**International Civil Aviation Organization**
**South American Regional Office - Regional Project RLA/03/901**
*REDDIG Management System and Satellite Segment Administration*
**Nineteenth Meeting of the Coordination Committtee (RCC/19)**
Lima, Peru, 7 to 9 March 2016

**Agenda Item 3: Report of the activities carried out to date since the last meeting of the Coordination Committee**

# CMR WRC-15 RESULTS AND REGISTRATION PROCESS OF REDDIG II EQUIPMENT AND FREQUENCIES AT NATIONAL ORGANISMS THAT MANAGE THE FREQUENCY SPECTRUM

(Presented by the Secretariat)

**SUMMARY**

This working paper presents information on the results of the Radio Navigation Conference (CMR) 2015 of the International Communications Union (UIT) carried out in Geneva, Switzerland, from 2 to 27 November 2015, regarding Agenda Item 1.1: *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),* specifically in frequency bands used by the fixed satellite service (FSS) for aeronautical purposes, as well as the progress in the registration process of REDDIG frequencies at the national organisms that manage the radio frequency spectrum.

**Reference**

- Report of the Eighteenth Meeting of the REDDIG Coordination Committee (RCC/18) (Lima, Peru, 2-4 March 2015);
- State Letter by the ICAO Secretary General E 3/5.15-15/52 dated 15 July 2015;
- Information Paper 01 of the Second Meeting of the FSMP Working Group (Montreal, Canada, 15 to 19 February 2015).

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| ***ICAO Strategic Objectives:*** | *A - Safety*<br>*B – Air navigation capacity and efficiency* |

## 1. Background

1.1 The UIT Radio Navigation Conference 2015 was conducted in Geneva, Switzerland, from 2 to 27 November 2015. The working teleconference was attended by 3800 participants from 162 UIT Member States and 130 from other entities including international organizations and industry.

1.2 This working paper presents results on agenda ítem 1.1 only, specifically related to the examination of the spectrum additional attributions for international mobile telecommunications (IMT) in the frequency band corresponding to the fixed satellite service (C band) for aeronautical use.

2. **Analysis**

2.1 The radio frequency spectrum is a finite and limited resource for which demand increases steadily. The needs of civil aviation as well as the other users of the spectrum continue to increase at an accelerated pace, which creates a more intense pressure with respect to this already meager resource. International competition between radiocommunication services requires all users of the spectrum, both aeronautical and non-aeronautical, to defend and justify, continuously, the retention of the existing frequency bands or the addition of new bands.

2.2 The posture of the ICAO in the CMR conferences, held approximately every four years, aims to protect the aeronautical spectrum for all systems of radiocommunication and radionavigation using facilities on ground and on board.

2.3 CMR agenda item 1.1 mentioned that several ranges of frequencies were adequate for a future introduction of mobile broadband including IMT. On this basis, the following bands/ranges were identified for possible use: 470-694/698 MHz;1 350-1 400 MHz; 1 427-1 452 MHz; 1 452-1 492 MHz; 1 492-1 518 MHz; 1 518-1 525 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.

2.4 From possible allocation of frequency bands indicated in the previous paragraph, ICAO presented its position (see State Letter by the Secretary General E 3/5.15-15/52 dated 15 July 2015) and with reference to the frequency bands used by the fixed-satellite service systems for aeronautical (3 400–4 200 MHz y 4 500–4 800 MHz) was the opposition to any new attribution to the mobile service for IMT or adjacent unless has been shown through studies agreed that he will become void in the aeronautical services.

2.5 The frequency band for the RF signal reception for the REDDIG II is from 3400 to 4200 Mhz band. Specifically, the following carriers frequencies and their respective bandwidth are used:

- ✓ F1: 3789.496Mhz BW : 1.75Mhz
- ✓ F2: 3791.246 Mhz BW : 1.75Mhz
- ✓ F3: 3792.56200 BW : 0.875Mhz

2.6 The total occupation of the REDDIG II reception bandwidth goes from frequency 3788.621 to frequency 3.792.9995.

2.7 Likewise, other VISAT networks for aeronautical use are been operated in Argentina, Brazil, Colombia, Ecuador, Paraguay, Peru and Venezuela from 3400 to 4200 Mhz band.

2.8 The results of the CMR 2015 pertaining the allocation of additional bandwidth to the IMT in the band of fixed satellite service (FSS) for aeronautical use was favorable with ICAO position, ensuring no allocation to the IMT from 3.7 Ghz to 4.2 Ghz especially in Africa, South and Central America. In the remaining bandwidth that is less critical for VSAT of aeronautical use (3.4 Ghz a 3.7 Ghz) the Conference specified its use for the IMT only if the necessary protection is ensured. See more details in the **Appendix** to this working paper.

2.11 Meeting RCC/18 formulated Conclusion RCC18/1 - *Registration process at the national entities that manage the spectrum, of the REDDIG II equipment and frequencies* requesting States that still have not complete the process of registration of frequencies and equipment at the entities that manages the national frequencies spectrum, carry out the procedure not later than 29 May 2015 forwarding a copy of registration forms to ICAO SAM Office by 12 June 2015, and those States that have already 2015 registered REDDIG II frequencies and equipment send a copy of the equipment send a copy of the forms by 31 March 2015.

2.12 The RCC/18 was informed that Argentina, Chile and Guyana had registered their equipment and frequencies and that Brazil, Ecuador, Peru, Trinidad & Tobago and Uruguay had begun the process. It is expected that during the Meeting those States that informed to have done the registration present the corresponding form.

2.13 In addition, to ensure the protection of frequencies of REDDIG II and national satellite networks used for aeronautical applications, it is essential that States through their respective national entities that manage the frequency spectrum, register their VSAT stations to the MIFR (Master International Frequency Register). In this sense, REDDIG II focal points must ensure that the international registration process is made.

3. **Suggested action**

3.1 The Coordination Committee is invited to:

a) Take note of the information provided;
b) analyse the results of the UIT CMR 15 and the corresponding actions to protect the fixed satellite service (FSS) system for aeronautical use as REDDIG II VSAT stations and other VISAT stations from national networks for aeronautical use; and
c) analyse any other aspect deemed necessary regarding this Agenda Item.

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**APPENDIX**

# WRC-15 RESULTS OF RELEVANCE TO INTERNATIONAL CIVIL AVIATION

1. **Agenda Item 1.1: 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).**

1.1 The demand for spectrum for mobile and broadband applications is growing at a fast pace. Under this agenda item, the telecommunications industry was seeking up to 1 200 MHz of additional spectrum in the 300 MHz to 6 GHz range for mobile and broadband applications.

1.2 The ICAO Position was to oppose any new allocation to the mobile service for IMT in or adjacent to frequency bands used for aeronautical safety applications unless it had been demonstrated through agreed studies that there would be no impact on those applications. The ICAO Position emphasized the importance of the frequency bands 1 215 – 1 350 MHz and 2 700 – 2 900 MHz for primary surveillance radar and the frequency band 4.2 – 4.4 GHz, used by radio altimeters which are a critical component of the aircraft ground proximity warning system (GPWS) and used during CAT I/II/III landings.

1.3 Relatively early during the conference an agreement was reached to take the bands immediately above 1 350 MHz and the band 2 700 – 2 900 MHz out of consideration, thus satisfying the aeronautical concerns to protect primary surveillance radar (PSR).

1.4 Similarly, a favourable outcome was secured for the C-band (3.4 – 4.2 GHz). This band is used for satellite links in the Fixed Satellite Service (FSS) supporting aeronautical ground-ground communications, using very small aperture terminal (VSAT) equipment, especially in Africa (WRC-15 Agenda Item 9.1.5 refers) and South/Central America. The conference made no new allocations or identifications for IMT between 3.7 and 4.2 GHz. In the remainder of the frequency range (less critical for aviation VSATs), the conference identified 3.4 to 3.6 GHz to IMT for ITU Region 1, which comprises Europe, Africa, the Middle East and Russia; Region 2, which comprises the Americas; and a number of countries in Region 3, the Asia Pacific, while specifying necessary conditions to protect the FSS, through coordination. Additionally, in Region 2 a few countries identified 3.6 – 3.7 GHz for IMT, similarly while specifying necessary conditions to protect the FSS. Discussions on WRC-15 agenda items 8 and 9.1.5 also refer to this issue.

1.5 Overall, the conference was only successful in identifying less than 400 MHz for IMT on a global or regional scale. One unexpected threat to aviation emerged towards the end of the conference and involved the protection of aeronautical radio altimeters, operating in the band, 4.2 – 4.4 GHz. Several countries made a strong push to identify the adjacent frequency band 4.4 – 4.5 GHz to IMT, despite the fact that no studies had been performed within the ITU Radiocommunication sector (ITU-R) analysing adjacent band compatibility and despite the fact that preliminary studies within ICAO (FSMP) had indicated that IMT in the adjacent band would interfere with the radio altimeters. Prompt action by ICAO, IATA and other aeronautical stakeholders during the conference and direct coordination to aviation authorities through the ICAO

APAC Office, was instrumental in averting the threat in the final days of the conference.

1.6 **Sub-item 5 (9.1.5): Consideration of technical and regulatory actions in order to support existing and future operation of fixed-satellite service earth stations within the band 3 400 – 4 200 MHz, as an aid to the safe operation of aircraft and reliable distribution of meteorological information in some countries in Region 1 (Resolution 154 (WRC-12)).**

1.6.1 The efficient provision of air navigation services requires the implementation and operation of ground communications infrastructure with high availability, reliability and integrity in order to fulfil aviation performance requirements. In the Africa and Indian Ocean Region, the difficulty of fulfilling these requirements, given the extent of the airspace and weakness in terrestrial communication infrastructure, led, in 1997, the ICAO AFI Planning and Implementation Regional Group to approve the use of fixed satellite technology (VSAT) operating under the Fixed Satellite Service (FSS) to support terrestrial aeronautical communications services in the frequency range 3.4 – 4.2 GHz. In tropical regions, due to more pronounced rain attenuation at higher frequency bands, this frequency range remains the only viable option for satellite links with high availability.

1.6.2 The ICAO Position under this agenda item was to support possible technical and regulatory protection of VSATs used for the transmission of aeronautical and meteorological information in the frequency range 3.4 – 4.2 GHz from other services operating in frequency bands within the same or adjacent frequency range.

1.6.3 While the frequency band 3.4 – 3.6 GHz is allocated to the FSS on a Primary basis, it is also allocated to the Mobile service, identified for International Mobile Telecommunications (IMT), through Footnote No. **5.430A**. This footnote requires that use by the IMT is coordinated under No. **9.21** and that the power flux-density received by the satellite terminals does not exceed a harmful value at the border of States which are not party to such coordination. Prior to this conference, No. **5.430A** was limited to certain countries in Region 1, including a large number of countries in Africa, now it has been changed into a generic footnote applicable to all of Region 1.

1.6.4 The main difficulty that aeronautical VSAT operations have been facing is the lack of sufficient measures to protect them by National Administrations when licensing IMT or other services to co-share the band. This has resulted in a number of cases where harmful interference to aeronautical VSATs has occurred. To address this issue, the conference modified Resolution **154**.

1.6.5 Resolution **154** (WRC-15) highlights the requirement that Administrations in certain countries of Region 1 where the frequency band 3.4 – 3.6 GHz is allocated on a primary basis for use by the IMT, ensure compliance of those IMT stations with the relevant provisions of No. **5.430A** addressing the protection needs of existing and planned aeronautical and meteorological VSAT stations in this frequency band, used as an aid to the safe operation of aircraft and reliable distribution of meteorological information. The Resolution highlights the need to license the VSAT stations and register them in the ITU Master International Frequency Register (MIFR), to ensure that they are visible to all Administrations concerned.

1.6.6 The modification to Resolution **154** developed by the conference is fully in line with the ICAO Position. As a follow-up measure, aviation service providers operating VSAT stations for the transmission of aeronautical and meteorological information should be encouraged to have their stations licensed and registered in the MIFR. It is expected that the same measures will help ameliorate similar issues, currently experienced with the operation of aeronautical VSAT networks in South and Central America.

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