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| **World Radiocommunication Conference (WRC-15)Geneva, 2–27 November 2015** |  |
| **INTERNATIONAL TELECOMMUNICATION UNION** |  |
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| PLENARY MEETING | **Addendum 25 toDocument 7-E** |
|  | **21 August 2015** |
|  | **Original: English** |
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| Member States of the Inter-American Telecommunication Commission (CITEL) |
| Proposals for the work of the conference |
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| Agenda item GFT(PP-14) |

Resolution 185 (Busan, 2014) Global flight tracking for civil aviation - The Plenipotentiary Conference of the International Telecommunication Union (Busan, 2014), resolves 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,

**Background**

Automatic Dependant Surveillance-Broadcast (ADS-B) is a terrestrial aeronautical monitoring system, broadcasting (twice per second) position, altitude, velocity, aircraft ID, and other related avionics information. This information enables accurate position determination and monitoring of aircraft and the safe airspace separation of aircraft by air traffic control management. The system is presently in use, as well as being implemented in a number of countries. ICAO has developed Standards and Recommended Practices (SARP)[[1]](#footnote-1) for the ADS-B system.

ADS-B information availability directly influences many factors such as the minimum separation distances between aircraft, resulting in efficient use of airspace, optimization of air routes and altitude availability due to events such as changes in weather conditions, safe operation of airspace with a higher density of aircraft, and contributes to having shorter flight times. Shorter flight times and altitude optimization contribute to fuel efficiencies and cost savings on aircraft maintenance requirements. The use of ADS-B also enables improved safety by providing additional information for search and rescue response.

ADS-B transmissions centred on 1 090 MHz use pulse-position modulation in a ± 1.3 MHz bandwidth. ICAO SARPs define the 3 dB signal bandwidth to be ±2.3 MHz (including a maximum ±1 MHz allowable carrier tolerance) therefore the band 1087.7-1092.3 MHz fully corresponds with the ICAO defined ADS-B signal. The ICAO standardized ADS-B signal broadcasts in accordance with the aeronautical mobile (route) service (AM(R)S) allocation. ADS-B signals are currently received by other aircraft and terrestrial stations on the ground within line-of-sight. In oceanic, Polar regions, remote areas or other areas where deployment of ground based surveillance systems is not feasible, ADS-B signals are currently not being utilized to track aircraft. In these situations, procedural airspace separation standards of approximately 80 nautical miles are used when air traffic management does not have availability of ADS-B data. This level of separation distance is a less than optimal means of airspace use and altitude availability.

A number of satellite systems are in development that will place ADS-B receivers on-board low-earth orbiting satellites, permitting the existing aircraft signals to be received and relayed to appropriate air traffic management (ATM) centres and airlines. This will make it possible to monitor ADS-B equipped aircraft in remote, oceanic and Polar regions, augmenting the current ground-based surveillance systems to provide monitoring capability anywhere on the globe. This represents an innovative use of currently available technology to enhance the safety of aviation operations on a global scale. A notional example of satellite reception of ADS-B is shown in Figure 1.



Figure 1 Example of satellite reception of ADS-B aircraft signals

At a special meeting on global flight tracking, ICAO encouraged ITU to take action, at the earliest opportunity, to provide the necessary spectrum allocations for satellite when emerging aviation needs are identified. ICAO has advised the ITU that a global allocation to AMS(R)S (Earth-to-space) would be appropriate for the reception of ADS-B aircraft transmissions by space station receivers.

The ITU Plenipotentiary Conference 2014 (PP-14) agreed upon Resolution 185 (Busan, 2014) that instructs 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. CITEL PCC I developed an IAP on global flight tracking for PP-14 and support from CITEL countries was instrumental in the development of this Resolution. As a result of this Resolution, there are no procedural matters preventing a prompt response with regulatory action at WRC-15.

The satellite system characterized in Figure 1 will simply receive existing commercial aircraft transmissions operating under AM(R)S. In addition to ICAO-standardized aeronautical systems, other aeronautical navigation systems (operating under the aeronautical radionavigation service (ARNS)) also operate in the frequency band 960-1164 MHz. Where these systems operate on frequencies overlapping the frequency band 1087.7-1092.3 MHz, there is a potential for a reduction in the ADS-B message throughput rate for ADS-B receivers, including those installed on satellite. Performance metrics for ADS-B such as throughput rate are standardized in ICAO. From a regulatory perspective, the concerns of incumbent ARNS users can be addressed through regulatory priority for those systems.

A report under development in ITU-R describes the technical characteristics of ADS-B satellite-based receivers and evaluates compatibility with incumbent services.

* Compatibility with ICAO systems is assured by existing ICAO standards.
* Sharing conditions with non-ICAO systems are described in Resolution **417** **(Rev.WRC-12)** for the AM(R)S signals the satellites will be receiving.

To enable the satellite reception of the ADS-B signals in a protected manner, a new primary AMS(R)S (Earth-to-space) allocation is proposed to be added to the frequency band 1087.7-1092.3 MHz. This allocation is limited to reception of signals from ICAO-standardized systems. A new WRC-15 Resolution **[IAP-ADS-B] (WRC-15)** regarding the satellite reception of ADS-B signals under an AMS(R)S (Earth-to-space) allocation will maintain the relationship between ICAO-standardized systems and other systems operating in the frequency band.

**ICAO considerations**

ICAO has indicated their position on global flight tracking in their contribution to WRC-15 (Document 17).

**ITU-R considerations**

In the Radio Regulations Article **5** Allocation Table, the frequency band 960-1 164 MHz is allocated to the aeronautical mobile (R) service and the aeronautical radionavigation service with the associated footnotes Nos. **5.327A** and **5.328** footnotes, respectively:

**5.327A** The use of the frequency band 960-1 164 MHz by the aeronautical mobile (R) service islimited to systems that operate in accordance with recognized international aeronautical standards. Such use shall be in accordance with Resolution **417 (Rev.WRC‑12)**.    (WRC‑12)

**5.328** The use of the band 960-1 215 MHz by the aeronautical radionavigation service is reserved on a worldwide basis for the operation and development of airborne electronic aids to air navigation and any directly associated ground-based facilities.     (WRC‑2000)

The technical and operational aspects of a satellite system which could receive the already-transmitted ADS-B signals are detailed in the Working Document toward a preliminary draft new report (PDNR ITU-R M.[ADS-B]), being developed in ITU-R. In order to comply with ICAO requirements for safety related communications, an aeronautical mobile satellite (route) service (AMS(R)S) allocation from the aircraft to the satellite (i.e., Earth-to-space direction) would be appropriate.

With an AMS(R)S (Earth-to-space) allocation, satellite filings could include this receive-only link as part of payload information, in conformity with the Radio Regulations. This does not represent an additional burden to the ITU-BR.

The proposal below suggests a simple addition of a primary AMS(R)S allocation by a new footnote to the frequency band 1 087.7-1 092.3 MHz. This allocation would satisfy both ITU and ICAO requirements in relation to satellite reception of the terrestrial ADS-B signal. Further, it is appropriate to also specify that such allocation is limited to reception of signals from recognised international aeronautical standardized systems. (See Resolution **[IAP-ADS-B] (WRC-15**)

This proposal is representative of Option 3 in the Report of the Director of the Radiocommunication Bureau on Global Flight Tracking For Civil Aviation, Document 5 to WRC-15.

**Proposals**

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. 2.1)

MOD IAP/7A25/1

890-1 300 MHz

|  |
| --- |
| Allocation to services |
| Region 1 | Region 2 | Region 3 |
| 960-1 164 AERONAUTICAL MOBILE (R) 5.327A  AERONAUTICAL RADIONAVIGATION 5.328ADD 5.AGFT |

**Reasons:** Add a primary allocation to the aeronautical mobile-satellite (R) service in the frequency band 1 087.7-1 092.3 MHz to enable satellite reception of automatic dependent surveillance-broadcast (ADS-B) messages transmitted in the aeronautical mobile (R) service in accordance with ICAO standards.

ADD IAP/7A25/2

5.AGFT The frequency band 1 087.7-1 092.3 MHz is also allocated to the aeronautical mobile-satellite (R) service (Earth‑to‑space) on a primary basis, limited to space station reception of automatic dependant surveillance-broadcast (ADS‑B) transmissions from aircraft in accordance with recognised international aeronautical standards. Resolution **[IAP-ADS-B]** **(WRC-15)** shall apply.

**Reasons:** To facilitate reception of the ADS-B signal by satellites satisfying both ITU and ICAO requirements in relation with communication of aircraft air navigation related position information on a global basis. Expanded ADS-B coverage by satellites contributes to ensuring the efficient management of air traffic in oceanic, Polar and remote airspace by air traffic management. A new resolution is required to provide information on AMS(R)S operations in this frequency band. Furthermore, with this provision there is no need to modify Resolution **417 (WRC-12)**.

ADD IAP/7A25/3

Resolution **[IAP-ADS-B] (WRC-15)**

**Use of the frequency band 1 087.7- 1 092.3 MHz by the aeronautical mobile-satellite (R) service (Earth to space)**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

*a)* that the frequency band 960-1 164 MHz is currently allocated to the aeronautical radionavigation service (ARNS) and the aeronautical mobile (R) service (AM(R)S);

*b)* that the frequency band 1 087.7-1 092.3 MHz is currently utilized for terrestrial transmission and reception of automatic dependent surveillance-broadcast signals in accordance with ICAO standards, involving transmissions from aircraft to terrestrial stations on the ground within line-of-sight and consequently do not provide flight tracking and surveillance in polar, oceanic and remote areas;

*c)* that automatic dependent surveillance-broadcast (ADS-B) is defined by the International Civil Aviation Organization (ICAO) as “a means by which aircraft, aerodrome vehicles and other objects can automatically transmit and/or receive data such as identification, position and additional data, as appropriate, in a broadcast mode via a data link”[[2]](#footnote-2);

*d)* that WRC-15 adopted **No. 5.AGFT**, allocating the frequency band 1087.7-1092.3 MHz to the aeronautical mobile-satellite (R) service AMS(R)S, limited to reception of ADS-B signals transmitted in accordance with recognized international aeronautical standards;

*e)* that the allocation of the frequency band 1 087.7-1 092.3 MHz to AMS(R)S is to extend reception of currently-transmitted ADS-B signals beyond terrestrial line-of-sight, to facilitate reporting position of commercial aircraft located anywhere in the world to air traffic control centers, accomplishing an important element of aviation safety and security;

*f)* that International Civil Aviation Organization (ICAO) develops Standards and Recommended Practices (SARPs) for systems enabling position determination and tracking of aircraft for air traffic control and management;

*g)* that the frequency band 1 087.7-1 092.3 MHz is also used by non-ICAO aircraft identification systems that have historically operated in this frequency band on a national coordination basis and should be taken into account;

*h)* that some administrations coordinate and control all users to ensure proper operation of all terrestrial systems, because of their complex interference environment in the frequency band

1 087.7-1 092.3 MHz,

*recognizing*

*a)* the need for systems operating under the provisions of **No. 5.AGFT** to be designed in a manner that will not change aircraft equipment currently operating in accordance with recognized international aeronautical standards, including their associated transmission characteristics;

*b)* that Annex 10 to the Convention on International Civil Aviation contains SARPs for terrestrial ADS-B usage;

*c)* that the AMS(R)S systems (Earth-to-space) in the frequency band 1 087.7-1 092.3 MHz are designed so that they can operate in the interference environment as described in considering *h)*,

*noting*

 that the development of performance criteria for satellite reception of ADS-B is the responsibility of ICAO,

*resolves*

1 that AMS(R)S use of the frequency band 1 087.7-1 092.3 MHz shall be in accordance with SARPs requirements published in Annex 10 to the Convention on International Civil Aviation;

2 that , taking into account *recognizing c)*, AMS(R)S use of the frequency band 1 087.7-1 092.3 MHz shall not constrain administrations in their responsibilities as described in *considering h)*,and AMS(R)S systems shall not claim protection from systems operating in the aeronautical radionavigation service,

*instructs the Secretary-General*

to bring this Resolution to the attention of ICAO.

1. ICAO Annex 10. [↑](#footnote-ref-1)
2. Annex 10, Volume III, Section 6. [↑](#footnote-ref-2)