary studies have been conducted within the ITU-R concerning the sharing and compatibility of surface based AM(R)S systems with planned RNSS systems in the 5 000-5 010 MHz and 5 010-5 030 MHz bands, and compatibility with the radio astronomy service operating in the band 4 990-5 000 MHz;

c) that system characteristics for RNSS and AM(R)S systems planned for the 5 000-5 010 MHz and 5 010-5 030 MHz bands are still evolving;

d) that technical characteristics for the RNSS have not been established by ITU-R;

e) that the RNSS needs access to the bands 5 000-5 010 MHz and 5 010-5 030 MHz in the longer term;

f) that spectrum efficiency is enhanced in situations where new applications can be implemented compatibly in heavily occupied bands,

noting

that currently only preliminary guidelines are available for the AM(R)S to ensure protection of the RNSS,

resolves

1 stations in the AM(R)S operating in the 5 000-5 010 MHz or 5 010-5 030 MHz bands shall operate in accordance with International Civil Aviation (ICAO) Standards and Recommended Practices (SARPs);

2 stations in the AM(R)S shall be restricted as necessary to ensure they do not cause harmful interference to, nor claim protection from, and shall not impose constraints on the operation and planned development of stations in the RNSS operating in the 5 000-5 010 MHz or 5 010-5 030 MHz bands;

3 that AM(R)S use in both bands shall be limited to surface applications at airports;

4 to recommend that WRC-10 review the results of the studies in *invites ITU-R* and take appropriate action,

invites ITU-R

to study the technical and operational issues relating to the compatibility between the RNSS and the AM(R)S in the bands 5 000-5 010 MHz and 5 010-5 030 MHz,

invites

1 administrations and ICAO to supply technical and operational characteristics for the AM(R)S necessary for compatibility studies, and to participate actively in the studies;

2 administrations to supply technical and operational characteristics and protection criteria for the RNSS necessary for compatibility studies, and to participate actively in the studies,

instructs the Secretary-General

to bring this Resolution to the attention of ICAO.

MOD

5 030-5 150 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 030-5 150	AERONAUTICAL RADIONAVIGATION 5.367 5.444 5.444A ADD 5.AM2	

ADD

5.AM2 The use of band 5091~~XCB~~-5 150 MHzbe the AM(R)S is ~~also allocated to the aeronautical mobile (R) service on a primary basis,~~ limited to ~~surface applications at airports by~~ systems operating in accordance with recognized international aeronautical standards. Such use shall be in accordance with Resolution **[AM(R)S-5 GHz] (WRC-07)**. (WRC 07)

NOC 5.444

NOC 5.444A

ADD

RESOLUTION [AM(R)S-5 GHz] (WRC-07)

Compatibility between the aeronautical mobile (R) service and fixed-satellite service (Earth-to-space) in the band 5 091 -5 150 MHz

The World Radiocommunication Conference (Geneva, 2007),

considering

a) the allocation of the 5 091-5 150 MHz band to the fixed-satellite (FSS) (Earth-to-space) limited to feeder links of non-geostationary-satellite (non-GSO) systems in the mobile-satellite service (MSS);

b) the current allocation of the frequency band 5 000-5 150 MHz to the aeronautical mobile satellite (R) service (AMS(R)S) subject to agreement obtained under No. **9.21** and the aeronautical radionavigation service (ARNS);

c) this conference has allocated the 5 091-5 150 MHz band for the aeronautical mobile (R) service (AM(R)S) limited to systems operating in accordance with recognized international aeronautical standards;

d) this conference has also allocated the 5 091-5 150 MHz band to the aeronautical mobile service (AMS) limited to secure and confidential communications between aircraft and ground, principally during unlawful interference to aircraft;

e) that ICAO is in the process of identifying the technical and operating characteristics of new systems operating in the AM(R)S in the band 5 091-5 150 MHz;

f) that one AM(R)S system, to be used by aircraft operating on the airport surface, has demonstrated compatibility with the FSS in the 5 091-5 150 MHz band;

g) that ITU-R studies have examined potential sharing among AMS applications and have shown that the aggregate interference from aeronautical security, aeronautical telemetry and AM(R)S should total no more than 3% $\Delta T/T$,

recognizing

a) that precedence is to be given to the microwave landing system (MLS) in accordance with No. **5.444** in the frequency band 5 030-5 150 MHz;

b) that ICAO publishes recognized international aeronautical standards for AM(R)S systems,

noting

a) that the number of FSS transmitting stations required may be limited;

b) that the use of the bands 5 091-5 150 MHz by the AM(R)S needs to ensure protection of the current or planned use of this band by the FSS (Earth-to-space);

c) that ITU-R studies describe methods for ensuring compatibility between the AM(R)S and FSS operating in the band 5 091-5 150 MHz, and compatibility has been demonstrated for the AM(R)S system referenced in *considering f)*,

resolves

1 that administrations, in making assignments, shall ensure that stations in the AM(R)S operate in accordance with International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPs);

2 that the coordination distance with respect to stations in the FSS operating in the band 5 091-5 150 MHz shall be based on ensuring that the received signal at the AM(R)S station from the FSS transmission does not exceed –143 dBW/MHz, where the required basic transmission loss shall be determined using the methods described in Recommendations ITU-R P.525-2 and ITU-R P.526-9;

3 that prior to operating in the frequency band 5 091-5 150 MHz any AM(R)S systems shall meet SARPs requirements published in Annex 10 of the ICAO Convention on International Civil Aviation, and that those requirements will ensure, consistent with appropriate ITU-R Recommendations, compatibility with FSS systems operating in that band;

4 that studies of the band 5 091-5 150 MHz be undertaken by ITU-R regarding the apportioning of the FSS 3% $\Delta T/T$ aggregate interference limit between the ~~new~~ AM(R)S and AMS allocated at this Conference, with the task of developing or revising Recommendation ITU-R M.[AM(R)S/AS 5 091-5 150 MHz] to ensure that aggregate limit is not exceeded;

5 Until the studies in *resolves 4* are completed, a provisional limit for the AM(R)S of less than xx%[1] $\Delta T/T$ will be applied. This value will be reviewed at a future conference preferably WRC-10,

invites

administrations and ICAO to supply technical and operational criteria necessary for sharing studies for the aeronautical mobile (R) service, and to participate actively in such studies,

instructs the Secretary-General

to bring this Resolution to the attention of ICAO.

1/1.6/6.5 Method 5: AMS allocation limited to aeronautical security applications in the band 5 091-5 150 MHz

MOD

5 030-5 150 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 030-5 150	AERONAUTICAL RADIONAVIGATION 5.367 5.444 5.444A	

ADD

5.XAS *Additional allocation:* The band 5 091-5 150 MHz is also allocated to the aeronautical mobile service, on a primary basis, in accordance with Resolution **[AMS(AS) 5 GHz] (WRC-07)**. (WRC 07)

NOC 5.444

NOC 5.444A

[1] xx equals 2% if the Conference allocates aeronautical mobile telemetry, and 3% otherwise.

ADD

RESOLUTION [AMS(AS) 5 GHz] (WRC-07)

Considerations for sharing the band 5 091 -5 150 MHz by the aeronautical mobile service for aeronautical security applications and fixed-satellite service

The World Radiocommunication Conference (Geneva, 2007),

considering

a) the current allocation of the 5 091-5 150 MHz band to the fixed-satellite (FSS) (Earth-to-space), which is limited to feeder links of non-geostationary-satellite (non-GSO) systems in the mobile-satellite service (MSS) services;

b) the current allocation of the frequency band 5 000-5 150 MHz to the aeronautical mobile satellite (R) service (AMS(R)S) subject to agreement obtained under No. **9.21** and the aeronautical radionavigation service (ARNS);

c) this conference has allocated the 5 091-5 150 MHz band for the aeronautical mobile (R) service (AM(R)S);

d) this conference has also allocated the 5 091-5 150 MHz band for the aeronautical mobile service (AMS) limited to secure and confidential communications between aircraft and ground, principally during unlawful interference to aircraft,

recognizing

a) that precedence is to be given to the microwave landing system (MLS) in accordance with No. **5.444** in the frequency band 5 030-5 150 MHz;

b) that Resolution **114 (WRC-03)** applies to the sharing conditions between the FSS and ARNS in the 5 091-5 150 MHz band;

c) that Resolution **[AM(R)S-5 GHz] (WRC-07)** provides guidance on the use of the band 5 091-5 150 MHz by the AMS,

noting

that ITU-R studies describe methods for ensuring compatibility between the AMS for aeronautical security applications and FSS operating in the band 5 091-5 150 MHz,

resolves

1 that the AMS is limited to stations providing secure and confidential communications principally during unlawful interference to aircraft;

2 that studies of the band 5 091-5 150 MHz be undertaken by the ITU-R regarding the apportioning of the FSS 3% $\Delta T/T$ aggregate interference limit between new AMS allocated at this Conference, with the task of developing or revising Recommendation ITU-R M.[AM(R)S/AS 5 091-5 150 MHz] to ensure that aggregate limit is not exceeded;

3 Until the studies in *resolves 2* are completed, stations in the AMS, limited to aeronautical security applications, shall be designed in such a manner that the transmitter power flux-density be limited to –140.25 dBW/(m^2 · 1.23 MHz) at an FSS satellite using full Earth coverage receive antennas with an orbit of 1 414 km. This value will be reviewed at a future Conference preferably WRC-10;

4 that the conditions of *resolves* 1 and 3 do not apply to the AM(R)S in provision **ADD** No. **5.AM2**;

5 the requirements for the AM(R)S shall take priority over those of the AMS for security applications,

Note 1) If an allocation to the AMS limited to aeronautical telemetry is made under Agenda item 1.5, the provisions of resolves 4 will need to be revised.

ADD

RECOMMENDATION XXXX (WRC-07)

Use of frequency allocations to the Fixed Satellite Service by civil aviation

The World Radiocommunication Conference (Geneva, 2007),

Considering

a) that remote and rural areas often still lack a terrestrial based communication infrastructure that meets the evolving requirements of modern civil aviation;

b) that the cost of providing and maintaining such an infrastructure is increasingly expensive, particularly in remote regions;

c) that satellite communication systems operating in the fixed satellite service provide a real possibility to meet the demands of the International Civil Aviation Organization (ICAO) communication, navigation, surveillance and air traffic management (CNS/ATM), especially in the areas where a terrestrial communication infrastructure is not available;

d) that the use of VSAT terminals, operating in the fixed satellite service and are being deployed on a large scale in aeronautical communications, has the potential to significantly enhance communications between air traffic control centres as well as with remote aeronautical stations;

e) the fixed satellite service is not a safety service;

f) that the benefits of establishing and utilizing satellite communication systems for civil aviation would also bring additional benefits for developing and sparsely populated countries by enabling the use of aeronautical VSAT systems also for non-aeronautical communications;

g) that there is a need in cases identified in *considering f)* to draw attention to the safety aspects of aeronautical communications with regard to the non-aeronautical communications,

noting

1 that Recommendation **34** **(WRC-95)** states that future world radiocommunication conferences, whenever possible, should allocate frequency bands to the most broadly defined services with a view to providing maximum flexibility in spectrum use;

2 that Resolution **20** **(Rev.WRC-2000)** *resolves to instruct the Secretary-General* "to encourage ICAO to continue its assistance to developing countries which are endeavouring to improve their aeronautical telecommunications",

recommends

1 that Administrations, in particular in developing countries and in remote and rural areas, encourage the implementation of VSAT terminals that, as required, could support both aeronautical and other communication requirements;

2 that Administrations, to the maximum extent possible and as necessary, give priority to aeronautical communications where VSAT terminals are being used for both aeronautical and non-aeronautical communication;

3 to encourage Administrations and service providers to provide for priority service restoration or alternative routing in case of breakdown of a VSAT link;

4 that Administrations provide their support to resolve issues related to interconnectivity between different VSAT networks and efficient and timely implementation of VSAT terminals;

5 to invite ICAO, noting **Resolution 20 (Rev. WRC-2000)**, to continue its assistance to developing countries to improve their aeronautical telecommunications,

requests the Secretary-General

to bring this Recommendation to the attention of ICAO.

– – – – – – – – – –

Attachment 1

Second Regional Preparatory Group (RPG) Meeting for
ITU World Radiocommunication Conference (WRC-2007)
Bangkok, Thailand, 15-17 January 2007

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Attachment 1

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Attachment 2

International Civil Aviation Organization

Second Regional Preparatory Group (RPG) Meeting for ITU World Radiocommunication Conference 2007 (WRC-2007)

Bangkok, Thailand, 15-17 January 2007

LIST OF INFORMATION PAPERS

IP No.	Agenda Item	Subject	Presented by
1	-	Meeting Bulletin	Secretariat
2	2	Amendments to the ICAO Position for Submission to the International Telecommunication Union World Radiocommunication Conference (2007) (ITU WRC-2007)	Secretariat

LIS OF WORKING PAPERS

WP No.	Agenda Item	Subject	Presented by
1	-	Provisional Agenda	Secretariat
2	1	Outcome of APANPIRG/17 and 43rd DGCA Conference on Preparatory Activities for ITU World Radiocommunication Conference 2007 (WRC-2007)	Secretariat
3	2a)	ICAO Position on WRC Agenda Item 1.5, 1.6, 1.20 and 7.2	Secretariat
4	2a)	Draft CPM Report for WRC-2007 on Agenda Item 1.5	Secretariat
5	2b)	Draft CPM Report for WRC-2007 on Agenda Item 1.6	Secretariat
6	2b)	ICAO Comments on the CPM Report for WRC-2007 on Agenda Item 1.6 (Resolution 415)	Secretariat

WP No.	Agenda Item	Subject	Presented by
7	2b)	ICAO Position on Proposed Allocations to the Aeronautical Mobile (R) Service in the Frequency Bands 108 – 117.975 MHz and 960 1 215 MHz	Secretariat
8	2	ICAO Position on Proposed Allocations to the Aeronautical Mobile (R) Service in the Frequency Band 5 000 – 5 150 MHz	Secretariat
9	2c)	ITU-R Recommendations and Report Relevant to WRC-07 Agenda Items 1.5 and 1.6	Secretariat
10	5	Use of Radio Transmitting Equipment (Mobile Phones) on Board Aircraft	Secretariat
11	3, 2a)	CITEL DIAP WRC-07 Agenda Item 1.3	J. Taylor
12	3, 2a)	CITEL DIAP and Preliminary Proposals for WRC-07 Agenda Item 1.5	J. Taylor
13	3, 2b)	CITEL DIAP WRC-07 Agenda Item 1.6	J. Taylor
14	3, 2a)	Draft European Common Proposals Regarding WRC-07 Agenda Item 1.5	Secretariat
15	3, 2b)	Draft European Common Proposals Regarding WRC-07 Agenda Item 1.6	Secretariat
16	3	Output of APT APG-2007-4 on some relevant agenda items	Secretariat
17	2a)	Deletion of footnotes and Country Names from Footnotes in the Radio Regulations	Secretariat
18	4	List of Designated Contact Persons Responsible for preparation of World Radiocommunication Conference (WRC-2007)	Secretariat