International Civil Aviation Organization

DRAFT REPORT

Draft Report 24 February, 2015

FREQUENCY AND SPECTRUM MANAGEMENT PANEL (FSMP)

THIRTY-SECOND MEETING OF WORKING GROUP F

Cairo, Egypt
18-24 February, 2015

DRAFT REPORT

1. Introduction

1.1 The meeting was opened by Mr Loftur Jonasson from the ICAO Secretariat, Montreal and Mr Mike Biggs, the Rapporteur of Working Group F (WG-F). Mr Jonasson acted as the Secretary of the meeting, assisted by Mr Raza Gulam, Regional Officer CNS for ICAO Middle East (MID) Regional Office. Mr Jonasson and Mr Biggs both expressed special thanks to the ICAO MID Office for hosting the meeting. Following introductions, Mr Biggs welcomed the group and provided introductory remarks, meeting information and housekeeping details.

1.2 It was noted that this would be the first meeting of WG-F as part of the new Frequency and Spectrum Management Panel (FSMP), however to avoid confusion it would still be considered the 32nd meeting of WG-F and not the 1st meeting of FSMP WG-F. Mr Jonasson gave some background on the expected plans for the FSMP, in particular noting that the first meeting of the Panel is planned for late August 2015 in Montreal. Further detail is contained in IP06 as discussed under Agenda Item 9 below.

1.3 The meeting was held in English. After the opening of the meeting the agenda was approved by the group. The agenda is contained in Appendix A.

1.4 The list of papers submitted for consideration by WG-F is contained in Appendix B. The list of participants is in Appendix C.

1.5 The material in this report is organized by meeting agenda item number, and does not necessarily reflect the order of discussions. Actions captured during discussions are shown in

Appendix D.

2. Agenda Item 2 – Aviation Safety Margins

2.1 No contributions were presented on this topic.

3. Agenda Item 3 – Updates to Aviation Frequency Spectrum Strategy

3.1 IP04 provided a draft SESAR Aeronautical Spectrum Strategy and Vision as developed by Eurocontrol. It contained a set of high-level strategic objectives focussed on ensuring spectrum requirements are fully met for currently deployed systems and those under development, together with a set of generic principles and practices designed to support the long-term sustainability of aeronautical spectrum to meet all potential future needs. The aim is to secure the long-term availability of suitable radio spectrum to meet all of aviation's future needs through cooperative engagement in the global spectrum environment. The meeting appreciated the briefing and suggested the material be used to suggest specific changes to the existing ICAO Spectrum Strategy for discussion at the next WG-F meeting.

3.2 WP12 provided European Frequency Management Group (FMG) comment on the Eurocontrol draft Aeronautical Spectrum Strategy and Vision (see IP04 above). The FMG noted that there appeared to be some differences in the SESAR strategy vs the ICAO Strategy. It was also recalled that there was another spectrum policy and strategy level type of a document, i.e. the European Common Aviation position for WRC. The paper concluded that a single global strategy should be developed, and the meeting agreed.

4. Agenda Item 4 – RF Handbook Volume II (Doc 9718 Vol II), Frequency Assignment Planning

4.1 WP11and IP02 were considered together and present a proposed revision of the frequency assignment planning criteria for air/ground communication systems operating in the band 117.975 – 137 MHz on adjacent frequencies. The revision was undertaken by the FMG on the basis of studies presented by Eurocontrol. The meeting agreed to consider the proposal, and if accepted, at the next WG-F meeting begin necessary revisions to the Spectrum Handbook and Annex 10 such that the new planning criteria can be used on a global basis.

5. Agenda Item 5 – 5 GHz Band Planning

5.1 WP03 reported on studies by Electronic Navigation Research Institute (ENRI) evaluating compatibility criteria for prototype Aeronautical Mobile Airport Communication System (AeroMACS) equipment. In particular, under the condition of a co-channel interference signal similar to AeroMACS, an undesired level of no more than -108 dBm/channel was required to ensure protection of minimum desired AeroMACS signals. The meeting appreciated the information and asked that other types of interference signals be considered including MLS-like

(i.e., narrow-band; pulsed) and aeronautical mobile telemetry (AMT).

5.2 IP03 presented a description and results of initial ground station handoff flight tests of the second-generation prototype, unmanned aircraft system (UAS) Control and Non-Payload Communications (CNPC) radio developed jointly under a cooperative agreement between the NASA Glenn Research Center and Rockwell Collins Inc. The tests are intended to support the validation of CNPC air-ground radio system requirements and the development of CNPC standards. The CNPC radio operates in both the 960-977 MHz and 5030-5091 MHz bands. The tests described in the paper involve in-flight CNPC radio operation focused on the handoff of communications between two separated ground stations.

6. Agenda Item 6 – Development of material for ITU-R meetings

6.1 Inputs regarding WRC-15 Agenda Item 1.1: No contributions were provided.

6.2 Inputs regarding WRC-15 Agenda Item 1.5

6.2.1 WP07 provided detail as to why FSS providers are concerned about the possibility of introducing an Aeronautical Mobile-Satellite (R) Service (AMS(R)S) allocation in the various FSS frequency bands under consideration as part of WRC-15 agenda item 1.5. In particular the paper focused on regulatory concerns of having AMS(R)S allocations in FSS frequency bands. After discussion, the meeting agreed that any proposal to the WRC regarding such an allocation should address specifically each of the issues identified in the paper.

6.2.2 WP10 addressed each of the "conditions" contained in the ICAO Position on WRC-15 agenda item 1.5, and provided proposed resolutions as developed in the International Telecommunications Union Radiocommunication Sector (ITU-R) Working Party 5B (WP5B). The meeting reviewed conditions 1-3 (i.e., the ones considered necessary for the ITU to address) and provided the following comments.

Condition 1: Specific example regulatory text should be developed, perhaps lifted from, or referenced from, the appropriate final Conference Preparatory Meeting (CPM) method.
Condition 2: No comment
Condition 3: Specific example regulatory text should be developed, perhaps lifted from, or referenced from, the appropriate final CPM method. In addition, the A8-3.3 text should be clarified as it seems to imply Radio Regulations No. 4.10 should <u>not</u> apply.

6.3 Inputs regarding WRC-15 Agenda Item 1.17

6.3.1 WP05 included a liaison statement from WP5B informing ICAO of the new ITU-R Report M.2319, containing the ITU study results relevant to implementation of Wireless Avionics Intra-Communications (WAIC) in the frequency band 4 200 – 4 400 MHz. The meeting noted the information with appreciation.

6.4 Inputs regarding WRC-15 Agenda Item 9.1 (sub-item 5): No contributions were

provided.

6.5 Inputs regarding other items

6.5.1 Satellite reception of automatic dependent surveillance-broadcast (ADS-B)

6.5.1.1 WP04 was discussed initially under Agenda Item 7 (see below). To assist the Secretariat with development of a reply liaison however, the meeting provided specific comments. In particular it was noted that the reply should highlight: that carrier to noise-plus-interference ratio (C/(N+I)) was not a good metric for determining interference to ADS-B; that TACAN/DME was not considered to be a significant interference source due to the short pulse durations compared to the ADS-B message, error correction capability, and expected frequency offset; and that determination of compatibility would require a complex analysis including probability of message overlap and required update rate.

6.5.1.2 WP17, presented under Agenda Item 7 (see below) was briefly discussed to note that the information will be augmented and taken to WP5B for further development. Toward that end it was noted that WP19 included suggestions on additional material that would be useful.

7. Agenda Item 7: Development of potential updates to ICAO WRC-15 Position

7.1 WP02 provided the results of WG-F/31 deliberations on the ICAO World Radiocommunication Conference 2015 (WRC-15) Position. Final suggested modifications based on WG-F/32 meeting discussions are contained in Appendix E. These changes will be forwarded to the Air Navigation Commission for their consideration and approval and then on to the ICAO Council for possible adoption as modifications to the current approved ICAO position.

7.2 Regarding WRC-15 agenda item 1.1

7.2.1 The changes proposed in WP02 with respect to agenda item 1.1 were preserved, with only some minor clean-up of text.

7.3 Regarding WRC-15 agenda item 1.5

7.3.1 WP06 provided modifications to the ICAO Position to support the proposed approach introduced at WG-F/31which takes account of the fact that the agenda item considers two distinct issues: (1) taking the necessary regulatory actions to allow fixed satellite service (FSS) links to be used for UAS CNPC, and (2) supporting the use of those links in non-segregated airspace. The first issue is clearly under the purview of the ITU, however the latter is more appropriately decided within ICAO.

7.3.2 WP14 proposed that the ICAO position for the ITU WRC-15 is amended to in-particular clearly state the requirement for an aeronautical mobile satellite (R) service (AMS(R)S) allocation for the UAS CNPC links.

7.3.3 WP20 discussed in a general sense various options open to aviation for the provision of

aeronautical safety communication services via satellite.

7.3.4 All documents were extensively discussed, and the agreed proposed modifications to the ICAO Position are shown in Appendix E.

7.4 Regarding WRC-15 agenda item 1.17

7.4.1 WP09 summarized recent ITU and ICAO efforts with regards to WAIC under WRC-15 Agenda Item 1.17, and proposed updates to the ICAO Position. The changes were agreed with slight modification, as shown in Appendix E.

7.4.2 While not providing specific changes to the ICAO Position, IP07 informed on recent WAIC efforts in Europe. Of particular note was that CEPT had agreed on a single method for the CPM report regarding WAIC, which may serve to simplify the text.

7.5 Regarding WRC-15 agenda item 8

7.5.1 WP12 provided input regarding WRC-15 AI 8, which seeks to remove names from country footnotes in the Radio Regulations. In particular it was noted that Nos. **5.201** and **5.202** provide allocation to the aeronautical mobile (off-route) service in VHF frequency bands extensively used for aeronautical safety communications. The ICAO Position was updated to include the material.

7.5.2 During discussion an observation was made that in Japan the 132-136 MHz frequency band is heavily used for AM(OR)S communications.

7.6 Regarding Global Flight Tracking (GFT)

7.6.1 With respect to GFT, WG-F/31 agreed to hold the material in its own section until after the ITU Plenipotentiary Conference 2104 (PP-14) which considered, among other items, whether the agenda for WRC-15 should be amended to add an agenda item to address global flight tracking. PP-14 *resolved* to instruct WRC-15, pursuant to No. 119 of the ITU Convention "To include in its agenda, as a matter of urgency, the consideration of global flight tracking, including, if appropriate, and consistent with ITU practices, various aspects of the matter, taking into account ITU-R studies". As a result, the ICAO WRC-15 Position was augmented at WG-F/32 to include GFT.

7.6.2 WP17 provided technical details on how one satellite system proposes to receive the already transmitted ADS-B messages, and described a model for calculating the expected impact of aircraft density, mixed avionics equipage, and satellite motion on the ADS-B update interval performance for wide area satellite/space-based receiver systems. Additionally, the paper discussed the current surveillance capability, the spectrum protection afforded to the frequencies used to enable the service and the ability of the satellite passive receivers to be fully interoperable within the current protection. Finally, several examples of expected performance based on the model were characterized in various Flight Information Regions (FIRs).

7.6.3 WP04 provided response from the Aeronautical Surveillance Panel (ASP) to an ICAO

liaison from WP5B. Of particular note was the ASP view that C/(N+I) was not a good metric for determination of impact to ADS-B, rather probability of collision and required update rate were key. They also noted that in many cases collision with very short signals like TACAN/DME would not be problematic due to the ADS-B error correction capabilities, and expected frequency offset.

7.6.4 WP12 expressed concern about impacts to existing aeronautical safety services due to satellites having a much larger field of view. As a result the paper expressed that any allocation made to the AMS(R)S to support ADS-B reception should be on the basis of no protection from aeronautical radionavigation service systems.

7.6.5 WP08 provided support for making an allocation to AMS(R)S at WRC-15 to support satellite reception of ADS-B. In particular it noted that the current ITU 1090 MHz frequency allocation does not protect transmissions between the aircraft and space. As a result, it was stated, that ICAO should flag this as a safety issue and needs to request protection for this frequency.

7.6.6 WP18 offered the view that an ICAO position on GFT should note that ADS-C is an existing and approved technology available today which can address ICAO's GADSS recommendations for urgent implementation of global flight tracking. The paper further advocated that advancements in surveillance technologies and the application of timely and deliberate risk assessment and management practices in on-going studies within the ITU-R should quantify the potential for interference from non-ICAO systems into systems providing global flight tracking.

7.6.7 IP05 provided the output of the recent High Level Safety Conference (HLSC). It was pointed out that global flight tacking is not a new thing, but has been evolving over time. The HLSC specifically called out satellite reception of ADS-B as a new technology which could support GFT, and asked that WRC-15 provide the necessary spectrum allocations for global air traffic services surveillance as a matter of urgency.

7.6.8 WP19 identified issues that need to be considered by GFT, and provided text for the ICAO Position. The paper also asked technical questions, some of which may be addressed by WP17. Finally, the paper argued against any WRC-15 AMS(R)S allocation, stating that PP-14 Resolution 185 does not call for an allocation to be considered; that GFT does not necessarily require in the short term an allocation; that studies that have not yet been completed; and that no evidence has been presented demonstrating that the satellite ADS-B system will be implemented and delivering benefits in terms of separation standards over and above those already available or being trialed by the next WRC.

7.6.9 WP16 discussed the benefits of global aircraft tracking and surveillance via satellite and availability of aircraft position data to ANSPs that will support various efficiencies being requested by airlines. It further suggested that the regulatory allocation matter for ADS-B via satellite should be included in the ICAO WRC-15 Position.

7.6.10 Taking into account the above contributions and significant WG-F/32 discussion, the

agreed proposal for an ICAO WRC-15 Position regarding GFT is shown in Appendix E.

7.7 Regarding WRC-15 agenda item 10

7.7.1 WP13 proposed that the ICAO Position be augmented to support a WRC-19 agenda item to address the output of on-going activities by the Ad-hoc Working Group established in ICAO to develop a concept of operations (CONOPS) to support the future development of a global aeronautical distress and safety system (GADSS). The meeting agreed a proposal for the ICAO WRC-15 Position as shown in Appendix E.

8. Agenda Item 8: Interference from non-aeronautical sources

8.1 No contributions were presented on this topic.

9. Agenda Item 9: Any other business

9.1 IP06 presented a progress report on the establishment of the new Frequency Spectrum Management Panel, which will undertake the work necessary to ensure continued sufficient access to the spectral resource for the provision of aeronautical CNS services in an efficient and safe manner. Taking into account the nature of the task to be performed by the panel, the Air Navigation Commission has agreed to invite nomination for memberships on the FSMP from certain States and international organizations, and a State Letter to that effect will be communicated by end of February 2015. The paper provided the terms of reference for the FSMP, and noted the first meeting is planned to be convened in August 2015, to finalize preparations for the WRC-15. However, until the first meeting of the FSMP, it was foreseen that WG-F (formerly under ACP, now under the new FSMP) will continue its final preparations for ITU WRC-15. It was also mentioned that no decision has been made regarding whether the Navigation Systems Panel Spectrum Subgroup would become part of the FSMP.

9.2 WP22 discussed the current working practices in Working Group F, perceived shortcomings, and potential action to help address those shortcomings. In particular the paper suggested WG-F (a) instigate and maintain an action list that tracks the decision and action on each paper submitted; (b) support the adoption of ITU working practices for the development of material within the group with working documents carried forward as annexes to the chairman's report for action at the next meeting; (c) support the need for members to be prepared to be more proactive in the review of material presented at meetings of the FSMP; and (d) consider the implication for the meeting length. After discussion the meeting agreed to (1) institute an action item list; (2) enforce a deadline for papers for WG-F of one week prior to that meeting; papers received after that date would only be considered on a case-by-case basis; (3) continue to attach documents as necessary to the Chairman's Report, but also track document development in the action item list; and (4) develop a password protected side to the new FSMP website, to ensure that certain FSMP documents would only be available to meeting participants.

9.3 WP21 provided an update on the situation with respect to potential interference from adjacent frequency band radio signals into radio altimeters. In particular it was reported that while action has been taken to try and engage the altimeter manufacturers in providing a critical

analysis of the theoretical studies undertaken, to date the manufacturers have been silent and not provided any comments. The paper further reported on a case of interference to a radio altimeter that was traced to the transmissions from a temporary radar operating at a frequency more than 1000 MHz from the altimeter band. The meeting agreed to consider for the next meeting whether ICAO should develop altimeter SARPS; how to best have ICAO raise awareness of aviation about this potential safety issue; and whether/if high intensity radiated field (HIRF) requirements apply to radio systems. Input to the next meeting is solicited.

9.4 IP01 provided an update on the progress regarding air-ground channel model development for the 960-977 MHz and the 5030-5091 MHz bands based on propagation flight measurement data gathered by NASA. The 960-977 MHz and 5030-5091 MHz frequency bands being modelled may support terrestrial provision of CNPC for UAS. Progress reported in the paper included descriptions and example results of channel parameter extraction and statistical analysis, and additional results for hilly terrain and over-water settings.

9.5 IP08 provided an outline of a working paper intended for submission to the next meeting of WGF with respect to rationalisation of aeronautical Radiocommunication systems. The approach was to try to determine the savings which could be accrued from removing one generic avionics box from an aircraft. Postulated elements included fuel savings due to reduced weight (avionics plus wiring plus antenna) and reduced maintenance costs. The meeting was asked to provide feedback to the author to aid in drafting the contribution.

9.6 WP15 suggested that it would benefit aviation to develop a definition of "aviation safety system". The stated intent was to assist Civil Aviation Authorities (CAAs) in making the case that a given system is used for safety purposes, and as such deserving of having safety margins applied in compatibility/sharing studies. In discussions it was noted that the use of the word "services" in the paper was confusing and perhaps "applications" could be used instead. The paper proposed a definition for "aviation safety system", however the meeting could not agree. The meeting did accept an action to review the need for a definition, and if supported to provide draft wording.

10 Date of next meeting

10.1 The next meeting has been tentatively scheduled for August [24-28], 2015 in Montreal, Canada. August [24], 2015 will be the first meeting of the Frequency and Spectrum Management Panel (FSMP). Papers for the WG-F meeting are due one week prior to the meeting. Deadlines for papers for the FSMP Panel meeting will be contained in the invitation.

APPENDICES

Appendix A – Agenda
Appendix B – List of Working Papers, Information Papers and Flimsies
Appendix C – List of Participants
Appendix D – Action Item List
Appendix E – DRAFT modifications to ICAO WRC-15 Position

APPENDIX A

INTERNATIONAL CIVIL AVIATION ORGANIZATION

32ND Meeting of Working Group F
of the Frequency Spectrum Management Panel (FSMP)
(formerly of the Aeronautical Communications Panel)
(FSMP WG-F/32)

(Cairo, Egypt, 16-24 February 2015)

Draft Agenda

1. Opening and working arrangements

2. Aviation Safety Margins

3. Updates to Aviation Frequency Spectrum Strategy

4. RF Handbook Volume II (Doc 9718, Vol. II), Frequency Assignment Planning
   - Further development in preparation for a second edition

5. 5 GHz Band Planning
   - AeroMACS status
   - UAS Study Group status
   - Global UAS/RPAS channel plan

6. Development of material for ITU-R meetings
   - Inputs regarding WRC-15 Agenda Item 1.1
   - Inputs regarding WRC-15 Agenda Item 1.5
   - Inputs regarding WRC-15 Agenda Item 1.17
   - Inputs regarding WRC-15 Agenda Item 9.1 (sub-item 5)
   - Other
     - Space-based reception of ADS-B

7. Development of potential updates to ICAO WRC-15 Position
   - If/as required based on studies

8. Interference from non-aeronautical sources

9. Any Other Business

APPENDIX B

List of Papers

List of Working Papers

Paper #	Source	Title	Agenda Item
1	Rapporteur	Draft Agenda ACP WG-F/32	
2	Secretary	Draft updates to the ICAO Position for WRC-15, as developed by WG-F/31	7
3	Naruto Yonemoto, Naoki Kanada, Akiko Kohmura, Shunichi Futatsumori, Kazuyuki Morioka and Yasuto Sumiya	Degradation of communication performance cause by Electromagnetic Interference in 5 GHz band (rev1)	5
4	Secretary	Liaison Statement from ITU-R WP5B "Characteristics of ADS-B Receivers on-board Satellite" and a draft response, developed by the Technical Sub-group (TSG) of the Aeronautical Surveillance Panel (ASP)	6
5	Secretary	Liaison Statement from ITU-R WP5B "Protection of radio altimeters following implementation of WAIC systems"	6
6	Don Nellis, Michael Neale, Don Jansky, John Nelsen, Brandon Mitchell, and Dave Reed	Proposed Modifications to the ICAO Position on WRC-15 AI 1.5	7
7	John Nelsen, Brandon MItchell	REGULATORY CONCERNS of AMS(R)S ALLOCATIONS IN FSS FREQUENCY BANDS - AGENDA ITEM 1.5	6

8	IATA	Global Flight Tracking – 1090MHz frequency protection between Aircraft and Space (rev1)	7
9	Joe Cramer	Update of Draft CPM Text Regarding WRC-15 AI 1.17 and Development of potential updates to ICAO WRC-15 Position on AI 1.17	6,7
10	Brandon Mitchell	Operation of Unmanned Aircraft Systems Under a Fixed Satellite Service Allocation	6
11	Secretary	Use of the frequency band 117.975 – 137 MHz. Adjacent frequency protection (rev1)	4
12	Secretary	Summary of Discussions of the 20th meeting of the ICAO European Frequency Management Group	3,7
13	John Mettrop, Gerlof Osinga	Update of ICAO Position for WRC-15 to support a future agenda item for Satellite ADS-B	7
14	John Mettrop	Proposed Modifications to the ICAO Position on WRC-15 AI 1.54 200 – 4 400 MHz	7
15	John Mettrop	What is an Aeronautical Safety Service? (rev1)	9
16	John Taylor	Update of ICAO Position for WRC-15 to include information on global tracking and surveillance and planned use of Satellite ADS-B	7
17	Dr Michael Garcia, John Taylor	Analysis of co-channel interference to space-based reception of 1090ES ADS-B (rev1)	6,7
18	Kamlesh Masrani	Update of ICAO Position for WRC-15 on Global Flight Tracking to include information on the use of ADS-C as one of available existing technology solutions.	7
19	John Mettrop	Update of ICAO Position for WRC-15 to support a future agenda item for ADS-B via satellite to support air traffic services	7
20	John Mettrop	Aeronautical Satellite Communication Allocations	9
21	John Mettrop	Radio Altimeters	9
22	John Mettrop	Working Practices in the Frequency Spectrum Management Group	9

List of Information Papers and Flimsies

Paper #	Source	Topic	Agenda Item
1	David Matolak, Kurt Shalkhauser and Robert Kerczewski	Progress in the Development of Air-Ground Channel Models for L-band (960-977 MHz) and C-band (5030-5091 MHz)	9
2	Secretary	Validation and Rationalisation of the VHF Adjacent Channel Frequency Planning Rules	4
3	Joseph Ishac, Dennis Iannicca, Kurt Shalkhauser, Brian Kachmar and Robert Kerczewski	Ground Station Handoff Tests of a Prototype CNPC Radio	5
4	Raffi Khatcherian	SESAR Spectrum Strategy and Vision	3
5	Secretary	Global Tracking of Aircraft. Excerpts from the report of the Second ICAO High-Level Safety Conference (HLSC).	7
6	Secretary	Establishment of the Frequency Spectrum Management Panel (FSMP). Progress report.	9
7	Uwe Schwark	Status of preparations for WRC-15 Agenda Item 1.17 within CEPT	6,7
8	John Mettrop	Rationalisation of Aeronautical Radiocommunication Systems	9
FLIMSIES			
1	Rapporteur	Draft updates to the ICAO Position for WRC-15	7

APPENDIX C

Aeronautical Communications Panel / Frequency Spectrum Management Panel
Working Group F (frequency)
(ACP/WGF-32)
Cairo, Egypt 18-24 February, 2015
Attendance List

NAME	TITLE & ADDRESS
STATES **CANADA** Mr. John Taylor	Aeronautical Spectrum Regulations Inspector Transport Canada 4th Floor TWR C Place De Ville 330 Sparks St. Ottawa, Ontario K1A0N8 CANADA Fax: (1-613) 998 7416 Tel: (1-613) 993 4061 Email: john.taylor@tc.gc.ca
EGYPT Mr. Ahmed Mostafa Mohamed Arman	CNS Inspector Engineer Egyptian Civil Aviation Authority Cairo Airport Road Cairo - EGYPT Mobile: 011 44369596 Email: ahmed.arman@civilaviation.gov.eg
Mr. Hesham Abd El-Fattah Ibrahim	Head of Air Navigation Central Administration Egyptian Civil Aviation Authority Cairo Airport Road Cairo - EGYPT Mobile: 01006068185 Email: htantawi@civilaviation.gov.eg
Mr. Mohamed Ahmed Ragab	Manager of CNS Inspectorate Egyptian Civil Aviation Authority Cairo Airport Road Cairo - EGYPT Mobile: 01146050411 Email: ma.ragab@yahoo.com

NAME	TITLE & ADDRESS
Ms. Heba Mostafa Mohamed	Senior AIS Unit and Technical Coordinator Ministry of Civil Aviation Cairo Airport Road Cairo - EGYPT Fax: (202) 2268 5420 Tel: (202) 2417 5389 Mobile: (202) 0114 7222 395 Email: heba.mostafa1@hotmail.com
Mr. Mohamed Abdel Mohsen Qatb	Manager of Airports Communication National Air Navigation Services Company Egyptian Civil Aviation Authority Cairo Airport Road Cairo - Egypt Fax: (202) 2267 4729 Tel: (202) 2267 472 Mobile: (202) 01148101086 Email: nansc1@yahoo.com
Mr. Sameh Mohamed Hussein	Manager of VHF/UHF Communication National Air Navigation Services Company Egyptian Civil Aviation Authority Cairo Airport Road Cairo - Egypt Tel: (202) 22657979 - 22657941 Mobile: (202) 01003815137 Email: sameh.mahdali@hotmail.com
Eng. Sayed Abdel Shafy Abdel Ghany	Chief Engineer (Airworthiness Dept.) Egyptian Civil Aviation Authority Cairo Airport Road Cairo - Egypt Fax: (202) 2268 2907 Tel: (202) 2268 2907 Mobile: (202) 0100 392 3101 Email: sayed.shafie@civilaviation.gov.eg gm_sayed_ecaa@yahoo.com

NAME	TITLE & ADDRESS
Mr. Ashraf Sadd El Din Hussein Farag	National Air Navigation Services Company Cairo International Airport Road Cairo - EGYPT Fax: (202) 2267 8882 Tel: (202) 4616 4736 Mobile: (2012) 756 4050/0100 95408898 Email: ashrafsaa_2006@yahoo.com Ashrafsaad-ATC@yahoo.com
Mr. Mohamed Abdel Hamid Ahmed	Air Traffic Controller National Air Navigation Services Company Cairo International Airport Road Cairo - EGYPT Fax: Tel: 202 37244763 Mobile: 011 54093998 Email:
Mr. Mohamed Mohamed Abdel Salam	Radar Manager Cairo Air Navigation Center Cairo - EGYPT Tel: (202) 22657905 Mobile: 01004114929 Email: mohamedsleem63@yahoo.com
Mr. Ahmed Diaa	Administrator Network Ministry of Civil Aviation Cairo Airport Road Cairo - EGYPT Fax: Tel: (202) 22663437 Mobile: (202) 012212930639 Email: ahmeddiaa23@hotmail.com

NAME	TITLE & ADDRESS
FRANCE Mr. Quoc Dung NGUYEN	Spectrum Manager 1 Avenue du Docteur Maurice Grynfogel BP 53584 31 035 Toulouse Cedex 1 DGAC FRANCE Fax: +33 5 62145401 Tel: +33 5 62145338 Mobile: +33 609880904 Email: quoc-dung.nguyen@aviation-civil.gouv.fr
JAPAN Mr. Naruto Yonemoto, Ph.D	Doctor Electronic navigation Research Institute 7-42-23, Jindaiji-higashi,Chofu, Tokyo, 182-0012 JAPAN Fax: (81) 422-41-3176 Tel: (81) 422-41-3174 Email: yonemoto@enri.go.jp
Ms. Takako Ishikawa	Assistant Director Ministry of Internal Affairs and Communications (MIC) 2-1-2, Kasumigaseki, Chiyoda-ku, Tokyo, 100-8926 JAPAN Fax: (81) 1 3 5253 5903 Tel: (81) 3 5253 5902 Mobile: (86) 136 0174 1949 Email: t.ishikawa@soumu.go.up
Mr. Sanshiro Shirahashi	Project Manager Japan Radio Air Navigation Systems Association JRANSA Kaiji Center Building 4-5 Kojimachi Chiyoda-ku Tokyo, 1020083 - JAPAN Fax: (81) 3 5214 1359 Tel: (81) 3 5214 1353 Email: shirahashi@jransa.or.jp

NAME	TITLE & ADDRESS
Mr. Hiroyuki Tsuji	Senior Researcher National Institute of Information and Communications Technology (NICT) 4-2-1, Nukui-Kitamachi, Koganei, Tokyo 184-8795 JAPAN Fax: +81-42-327-7553 Tel: +81-42-327-6034 Mobile: +81-90-5536-1333 Email: tsuji@nict.go.jp
KUWAIT Eng. Fahad S. Albaloushi	Superintendent of Communication – Navigational Equipment Dept. Directorate General of Civil Aviation P.O. Box 17 Safat 13001 State of KUWAIT Fax: (965) 24343417 Tel: (965) 24332227 Mobile: (965) 66072288 Email: fs.albaloushi@dgca.gov.kw
Eng. Hamed A. Abdulrahman	Director Navigational Equipment Dept. Directorate General of Civil Aviation Kuwait International Airport P.O. Box 17 Safat 13001 State of KUWAIT Fax: (965) 24343417 Tel: (965) 24332227 Mobile: (965) 99676242 Email: ha.abdulrahman@dgca.gov.kw
PHILIPPINES Mr. Charlemagne P. Gilo	Acting Division Chief, Aeronautical Telecommunications Division, AICD, Air Traffic Service Civil Aviation Authority of the PHILIPPINES Old MIA Road, Pasay City, 1300 PHILIP REPUBLIC OF THE PHILIPPINES Fax: (63) 2 879 9282 Tel: (63) 2 879 9259 Mobile: 639 185752979 Email: charlemagne.gilo@gmail.com

NAME	TITLE & ADDRESS
Eng. Josue R. Sugui	Communication, Navigation, Surveillance Systems Officer IV Air Navigation Quality Management Department Civil Aviation Authority of the PHILIPPINES Old MIA Road, Pasay City, 1300 PHILIP REPUBLIC OF THE PHILIPPINES Fax: (63) 2 879 9259 Tel: (63) 2 879 9258/8799170 Mobile: (63) 932 8656783 Email: josuesugui@yahoo.com
SAUDI ARABIA Mr. Khalid D. Alhazmi	Communication Engineer General Authority of Civil Aviation P.O. Box 15441 Jeddah 21444 KINGDOM OF SAUDI ARABIA Fax: (966-2) 671 9041 Mobile: (966-50) 564 7067 Email: kalhazmi@gaca.gov.sa
Mr. Turki M. Abed Yosef	Communications Engineer SED/Comms Engineering Division P.O. Box 15441 Jeddah 21444 KINGDOM OF SAUDI ARABIA Tel: (966) 12 671 7717 Mobile: (966) 504320550 Email: tayosef@gaca.gov.sa
SOUTH AFRICA Ms. Lisa Cokisa Tele	Systems Engineer: CNS Planning ATNS Head Office, Eastgate Office Park South Boulevard Road, Bruma, 2198 Private Bag X15, Kempton Park, 1620 SOUTH AFRICA Fax: +27 (0) 11 607 1533 Tel: +27 (0) 11 607 1134 Mobile: +27 (0) 72 456 0809 Email: LisaT@atns.co.za

NAME	TITLE & ADDRESS
UK Mr. John Mettrop	Policy Specialist Spectrum UK Civil Aviation Authority K6, CAA House, 45-59 Kingsway, London WC2B 6TE, England Fax: (+44) 0 20 7453 6565 Tel: (+44) 0 20 7453 6531 Email: john.mettrop@caa.co.uk
Mr. Stephen Parry	Spectrum Manager NATS (United Kingdom) Corporate and Technical Centre - 4000 Parkway, Whiteley Fareham, P015 7FL UNITED KINGDOM Fax: Tel: +44 1489 616 454 Mobile: +44 7909 877 494 Email: stephen.parry@nats.co.uk
USA Mr. Michael Biggs	Senior Engineer, FAA Spectrum Engineering Services United States/ Federal Aviation Administration AVW-1C3 Room 7E-513 800 Independence Avenue SW Washington, DC 20591 USA Fax: (+1) 202 267 8241 Tel: (+1) 202 267 8241 Mobile: (+1) 202 236 3544 Email: michael.biggs@faa.gov
Mr. Carlos Flores	Electronics Engineer Federal Communication Commission (FCC) 445 12th Street, N. W. Washington, DC 20554 Tel: (+1) 202 418 2858 Email: carlos.flores@fcc.gov

NAME	TITLE & ADDRESS
Mr. Joseph Cramer	Regional Director Boeing Company 929 Long Bridge Drive Arlington, VA 22202, USA Tel: (+1) 703 465 3486 Email: joseph.cramer@boeing.com
Mr. Brandon Mitchell	International Spectrum Policy Division NTIA 1401 Constitution Ave N.W. Washington D.C. 20230 Fax: Tel: +1 202 482 4487 Mobile: +1 202 714 1761 Email: bmitchell@ntia.doc.gov
Mrs. Kathryn Martin	Director, Access Partnership United States 1730 Rhode Island Avenue, 803 NW Washington D.C. 20036 Fax: 1 202 223 2009 Tel: +1 202 503 1571 Mobile: +1 301 529 5511 Email: Kathryn@accesspartnership.com

NAME	TITLE & ADDRESS
ORGANIZATIONS/INDUSTRIES **AIRBUS** Mr. Uwe Schwark	Standardization and Regulation Airbus Operations GMBH Kreetslag 10, 21129 Hamburg AIRBUS Fax: +49 0 743 870 72908 Tel: +49 0 743 72908 Mobile: +49 0 151 14081929 Email: uwe.schwark@airbus.com
Mr. Claude Pichavant	ICCAIA Member for ACPAIRBUS 316 Route de Bayonne BP M01 141/2 31060 Toulouse Cedex FRANCE Fax: Tel: (33-5) 6193 5788 Mobile: (33-6) 2245 2389 Email: claude.pichavant@airbus.com
BOEING Mr. Mohamed El Amin.	Director, Regulatory Policy and International Spectrum Management Boeing UK Ltd, Heathrow Hosue, Bath Road Hounslow TW5 9QQ UK Fax: +44 2082355600 Tel: +44 7739499583 Mobile: Email: mohamed.elamin@boeing.com .
EUROCONTROL Mr. Raffi Khatcherian	Senior ATM Expert International Spectrum Management EUROCONTROL Rue de la Fusée 96 B1130 Brussels BELGIUM Fax: (+32) 2 729 9078 Tel: (+32) 2 729 3687 Mobile: +32 (0)478 241 421 Email: raffi.khatcherian@eurocontrol.int

NAME	TITLE & ADDRESS
ITU Mr. Xingguo Zhou	Radiocommunication Engineer Place des Nations CH-1211 Geneva b20 Switzerland Switzerland/ITU Tel: (+41) 22 7305068 Mobile: (+41) 788409643 Email: xingguo.zhou@itu.int
GCC Mr. Ali A. Hameed Saleh	Telecommunications Engineer Bahrain/The Cooperation Council for the Arab States of the Gulf P.O. Box 26831 Manama - KINGDOM of BAHRAIN Fax: (+973) 17728393 Tel: (+973) 17727007 Mobile: (+973) 33363033 Email: ahussain@gccsg.org
Mr. Tariq Ahmed Alkhan	Telecommunications Engineer Bahrain/The Cooperation Council for the Arab States of the Gulf P.O. Box 26831 Manama - KINGDOM of BAHRAIN Fax: (+973) 17728393 Tel: (+973) 17727007 Mobile: (+973) 39454999 Email: alkhan17@gmail.com
IATA Mr. Achim Baumann	Regional Director, Safety and Flight Operaitons IATA, MENAKing Abdallah II Street P.O.Box 940587 Amman 11194, JORDAN Fax: (962-6) 593 9921 Tel: (962-6) 580 4200 Ext 1214 Mobile: (962-79) 704 5556 Email: baumanna@iata.org

NAME	TITLE & ADDRESS
INMARSAT Mr. Kamlesh Masrani	Principal Spectrum Management Engineer 99 City Road, London, United Kingdom EC1Y 1AX United Kingdom Tel: (+44) 207 278 1338 Mobile: +44 (0) 7850 230 817 Email: kamlesh.masrani@inmarsat.com
ICAO HEADQUARTERS Mr. Loftur Jonasson	TO/CNS/AOI Air Navigation Bureau International Civil Aviation Organization 999 University St., Montreal H3C 5H7 Quebec - Canada Fax: 1 514 954 6077 Tel: 1 514 954 8219 x7130 Email: ljonasson@icao.int

APPENDIX D

ACTION ITEM LIST

Number	Description	Actionee	Due Date
32-1	Provide J. Taylor with maximum 1090 MHz FRUIT rates for Europe, including reference	J. Mettrop R. Khatcherian	April 2015
32-2	Provide feedback to R. Khatcherian regarding the draft SESAR vision and strategy.	All	WG-F/33
32-3	Review proposed VHF adjacent channel planning criteria contained in WG-F/32 WP11/IP02 in order to allow for a decision on whether to update the Spectrum Handbook.	All	WG-F/33
32-4	Provide N. Yonemoto with characteristics of 5 GHz aeronautical mobile telemetry (AMT) characteristics to support AeroMACS studies	C. Pichavant	April 2015
32-5	Consider the issue of interference to radio altimeters as presented in WG-F/32 WP21. Provide input on issues such as: should ICAO develop altimeter standards? What is the best way for ICAO to raise the visibility of the safety issue? Do high intensity radiated field (HIRF) requirements apply to radio systems, and if so, how?	All	WG-F/33
32-6	Poll internal data bases and compile list of reported interference to radio altimeter systems. Include geographic locations of instances. Also present a paper to the RASG-MID/4 meeting on the issue.	Achim Baumann/IATA	WG-F/33
32-7	Provide input to J. Mettrop to support the examination of cost savings from removing a generic avionics box (ref. WG-F/32 IP08)	All	June 2015
32-8	Review the proposal to develop a definition of “aviation safety system” and provide draft inputs as appropriate	All	WG-F/33
32-9	Develop a liaison to WP5B based on the meeting discussion of WG-F/32 WP04	L. Jonasson	May 2015

APPENDIX E

DRAFT modifications to ICAO WRC-15 Position as developed by WG-F/32

WRC-15 Agenda Item 1.1

Agenda Item Title:
To consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution 233 (WRC-12);

Discussion:
~~This agenda item seeks to identify additional spectrum for use by terrestrial mobile communication systems to facilitate the development of terrestrial broadband applications. While the agenda item is not specific about the required RF spectrum bandwidth or the frequency bands targeted, the United States and Europe have both declared that they are intending to make at least 500 MHz of additional spectrum available for international mobile telecommunications (IMT), ideally below 6 GHz.~~ ITU-R Working Parties 5A and 5D indicated a number of frequency ranges as suitable for possible future deployment of mobile broadband applications including IMT. Based on that input, the following frequency bands/ranges were identified as potential candidate bands 470-694/698 MHz; 1 350-1 400 MHz; 1 427-1 452 MHz; 1 452-1 492 MHz; 1 492-1 518 MHz; 1518-1525 MHz; 1 695-1 710 MHz; 2 700-2 900 MHz; 3 300-3 400 MHz; 3 400-3 600 MHz; 3 600-3 700 MHz; 3 700-3 800 MHz; 3 800-4 200 MHz; 4 400-4 5 00 MHz; 4 500-4 800 MHz; 4 800-4 990 MHz; 5 350-5 470 MHz; 5 725-5 850 MHz and 5 925-6 425 MHz. It should be noted that identification was solely based on 3 criteria: the frequency band/range had to (a) be indicated as suitable by WP5D; (b) be proposed by at least one administration; and (c) have been studied by the ITU-R.

~~Resolution **233** (WRC-12) identifies, in the *considering*, a number of frequency bands below 6 GHz where studies have previously been undertaken in ITU-R. Two of these frequency bands (2 700 – 2 900 MHz and 3 400 – 3 700 MHz) are of concern to aviation. It has been assumed that frequency bands below 100 MHz (and probably below 400 MHz) will not be of interest due to the cost of implementation, variability in propagation and throughput capacity.~~

~~A number of aviation systems used for the assurance of safety of flight are operating below 6 000 MHz and it is therefore essential to ensure that any new allocation to the mobile service does not adversely impact the operation of these systems. Based on recent experience with the introduction of mobile systems in the frequency band below 2 690 MHz and the remediation that was required to avoid interference to primary surveillance radar systems in the adjacent frequency band (2 700 – 2 900 MHz), care needs to be taken not only with any proposal for co-frequency band sharing of aeronautical services~~

~~with non-aeronautical services but also with proposals for the introduction of new allocations in adjacent frequency bands.~~

The following aeronautical systems operate in/near the potential candidate frequency bands/ranges ~~400 – 6 000 MHz~~:

~~**406 – 406.1 MHz**~~
~~**Emergency Locator Transmitter:** Emergency locator transmitters, referred to as emergency position-indicating radio beacons (EPIRB) in the ITU, when activated transmit a distress signal which can be received by the COSPAS/SARSAT satellites and suitably equipped aircraft and vessels to facilitate search and rescue operations. Whilst there have been no recent compatibility studies, Resolution **205** was updated at WRC-12 to call for regulatory, technical and operational studies with a view to identify any required regulatory action that can be identified in the Director's report to WRC-15.~~

~~**960 – 1 215 MHz**~~
~~**Distance measuring equipment (DME):** DME is the ICAO standard system for the determination of the position of an aircraft based on the distance between that aircraft and a ground-based DME beacons within radio line of sight. Studies in Europe with respect compatibility with adjacent frequency band (below 960 MHz) IMT systems, and within ICAO with regard to co-frequency band sharing of the aeronautical mobile (R) service (AM(R)S) within the frequency band 960 – 1 164 MHz, show that any co-frequency band sharing with IMT systems would be difficult.~~

~~**1 030 & 1 090 MHz**~~
~~**Secondary surveillance radar (SSR):** SSR is the ICAO standard system that operates on two frequencies (1 030 and 1 090 MHz), used to identify the position of an aircraft based on an aircrafts' response to an interrogation by the ground based element of the SSR system.~~

~~**1 090 Extended Squitter (1 090ES): 1090 ES** is an ICAO standard system to support automatic dependent surveillance-broadcast (ADS-B); automatically broadcasting the position and other parameters of the aircraft in order to allow other aircraft and ground facilities to track that aircraft.~~

~~**Multilateration (MLAT):** MLAT is the ICAO standard system used to identify the position of an aircraft based on an aircraft's transmission of a squitter or as respon se to an interrogation by a ground based SSR or by active MLAT.~~

~~**Airborne collision avoidance system (ACAS):** ACAS is the ICAO standard system operating on the same frequencies as SSR, used for the detection and avoidance of airborne conflict situations.~~

~~These systems provide for essential surveillance functions on a global basis. Although detailed studies would be required to fully assess any sharing proposals, the fact that two frequencies are used to support all of these safety-of-life systems would indicate that any sharing is unlikely to be acceptable to ICAO on safety grounds.~~

~~**Universal access transceiver (UAT):** UAT is an ICAO standardized system operating on 978 MHz intended to support automatic dependant surveillance-broadcast as well as ground-uplink services to aircraft such as situational awareness and flight information services.~~

~~**Global navigation satellite systems:** The global allocation to the radionavigation satellite service in the frequency bands 1 164 – 1 215 MHz is intended to provide civil precision navigational services for various users, including aviation. Compatibility of the radionavigation satellite service and the aeronautical radionavigation service in the frequency range 960 – 1 215 MHz has been established through footnote **5.328A** and Resolutions **609** and **610**.~~

~~**Aeronautical Communications Future Communication System:** The frequency band 960 – 1 164 MHz was allocated to the AM(R)S for the development by ICAO of a significant component of the aeronautical future communication system. Report ITU-R **M.2235** presents compatibility studies of AM(R)S systems operating in the band 960 – 1 164 MHz with systems operating in the same frequency band, and in the adjacent frequency bands, both on-board the aircraft and on the ground.~~

1 215 – 1 350 MHz

Primary radar: This band, especially frequencies above 1 260 MHz, is extensively used for long-range primary surveillance radar to support air traffic control in the en-route and terminal environments.

All studies carried out were based on the parameters provided by ITU-R and show that within the same geographical area co-frequency operation of mobile broadband systems and radar is not feasible. Furthermore, there is widespread usage of this frequency range in some countries for radar. In addition, harmonized usage of all or a portion of this frequency range by mobile services for the implementation of IMT may not be feasible, in particular on a global basis. Hence none of the frequency bands in the frequency range were included in the list of potential candidate frequency bands. However these studies could not agree on the size of the guard band required to protect radars operating in the frequency band 1 300 – 1 350 MHz. Therefore the proposal to use the adjacent frequency band 1 350 – 1 400 MHz should be treated with caution.

In some countries the band is not fully used by radiodetermination systems, and there were studies undertaken in ITU-R which showed that sharing may be feasible in those countries subject to various mitigation measures, and to co-ordination with potentially affected neighbouring countries. However no conclusions as to the applicability, complexity, practicability or achievability of these mitigations could be reached. ~~No recent studies have been undertaken with respect to compatibility with terrestrial mobile systems. Given the similarity between these radars and those operating in the frequency band 2 700 – 2 900 MHz, the results of studies in that frequency band should be applicable.~~

~~**1 559 – 1 610 MHz**~~

~~**Global navigation satellite systems:** These systems are used by the ICAO standardized satellite navigation systems for navigation in the en-route, terminal and airport environments. A number of recent studies have been undertaken within United States~~

~~with respect to the compatibility between terrestrial mobile systems operating in an adjacent frequency band and satellite navigation systems. Those studies indicated that sharing was not possible.~~

1.5 / 1.6 GHz

Aeronautical mobile satellite communication systems: Portions of ~~T~~the frequency bands 1 ~~545~~525 – 1 ~~555~~559 and 1 ~~646~~626.5 – 1 ~~656~~660.5 MHz as well as the frequency band 1 610 – 1 626.5 MHz are used for the provision of ICAO standardised satellite communication services. A number of recent studies have been undertaken within ~~Europe and United States~~ITU-R with respect to the compatibility between terrestrial mobile systems and aeronautical satellite systems ~~in a frequency range that covers these assignments. Those studies~~and indicated that sharing was not possible. While those bands are not identified as potential candidate bands, adjacent bands have been. Studies related to adjacent band compatibility have identified the need for IMT constraints in order to protect aeronautical satellite systems.

2 700 – 3 100 MHz

Approach primary radar: This band is extensively used to support air traffic control services at airports especially approach services. There have been a number of studies undertaken within the ITU, Europe and the United States on sharing with respect to compatibility with terrestrial mobile systems. All studies carried out were based on the parameters provided by ITU-R and show that within the same geographical area co-frequency operation of mobile broadband systems and radar is not feasible. Furthermore, there is widespread usage of this frequency range in some countries for radar. In addition, harmonized usage of all or a portion of this frequency range by mobile services for the implementation of IMT may not be feasible, in particular on a global basis.

In some countries the band is not fully used by radiodetermination systems, and there were studies undertaken in ITU-R which showed that sharing may be feasible in those countries subject to various mitigation measures, and to co-ordination with potentially affected neighbouring countries. However no conclusions as to the applicability, complexity, practicability or achievability of these mitigations could be reached.~~The more recent studies are related to the introduction of mobile systems below 2 690 MHz and compatibility with radars operating above 2 700 MHz. These studies have shown significant compatibility issues which would suggest that co-frequency band sharing would be impractical. Additionally, previous technical studies in the ITU, in particular on co-channel compatibility between primary radars operating in the frequency range 2 700 – 3 100 MHz and mobile service showed that co-frequency compatibility between the terrestrial mobile service and radar systems was not feasible.~~

3 400 – 4 200 MHz and 4 500 – 4 800 MHz

Fixed Satellite Service (FSS) systems used for aeronautical purposes: FSS systems are used in the frequency range 3 400 – 4 200 MHz and the frequency band 4 500 – 4 800 MHz as part of the ground infrastructure for transmission of critical aeronautical and meteorological information (see Resolution **154** (WRC-12) and agenda item 9.1.5). FSS systems in the 3.4 – 4.2 GHz frequency range are also used for feeder links to support AMS(R)S systems. ITU-R Report **M.2109** contains sharing studies between IMT and FSS in the frequency range 3 400 – 4 200 MHz and frequency band 4 500 – 4 800 MHz and ITU-R Report **S.2199** contains studies on compatibility of broadband wireless access

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systems and FSS networks in the frequency range 3 400 – 4 200 MHz. Both studies show a potential for interference from IMT and broadband wireless access stations into FSS Earth stations at distances of up to several hundred km. Such large separation distances would impose substantial constraints on both mobile and satellite deployments. The studies also show that interference can occur when IMT systems are operated in the adjacent frequency band.

4 200 – 4 400 MHz

Radio altimeters: This frequency band is used by radio altimeters. Radio altimeters provide an essential safety-of-life function during all phases of flight, including the final stages of landing where the aircraft has to be maneuvered into the final landing position or attitude. It should be noted that although adjacent frequency bands/ranges were identified as potential candidate bands, no studies were provided within ITU regarding protection of radio altimeters from unwanted emissions from IMT operating in those adjacent bands/ranges. Studies were carried out within the auspices of ICAO however, and have indicated that deployment of IMT in an adjacent band would cause interference to radio altimeters especially on approach to an airport where their operation is most critical

~~**5 000 – 5 250 MHz**~~

~~**Microwave Landing System (MLS):** The frequency band 5 030 – 5 091 MHz is to be used for the Microwave Landing System. MLS provides for precision approach and landing of aircraft. Future implementation of MLS is expected to be limited, mainly due to the prospect of GNSS (GBAS) offering equivalent capabilities, but where deployed, the MLS needs to be protected from harmful interference.~~

~~**UAS Terrestrial and UAS Satellite communications:** At WRC-12, an allocations to the AM(R)S was introduced~~ in the frequency band 5 030-5 091 MHz, ~~and a footnoted aeronautical mobile satellite (R) service allocation was brought into the table of allocations in the frequency range 5 000-5 150 MHz~~, both ~~with the view to provide spectrum for command and non-payload communications with unmanned aircraft systems. The development and implementation of these systems, taking into account the need to protect other uses in the frequency range 5 000 – 5 150 MHz is currently being considered in ICAO.~~

~~**AeroMACS:** Provisions for introducing systems for communications with aircraft on the surface of an airport (AeroMACS) were introduced in the Radio Regulations in 2007 in the frequency band 5 091 – 5 150 MHz. Currently ICAO is developing SARPs for implementing AeroMACS.~~

~~**Aeronautical Telemetry:** Provisions for introducing systems for Aeronautical telemetry were introduced in the Radio Regulations in 2007 in the frequency range 5 091 – 5 250 MHz. Aeronautical telemetry systems are currently being implemented.~~

5 350 – 5 470 MHz

Airborne Weather Radar: The frequency range 5 350 – 5 470 MHz is globally used for airborne weather radar. The airborne weather radar is a safety critical instrument assisting pilots in deviating from potential hazardous weather conditions and detecting wind shear and microbursts. This use is expected to continue for the long term.

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5 850 – 6 425 MHz

Fixed Satellite Service (FSS) systems used for aeronautical purposes: The frequency range 5 850 – 6 425 MHz is used by aeronautical VSAT networks for transmission (E-s) of critical aeronautical and meteorological information. As this agenda item could impact a variety of frequency bands used by aeronautical safety services below 6 GHz it will be important to ensure that agreed studies validate compatibility prior to considering additional allocations.

Other bands important to protect which are not identified as potential candidate frequency bands

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It should be noted that the following frequency bands are also used by aeronautical systems and whilst these frequency bands have not been identified that does not preclude proposals being made which may need to be addressed:-

- 406-406.1 MHz Emergency Locator Transmitter:
- 960-1 215 MHz Distance measuring equipment
  - 1 030 & 1 090 MHz Secondary surveillance radar
  - Universal access transceiver
  - Global navigation satellite systems
  - Aeronautical Communications Future Communication System:
- 1 559-1 610 MHz Global navigation satellite systems:
- 5 000-5 250 MHz Microwave Landing System (MLS):
  - UAS Terrestrial and UAS Satellite communications:
  - AeroMACS
  - Aeronautical Telemetry.

ICAO Position:

To oppose any new allocation to the mobile service for IMT in or adjacent to:

- frequency bands allocated to aeronautical safety services (ARNS, AM(R)S, AMS(R)S); ~~or~~

- frequency bands allocated to RNSS and used for aeronautical safety applications; or

- frequency bands used by fixed satellite service (FSS) systems for aeronautical purposes as part of the ground infrastructure for transmission of aeronautical and meteorological information or for AMS(R)S feeder links,

unless it has been demonstrated through agreed studies that there will be no impact on aeronautical services.

Due to the potential for serious impacts to aeronautical radar systems, global and/or Regional allocations to the mobile service for IMT, and/or identification for IMT, should be opposed in any portion of the potential candidate frequency bands/ranges 1 350-1 400 MHz and 2 700-2 900 MHz. Allocations/identifications on a country/multi-country basis should be contingent on successful completion of coordination with countries within several hundred kilometres of the IMT proponent country's border.

Any new allocations to the mobile service for IMT, and/or identification for IMT, in frequency bands/ranges near that used by radio altimeters (4 200-4 400 MHz) should be contingent on successful completion of studies to demonstrate that IMT operations will not cause harmful interference to the operation of radio altimeters.

WRC-15 Agenda Item 1.5

Agenda Item Title:
To consider the use of frequency bands allocated to the fixed-satellite service not subject to Appendices 30, 30A and 30B for the control and non-payload communications of unmanned aircraft systems (UAS) in non-segregated airspaces, in accordance with Resolution 153 (WRC-12);

Discussion:

International Civil Aviation Organization (ICAO) ~~S~~standardised systems to support safe and efficient ~~aircraft operations~~ operation of aircraft on a global basis are developed in accordance with the provisions of the International Telecommunications Union (ITU) Radio Regulations as well as ICAO Standards and Recommended Practices (SARPS). Of significant importance to aviation is that the frequency bands that support radio communication and navigation for aircraft are allocated to an appropriate aeronautical ~~recognized~~ safety service (such as the AM(R)S, AMS(R)S or the ARNS).

~~This agenda item calls for studies to determine whether a system operating under an allocation to the Fixed Satellite Service (FSS), which is regarded as a non-safety service, can be used to support unmanned aircraft system (UAS[1]) control and non-payload communications (CNPC[2]) which has been determined to be a safety application. If such use is found feasible, then any resultant technical and regulatory actions should be limited to the case of UAS using satellites, as studied, and not set a precedent that puts other aeronautical safety services at risk.~~

~~The Twelfth Air Navigation Conference (AN Conf/12) was held in November 2012, and the main theme was to redraft the global Air Navigation Plan based on the concept of Aviation System Block Upgrades (ASBU). Worldwide ICAO Air Navigation Conferences are held approximately every 10 years, and their primary goal is to establish and promote a common vision or path to ensure a safe, coherent and harmonized modernization of the Air Transport System. There was substantive discussion on spectrum, resulting in two AN Conf/12 Recommendations (1/12 and 1/13) relevant to this WRC-15 agenda item.~~

At WRC-12 no new satellite allocations were made to support beyond-line-of-sight (BLOS) UAS[3] control and non-payload communications (CNPC)[4]. However the aeronautical mobile satellite (R) service (AMS(R)S) in the frequency range 5 000 – 5 150 MHz, previously allocated through footnote **5.367**, is now a table allocation and the coordination requirements in the frequency band 5 030 – 5 091 MHz were changed from **9.21** to **9.11A**.

The requirement for BLOS (satellite) communications of between 56 and 169 (~~54~~ MHz, as documented in Report ITU-R M.2171,) ~~,~~ likely cannot be fulfilled entirely in the ~~limited spectrum available in the~~ AMS(R)S allocated frequency bands 1.5/1.6/5 GHz, especially as a~~, and no AMS(R)S~~ satellite system is not operational at 5GHz ~~currently operates in the frequency range 5 000 – 5 150 MHz~~ in the current or near term to support ~~current/near-term~~ UAS CNPC.

Existing ~~systems~~networks operating in the FSS in the unplanned frequency bands ~~4/6 GHz,~~at ~~12/~~14/12 GHz and ~~20/~~30/20 GHz have potential spectrum capacity available that can meet the requirements for BLOS communications and could be used for UAS CNPC provided that the principles (conditions) detailed below are fulfilled. However the FSS is not recognised in the ITU as a safety service, and~~,~~

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[1] ~~UAS is referred to in ICAO as Remotely Piloted Aircraft Systems (RPAS)~~

[2] ~~CNPC is referred to in ICAO as Command and Control (C2) or Command, Control and ATC Communications (C3).~~

[3] UAS is referred to in ICAO as Remotely Piloted Aircraft Systems (RPAS)

[4] CNPC is referred to in ICAO as Command and Control (C2) or Command, Control and ATC Communications (C3)

~~Some of these systems have been notified for registration under article **11.41**.~~ it should be noted that any consideration of operation of UAS CNPC under an allocation to the FSS must address the inconsistency with Article 1 definitions of the fixed satellite service (No. **1.21**) and aircraft earth station (No**. 1.84**).

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Studies within the ITU have provided information on the CNPC radio link performance under various UAS operating conditions. Other studies within the ITU also address the compatibility between this application of the FSS and other services that may be authorized by administrations.

~~Standards and Recommended Practices (SARPs) for CNPC are developed in ICAO. CNPC links must meet specific Required Communications Performance (RCP) to satisfy the aviation safety requirements as identified during this development. UAS CNPC links operated on frequencies in FSS allocations would have to be validated to meet those SARPs. Command and Control communication (C2) requirements should be differentiated from ATC communications requirements since technical and operational constraints, as well as technological solutions, may differ. Actual UAS operations with satellite-based CNPC systems using FSS allocations are performed to date in segregated airspace. This gives some indication that FSS satellite systems operating in the frequency bands 4/6 GHz, 12/14 GHz and 20/30 GHz may have the capability of supporting UAS CNPC in nonsegregated airspace as well. However regulatory measures will be required to address the conditions for UA CNPC links. In addition regulatory measures will be required to address some of the safety related conditions as detailed below.~~

~~AMS(R)S is the appropriate type of service allocation to support the satellite component for UAS command and control and ATC relay in non-segregated airspace. However, WRC-15 AI 1.5 asks for studies for the use of FSS allocations for UAS applications.~~

~~Article 15 of the Radio Regulations states that special consideration shall be given to avoiding interference on distress and safety frequencies.~~

In order to satisfy the requirements for BLOS communications for UAS, the use of satellite CNPC links will have to comply with the following seven conditions, the first three of which will be addressed in the ITU-R Radio Regulations, and the remainder in the ICAO UAS CNPC SARPS:

1. That the technical and regulatory actions should be limited to the case of UAS using satellites, as studied, and not set a precedent that puts other aeronautical safety services at risk.

2. That all frequency bands which perform aeronautical safety functions need to be clearly identified in the ITU Radio Regulations.

3. That the assignments and use of the relevant frequency bands have to be consistent with No. **4.10** of the ITU Radio Regulations, which recognizes that safety services require special measures to ensure their freedom from harmful interference.

4. Knowledge that any UAS CNPC assignment operating in those frequency bands:
   - is in conformity with technical criteria of the ITU Radio Regulations,
   - has been successfully co-ordinated, including cases where co-ordination was not completed but the ITU-R examination of probability of harmful interference resulted in favourable finding, or any caveats placed on that assignment have been addressed and resolved such that the assignment is able to satisfy the requirements to provide BLOS communications for UAS; and
   - has been recorded in the ITU International Master Frequency Register.

5. That any harmful interference to ~~systems~~ FSS networks supporting CNPC links is reported in a transparent manner and addressed in the appropriate timescale.

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6. That realistic worst-case conditions, including an appropriate safety margin, can be applied during

compatibility studies.

7. That any operational considerations for UAS will be handled in ICAO and not in the ITU-R.

ICAO SARPS for UAS CNPC are in the early stages of development, so the technical and operational requirements of satellite systems supporting those communications are not yet defined. As a result, the ITU-R actions under WRC-15 agenda item 1.5 should be focused on providing a regulatory framework for the safe operation of UAS CNPC links in FSS bands under the ITU Radio Regulations and thus obtaining international recognition along with the basis for avoiding harmful interference.

ICAO Position:

Support that ~~U~~unmanned aircraft systems (UAS) have great potential for innovative civil applications, provided that their operation does not introduce risks to the safety of life.

Support that ~~T~~taking into account ~~Recommendations 1/12 and 1/13 of~~ the Twelfth Air Navigation Conference (November 2012) Recommendation 1/12 "*That ICAO … develop and implement a comprehensive aviation frequency spectrum strategy … which includes the following objectives: … clearly state in the strategy the need for aeronautical systems to operate in spectrum allocated to an appropriate aeronautical safety service*"; and Recommendation 1/13 as amended by the 38th Assembly "*That ICAO should support studies in the International Telecommunication Union Radio Communication Sector (ITU-R) to ensure that the safety of life concerns could be sufficiently addressed. The outcome of these studies would have to provide the necessary assurance that there were no undue implications for other aeronautical systems. Provided this was the case, then it could be determined what ITU regulatory actions would be required to enable use of frequency bands allocated to the fixed-satellite service (FSS) for RPAS command and control links to ensure consistency with ICAO technical and regulatory requirements for a safety service" ~~determine what ITU regulatory actions are required to enable use of frequency bands allocated to the fixed satellite service for remotely piloted aircraft system command and control (C2) links to ensure consistency with ICAO technical and regulatory requirements for a safety service."~~*, in order to support the use of FSS systems for UAS CNPC links in non-segregated airspace, the technical and regulatory actions identified by studies under **Resolution 153** (WRC-12) must be consistent with the above Recommendations, and satisfy the following conditions:

1. That the technical and regulatory actions should be limited to the case of UAS using satellites, as studied, and not set a precedent that puts other aeronautical safety services at risk.

2. That all frequency bands which carry aeronautical safety communications need to be clearly identified in the ITU Radio Regulations.

3. That the assignments and use of the relevant frequency bands have to be consistent with article **4.10** of the ITU Radio Regulations which recognizes that safety services require special measures to ensure their freedom from harmful interference.

~~4. Knowledge that any assignment operating in those frequency bands:~~

- ~~is in conformity with technical criteria of the Radio Regulations,~~
- ~~has been successfully co-ordinated, including cases where co-ordination was not completed but the ITU examination of probability of harmful interference resulted in a favourable finding, or any caveats placed on that assignment have been addressed and resolved such that the assignment is able to satisfy the requirements to provide BLOS communications for UAS; and~~
- ~~has been recorded in the International Master Frequency Register.~~

~~5. That interference to systems is reported in a transparent manner and addressed in the appropriate timescale.~~

~~6. That realistic worst case conditions, including an appropriate safety margin, can be applied during compatibility studies.~~

~~7. That any operational considerations for UAS will be handled in ICAO and not in the ITU.~~

Support that additional conditions will need to be addressed in ICAO SARPS for UAS CNPC, and not in ITU.

Support that the provisions for UAS CNPC communications links to meet the

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necessary technical and operational requirements for any specific airspace in any particular frequency band will be addressed within ICAO.

WRC-15 Agenda Item 1.12

Agenda Item Title:
To consider an extension of the current worldwide allocation to the Earth exploration-satellite (active) service in the frequency band 9 300 – 9 900 MHz by up to 600 MHz within the frequency bands 8 700 – 9 300 MHz and/or 9 900 – 10 500 MHz, in accordance with Resolution 651 (WRC-12);

Discussion:
The frequency band 9 000 – 9 200 MHz is used by aeronautical radar systems (ground and airborne), including Airport Surface Detection Equipment (ASDE), Airport Surface Movement Radar (ASMR) and Precision Approach Radar (PAR) sometimes combined with Airport Surface Radar (ASR). They cater for short-range surveillance and precision functions up to a 50 km (approx. 25 NM) range. In aviation, these systems are used for precision monitoring, approach and surface detection functions and in airborne weather radar systems where their shorter wavelength is suitable for the detection of storm clouds. These radars are due to remain in service for the foreseeable future. The ongoing protection of the aeronautical uses of this frequency band needs to be assured.

Within ITU-R it has been argued that the impact on the aeronautical services has already been proven since the technical data is mainly identical to the outcome of studies performed prior to the allocation for the Earth exploration-satellite service (EESS) above 9 300 MHz by WRC-07. However the equipment types considered in the past were only un-modulated pulse Radars, rather than newer solid state-
based Radars that utilize pulse-compression modulation. The compatibility of these new Radar technologies with the EESS ~~has not yet been analysed, however, they are being~~was addressed in ~~current~~new ITU studies contained in Report ITU-R RS.2313. Those studies demonstrated that EESS operation in 9 000-9 200 MHz would not be compatible with aeronautical radar systems~~.~~.
~~Whilst understanding that an increase in EESS synthetic aperture radar transmission bandwidth will increase the resolution with which objects can be measured, aviation would wish to understand the tangible benefits brought by such an increase in resolution before considering any allocation to the EESS. Additionally any proposals for the sharing of the aeronautical radionavigation frequency band 9 000 – 9 200 MHz by the EESS can only be considered on the basis of agreed studies, which take into account the present and expected future use of the band by aviation, and the constraints applied to this use. Such an allocation to EESS shall be subject to the provision that no harmful interference is caused to, nor protection is claimed from, or otherwise constraints are imposed on the operation and future development of aeronautical systems operating in the aeronautical radionavigation service in the frequency band 9 000 – 9 200 MHz. This provision protects the aeronautical utilization against harmful interference that may be caused when assignments are made with system characteristics different from those assumed in the compatibility analysis and interference mechanisms which were not foreseen in the compatibility analysis (for example the studies done for the 9 300 – 9 500 MHz allocation did not consider the radar systems with pulse compression).~~

ICAO Position:

Oppose any allocation to the Earth exploration-satellite service in the frequency band 9 000 – 9 200 MHz ~~unless:~~ as
- it has been demonstrated through agreed studies that ~~there~~ EESS ~~will~~ would~~be no~~ impact ~~on~~ aviation use,~~.~~ and will place ~~no additional~~ constraints ~~are placed~~ on the use of the frequency band by aeronautical systems.

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No change to Nos. **5.337**, **5.427**, **5.474** and **5.475**.

WRC-15 Agenda Item 1.17

Agenda Item Title:

To consider possible spectrum requirements and regulatory actions, including appropriate aeronautical allocations, to support wireless avionics intra-communications (WAIC), in accordance with Resolution 423 (WRC-12);
Discussion:

The civil aviation industry is constantly developing the future generation of aircraft. Each subsequent~~This future~~ generation is being designed to enhance efficiency and reliability while maintaining~~,~~ current required levels of safety. ~~as a minimum.~~ The use of wireless technologies in the aircraft may reduce the overall weight of systems, reducing the amount of fuel required to fly and thus benefiting the environment.

Wireless Avionics Intra-Communications (WAIC) systems will offer aircraft designers and operators opportunities to improve flight safety and operational efficiency with the goal of reducing costs to airlines and passengers. WAIC systems could improve an aircraft's performance over its lifetime through more cost-effective flight operations, reduction in maintenance costs, enhancement of aircraft systems that maintain or increase the level of safety, and environmental benefits. WAIC systems are also envisioned to provide new functionalities to aircraft manufacturers and operators.

Manufacturers are provided additional installation options for previously wired systems, while operators are afforded more opportunities to monitor aircraft systems. A major WAIC system application is wireless sensing. It is expected that existing and future aircraft will be equipped with such wireless sensors. These sensors could be located throughout the aircraft and will be used to monitor the health of the aircraft structure and its critical systems, and to communicate this information. WAIC systems are also intended to support data, voice and safety related video surveillance applications such as taxiing cameras and may also include communications systems used by the crew for safe operation of the aircraft. WAIC systems can provide additional opportunities to monitor more components and systems without significantly increasing the aircraft's weight.

~~Wireless Avionics Intra-Communications (~~WAIC~~)~~ systems provide one way to derive these benefits. WAIC systems provide for radiocommunication between two or more points on a single aircraft and constitute exclusive closed on board networks required for the aircraft's operation ~~of an aircraft~~. WAIC systems do not provide air-to-ground, air-to-satellite or air-to-air communications. ~~WAIC systems will only be used for safety-related aircraft applications.~~

~~Resolution **423** calls for consideration to be initially given to frequency bands currently allocated to aeronautical services (AMS, AM(R)S and ARNS) on a worldwide basis. If existing aeronautical bands cannot support the WAIC spectrum requirements, then new aeronautical allocations should be considered.~~

WAIC is a communication system which only carries aeronautical safety related content and should therefore be seen as an application of the aeronautical mobile (route) service (AM(R)S). The spectrum requirements for WAIC systems were identified to evaluate the possible use of existing AM(R)S allocations. However, since the spectrum requirements could not be met in those bands, additional AM(R)S allocations were required. ~~Initially the spectrum requirements for WAIC need to be identified to evaluate the possible use of existing AM(R)S allocations, and as such, if the spectrum requirements cannot be met then additional AM(R)S allocations are required.~~
In accordance with Resolution **423 (WRC-12)**, an initial assessment was conducted that analyses potential compatibility between proposed WAIC systems and systems operating under an allocation to an incumbent service. It considered all aeronautical bands in the frequency range 960 MHz-15.7 GHz containing either an AM(R)S, AMS or ARNS allocation.

Studies were conducted analysing potential compatibility between proposed WAIC systems and systems operating under an allocation to an incumbent service in the frequency bands 2 700-2 900 MHz, 4 200-4 400 MHz, 5 350-5 460 MHz, 22.5-22.55 GHz, and 23.55-23.6 GHz. Of the frequency bands studied, only the frequency band 4 200-4 400 MHz shows that sharing is feasible. Use of the band 4 200-4 400 MHz by the radio navigation service is reserved for radio altimeters. Consistent with the studies contained in Report ITU-R M. 2319, the compatibility between WAIC systems and radio altimeters has been confirmed within Working Group F and ITU-R Working Party 5B.

~~Provided that technical studies show that WAIC systems will not cause harmful interference to
existing or planned aeronautical systems in the aeronautical bands, ICAO supports any necessary
additional AM(R)S allocations required to support the implementation of WAIC.~~

ICAO Position:

Support ~~any necessary additional~~a global aeronautical mobile (route) service allocation in the frequency band 4 200 – 4 400 MHz exclusively reserved for Wireless Avionics Intra-Communications (WAIC) systems operating in accordance with recognized international aeronautical standards~~required to facilitate the implementation of WAIC, provided technical studies show that WAIC systems will not cause harmful interference to existing or planned aeronautical systems operating in frequency bands allocated to aeronautical safety services~~.

WRC-15 Agenda Item 1.18

Agenda Item Title:
Allocation of the band 77.5 – 78 GHz to the radiolocation service to support automotive short-range high-resolution radar operations

Discussion:

As aircraft have got larger, the ability of the captain and co-pilot to accurately taxi an aircraft around a busy airport has become more difficult and incidents of aircraft colliding with other objects on the airport have become more common. A solution has been proposed that would use off the shelf automotive radar located in the wing tips of aircraft to detect other ground object that might be in the path of the taxiing aircraft.

WRC-15 agenda item 1.18 is seeking an allocation to the radiolocation service at 77.5 – 78 GHz in order to create a contiguous piece of spectrum from 76 to 81 GHz that could support high resolution applications in the automotive industry. In order to ensure a cost effective solution for aviation to the ground taxiing issue it is essential to maintain commonality between automotive radars and those that can be fitted to aircraft. This application would operate in the radiolocation service on an advisory basis and only when the aircraft was on the airport surface.

As a result aviation would support an allocation to the radiolocation service at 77.5-78 GHz that is not limited in a way that would preclude the use of such radar on taxiing aircraft noting that such an application is not regarded as a safety of life service.

ICAO Position:

Support the allocation of the frequency band 77.5-78 GHz to the radiolocation service in such a way as not to preclude its use on an advisory basis by taxiing aircraft.

WRC-15 Agenda Item 8

Agenda Item Title:
To consider and take appropriate action on requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, taking into account Resolution 26 (Rev. WRC-07).

Discussion:

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

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

The following footnotes in aeronautical bands should be deleted for safety and efficiency reasons as discussed below:

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

bands by the mobile service is not feasible, in particular since no acceptable sharing criteria that secure the protection of aeronautical systems have been established to date. Nos. **5.181**, **5.197** and **5.259** should now be deleted since they do not represent a realistic expectation for an introduction of the mobile service in these bands.

b) Nos. **5.201** and **5.202** allocate the frequency bands 132 – 136 MHz and 136 – 137 MHz in some States to the aeronautical mobile (off-route) service (AM(OR)S). Since these frequency bands are heavily utilized for ICAO-standard VHF voice and data communications, those allocations should be deleted.

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~~a)~~c) In the frequency band 1 215 – 1 300 MHz, which is used by civil aviation for the provision of radionavigation services through No. **5.331.** Footnote No. **5.330** allocates the band in a number of countries to the fixed and mobile service. Given the receiver sensitivity of aeronautical uses of the frequency band, ICAO does not support the continued inclusion of an additional service through country footnotes. ICAO would therefore urge administrations to remove their name from the No. **5.330**.

~~b)~~d) In the frequency bands 1 610.6 – 1 613.8 MHz and 1 613.8 – 1 626.5 MHz, which is assigned to the aeronautical radionavigation service, No. **5.355** allocates the band on a secondary basis to the fixed service in a number of countries. Given that this band is allocated to a safety of life service, ICAO does not support the continued inclusion of an additional service through country footnotes. ICAO would therefore urge administrations to remove their name from the No. **5.355.**

~~c)~~e) In the frequency band 1 559 – 1 610 MHz, which is used for elements of the ICAO global navigation satellite system (GNSS), Nos. **5.362B** and **5.362C** allow the operation of the fixed service in some countries on a primary basis until 1 January 2010 and on a secondary basis until 1 January 2015. This band is allocated, on a worldwide, primary basis, to the aeronautical radionavigation service (ARNS) and to the radionavigation-satellite service (RNSS). The band already supports operation of two prime elements of the global navigation satellite system (GNSS), i.e. global navigation satellite system (GLONASS) and global positioning system (GPS), the standards for which have been adopted into ICAO SARPs. SARPs for other RNSS systems, such as the European Galileo system, are under development. Studies undertaken in preparation for WRC-2000 indicate that a geographical separation distance exceeding line-of-sight (in the order of 400 km) between aircraft using GNSS and stations of the fixed service is required to ensure safe operation of GNSS. This is a very severe restriction, which can prohibit the safe use of GNSS over wide areas around any fixed service installation. Were a fixed service to be introduced into this band then harmful interference situations could arise leading to disruption to GNSS, affecting the safety of aircraft in flight. Thus, the WRC-2000 agreement to terminate all use by the fixed service in this band in 2015 still constitutes a severe and unacceptable constraint on the safe and effective use of GNSS in some areas of the world. It is, therefore, recommended that deletion of these allocations be effective from

2015.

~~d)~~f) In the frequency band 3 400 – 4 200 MHz, the existing allocation to the fixed satellite service (FSS) (space-Earth) is used to provide aeronautical VSAT service, see discussion under agenda items 1.1 and 9.1.5. No. **5.430A** allocates this band also to the mobile service in a number of States in Region 1, including States in Africa. African States are recommended to withdraw their names from this footnote.

g~~f~~) In the frequency band 4 200 – 4 400 MHz, which is reserved for use by airborne radio altimeters, No. **5.439** allows the operation of the fixed service on a secondary basis in some countries. Radio altimeters are a critical element in aircraft automatic landing systems and serve as a sensor in ground proximity warning systems. Interference from the fixed service has the potential to affect the safety of all-weather operations. Deletion of this footnote is recommended.

ICAO Position:

To support deletion of Nos. **5.181, 5.197** and **5.259**, as access to the frequency bands 74.8 – 75.2, 108 – 112 and 328.6 –335.4 MHz by the mobile service is not feasible and could create the potential for harmful interference to important radionavigation systems used by aircraft at final approach and landing as well as systems operating in the aeronautical mobile service operating in the frequency band 108 – 112 MHz.

To support deletion of Nos. **5.201** and **5.202,** as use by the AM(OR)S of the frequency bands 132 – 136 MHz and 136 – 137 MHz in some States may cause harmful interference to aeronautical safety communications.

To support deletion of No. **5.330** as access to the frequency band 1 215 – 1 300 MHz by the fixed and mobile services could potentially cause harmful interference to services used to support aircraft operations.

To support deletion of No. **5.355** as access to the frequency bands 1 610.6 – 1 613.8 and 1 613.8 – 1 626.5 MHz by the fixed services could potentially jeopardize aeronautical use of these frequency bands.

To support the deletion of Nos. **5.362B** and **5.362C** as of 2015 in order to eliminate harmful interference that has been caused by the fixed service to essential aeronautical radionavigation satellite functions in the frequency band 1 559 – 1 610 MHz and to permit the full utilization of GNSS services to aircraft on a global basis.

To support the removal of States in the African region from No. **5.430A** to ensure the protection of the safety operation of the aeronautical VSAT in the frequency band 3 400 – 4 200 MHz, where it is allocated on primary basis to the mobile service.

To support the deletion of No. **5.439** to ensure the protection of the safety critical operation of radio altimeters in the frequency band 4 200 – 4 400 MHz.

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

*No. **5.181***	*Egypt, Israel and Syrian Arab Republic*
*No. **5.197***	*Syrian Arab Republic*
*No. **5.201***	*Angola, Armenia, Azerbaijan, Belarus, Bulgaria, Estonia, the Russian Federation, Georgia, Hungary, Iran (Islamic Republic of), Iraq, Japan, Kazakhstan, Latvia, Moldova, Mongolia, Mozambique, Uzbekistan, Papua New Guinea, Poland, Kyrgyzstan., Romania, Tajikistan, Turkmenistan and Ukraine*
*No. **5.202***	*Saudi Arabia, Armenia, Azerbaijan, Belarus, Bulgaria, the United Arab Emirates, the Russian Federation, Georgia, Iran (Islamic Republic of), Jordan, Latvia, Moldova, Oman, Uzbekistan, Poland, the Syrian Arab Republic, Kyrgyzstan,Romania, Tajikistan, Turkmenistan and Ukraine*
*No. **5.259***	*Egypt and Syrian Arab Republic*
*No. **5.330***	*Angola, Bahrain, Bangladesh, Cameroon, Chad, China, Djibouti, Egypt, Eritrea, Ethiopia, Guyana, India, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Japan, Jordan, Kuwait, Nepal, Oman, Pakistan, the Philippines, Qatar, Saudi Arabia, Somalia, Sudan, South Sudan, the Syrian Arab Republic, Togo, the United Arab Emirates, and Yemen*
*No. **5.355***	*Bahrain, Bangladesh, Congo (Rep of the), Djibouti, Egypt, Eritrea, Iraq, Israel, Kuwait, Qatar, Syrian Arab Republic, Somalia, Sudan, South Sudan, Chad, Togo and Yemen*

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No. ***5.362B***	*Algeria, Armenia, Azerbaijan, Belarus, Benin, Cameroon, Democratic People's Republic of Korea, Gabon, Georgia, Guinea, Guinea-Bissau, Jordan, Kazakhstan, Kyrgyzstan, Libya, Lithuania, Mali, Mauritania, Nigeria, Pakistan, Poland, Romania, Russian Federation, Saudi Arabia, Senegal, the Syrian Arab Republic, Tajikistan, Tanzania, Turkmenistan, Tunisia, Ukraine, and Uzbekistan*
No. ***5.362C***	*Chad, Congo (Rep of the), Eritrea, Iraq, Israel, Jordan, Qatar, Somalia, Sudan, South Sudan, the Syrian Arab Republic, Togo, and Yemen*
No. ***5.430A***	*Algeria, Saudi Arabia, Bahrain, Benin, Botswana, Burkina Faso, Cameroon, Congo (Rep. of the), Côte d'Ivoire, Egypt, French overseas departments and communities in Region 1, Gabon, Guinea, Israel, Jordan, Kuwait, Lesotho, Malawi, Mali, Morocco, Mauritania, Mozambique, Namibia, Niger, Oman, Qatar, the Syrian Arab Republic, the Dem. Rep. of the Congo, Senegal, Sierra Leone, South Africa, Swaziland, Chad, Togo, Tunisia, Zambia and Zimbabwe*
No. ***5.439***	*Iran (Islamic Republic of)*

Global Flight Tracking

The International Telecommunications Union (ITU) 2014 Plenipotentiary Conference (PP-14) adopted Resolution 185 (Busan, 2014) on global flight tracking (GFT) for civil aviation. The Resolution resolved: "to instruct WRC-15, pursuant to No. 119 of the ITU Convention, and to include in its agenda, as a matter of urgency, the consideration of global flight tracking, including, if appropriate, and consistent with ITU practices, various aspects of the matter, taking into account ITU-R studies". PP-14 further instructed the Director of the Radiocommunication Bureau to complete a Report on GFT for consideration by WRC-15. Studies within the ITU-R related to GFT are to be conducted as a matter of urgency in order to support that Report.

The International Civil Aviation Organization (ICAO), upon the completion of a Special Meeting on Global Flight Tracking of Aircraft in Montreal May 2014, forged consensus among its Member States and the international air transport industry sector on the near-term priority to track airline flights, no matter their global location or destination. The meeting concluded that global flight tracking should be pursued as a matter of urgency and as a result, two groups were formed, an ICAO ad hoc Working Group which developed a concept of operations to support future development of a Global Aeronautical Distress and Safety System (GADSS) and an industry led group under the ICAO framework called the Aircraft Tracking Task Force (ATTF) that identified near term capabilities for normal flight tracking using existing technologies.

With regards to the flight tracking technology, the ICAO 2015 High Level Safety Conference (HLSC 2015) noted the ATTF Report which detailed existing technologies such as automatic dependent surveillance-contract (ADS-C) which are already installed on aircraft and which could be used to perform global aircraft tracking. This range of technologies and related services will enable operators to take a performance-based approach when implementing aircraft tracking capabilities. The ATTF report contained a set of performance-based criteria that could be used to establish a baseline level of aircraft tracking capability. Additionally, the report also identified future technologies that could support flight tracking in oceanic and remote airspace such as satellite-based ADS – broadcast (ADS-B). In this regard, the conference supported that ICAO should encourage States and the International Telecommunication Union (ITU) to discuss allocation requirements at the World Radiocommunication Conference in 2015 (WRC-15) to provide the necessary frequency spectrum allocations to enable global air traffic services (ATS) surveillance.

Elements of the final GFT configuration will not likely be available by WRC-15. Given the recent trend toward performance-based communications/navigation/surveillance, that final configuration may be a "system of systems" composed of both current and evolving capabilities, taking into account it must consider GFT for commercial/transport, as well as general aviation and business, aircraft. As a result, the ICAO WRC-15 position on GFT supports consideration by the Conference of all possible options as supported by studies. That could include addition of an allocation around 1090 MHz to the aeronautical mobile satellite (R) service (AMS(R)S) to support satellite reception of

ADS-B, and support of a future Conference (WRC-19) agenda item to address evolving GFT applications. Consideration should be given to ensuring new allocations do not constrain the existing aeronautical safety systems.

ICAO Position:

Support consideration of all possible options for support of ICAO global flight tracking as supported by studies. This should include:

- a new provision in the Earth-to-space direction only for an AMS(R)S allocation at 1090 MHz for the satellite reception of existing aircraft ADS-B signals that operate in accordance with recognised international aeronautical standards under the condition that it not constrain existing aeronautical safety systems

- a future Conference (WRC-19) agenda item to address evolving GFT requirements.

Agenda Item 10 – Future Conference Agenda Items

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GLOBAL AERONAUTICAL DISTRESS AND SAFETY SYSTEM

The International Civil Aviation Organization (ICAO), upon the completion of a Special Meeting on Global Flight Tracking of Aircraft in Montreal May 2014, forged consensus among its Member States and the international air transport industry sector on the near-term priority to track airline flights, no matter their global location or destination. The meeting concluded that global flight tracking should be pursued as a matter of urgency and as a result, two groups were formed, an ICAO ad hoc Working Group which developed a concept of operations to support future development of a Global Aeronautical Distress and Safety System (GADSS) and an industry led group under the ICAO framework called the Aircraft Tracking Task Force (ATTF) that identified near term capabilities for normal flight tracking using existing technologies. While not yet complete, in combination, those efforts will address issues such as:

- Aircraft tracking under normal and abnormal conditions
- Autonomous distress tracking
- Automatic deployable flight recorder
- Procedures and information management

The collective urgency of the situation is highlighted by the decision of the ITU Plenipotentiary Conference, through Resolution 185, to instruct WRC-15, pursuant to No. 119 of the ITU Convention, to include in its agenda, as a matter of urgency, the consideration of global flight tracking, including, if appropriate, and consistent with ITU practices, various aspects of the matter, taking into account ITU-R studies. As a result, the ICAO WRC-15 position regarding Global Flight Tracking is contained above.

With respect to the GADSS however, while the systems needed have yet to be fully defined it is anticipated that there will be a need to change the Radio Regulations in order to facilitate the introduction of such a system. It is therefore proposed that an agenda item be established for WRC-2019 that is flexible enough to address any required changes to the Radio Regulations necessary to allow the implementation of the GADSS.

ICAO Position:

Support the inclusion of an item on the agenda of a future World Radiocommunication Conference to address the need of the global aeronautical distress and safety system.