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| **World Radiocommunication Conference (WRC-15) Geneva, 2–27 November 2015** |  |
| **INTERNATIONAL TELECOMMUNICATION UNION** |  |
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| PLENARY MEETING | **Addendum 7 to Document 7-E** |
|  | **29 September 2015** |
|  | **Original: English** |
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| Member States of the Inter-American Telecommunication Commission (CITEL) | |
| Proposals for the work of the conference | |
|  | |
| Agenda item 1.7 | |

1.7 to review the use of the band 5 091-5 150 MHz by the fixed-satellite service (Earth-to-space) (limited to feeder links of the non-geostationary mobile-satellite systems in the mobile-satellite service) in accordance with Resolution **114 (Rev.WRC‑12)**;

Background

At WRC-95, a primary allocation, subject to No. 5.444A, was made to the fixed-satellite service in the 5 091-5 150 MHz band for feeder links to non-GSO mobile-satellite service systems, in the Earth-to-space direction.

The 5 091-5 150 MHz frequency band was originally designated for expansion of the international standard Microwave Landing System (MLS) for planned assignments which could not be satisfied in the 5 030-5 091 MHz frequency band and MLS had priority over other uses in the band. At WRC-07, the priority to MLS was removed in the 5 091-5 150 MHz frequency band and the sunset date for assignments to the FSS in this band was extended from 2012 to 2016 (a date after which no new assignments should be made to the FSS). Recommendation ITU-R S.1342 describes a method for determining coordination distances between international standard MLS stations operating in the band 5 030-5 090 MHz and FSS stations providing Earth-to-space feeder links in the 5 091-5 150 MHz band.

At WRC-07, an additional allocation subject to No. 5.444B was made, in the 5 091-5 150 MHz band, to the aeronautical mobile service (AMS) for use by surface applications at airports, aeronautical telemetry transmissions from aircraft stations and aeronautical security transmissions. The latter application was suppressed by WRC-12. Compatibility between the newly allocated aeronautical mobile service planned usage and the existing fixed-satellite service usage was demonstrated by extensive studies carried out by the ITU-R in the lead up to WRC-07.

The fixed-satellite service allocation at 5091-5150 MHz is currently used by the HIBLEO-4FL and HIBLEO-X systems and has been used compatibly with other services since 1998. The extensive studies undertaken in preparation for WRC-07 resulted in the creation of No. 5.444B and Resolutions 748 (WRC-07), 418 (WRC-07) and 419 (WRC-07)[[1]](#footnote-1) and demonstrated compatibility between the fixed-satellite service and each of the aeronautical mobile (route) service applications.

The operator of the HIBLEO-4FL and HIBLEO-X systems has completed initial phase of the replenishment of its satellite constellation. As these new spacecraft are replacements for existing equipment, they will also utilize the 5 091-5 150 MHz range for feeder links in the Earth-to-space direction. The replacement satellites are expected to remain in service beyond the year 2025.

As a result of these developments, continued FSS use of the 5 091-5 150 MHz band for feeder links of the MSS, Earth-to-space, is required. Taking into account the time constraints contained in No. 5.444A, it is necessary to comply with Resolution 114 (WRC-03) prior to 2018. Recognizing the considerable effort expended in studying the compatibility between the Earth-to-space feeder links of the MSS systems and the Aeronautical Mobile Service in preparation for WRC-07, and since the interference budgets and scenarios studied before remain the same for the HIBLEO-4FL and HIBLEO-X replacement spacecraft, study of technical and operational issues can and should be limited to the sharing of this band between new systems of the aeronautical radionavigation service (ARNS) and the FSS providing feeder links of the non-GSO systems in the MSS.

The continued use of this allocation by feeder uplinks is of great importance in providing ongoing service by MSS systems to developing countries, under-served areas and critical response in the event of natural disasters and other civil emergencies.

Work finalized in ITU-R WP 4A on agenda item 1.7 in preparation for WRC-15 has resulted in the development of a single suitable method to satisfy the requirements of Resolution 114 (WRC-12). The Method objectives are:

• to maintain the primary allocation to the Earth to space feeder links,

• to suppress the time limitation dates in RR No. 5.444A,

• that the regulatory provisions of Resolution 114 be retained as revised by WRC-15,

• that coordination between FSS earth stations and ARNS is required in certain circumstances,

• that flexibility for deploying AM(R)S has been improved while protecting the FSS, and

• to move the allocation to the FSS from footnote to the Table of Frequency Allocations.

Proposals

ARTICLE 5

Frequency allocations

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

MOD IAP/7A7/1

4 800-5 570 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 5 091-5 150 FIXED-SATELLITE (Earth-to-space)  AERONAUTICAL MOBILE 5.444B  AERONAUTICAL MOBILE-SATELLITE (R) 5.443AA  AERONAUTICAL RADIONAVIGATION  5.444 MOD 5.444A | | |

**Reasons:** Consequential to rendering the fixed-satellite service allocation without time-limits.

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5.444A The use of the allocation to the fixed-satellite service (Earth-to-space) in the band 5 091-5 150 MHz is limited to feeder links of non‑geostationary satellite systems in the mobile-satellite service and is subject to coordination under No. **9.11A**. The use of the band 5 091-5 150 MHz by feeder links of non‑geostationary satellite systems in the mobile-satellite service shall be subject to application of Resolution **114** **(Rev.WRC‑15)**. Moreover, to ensure that the aeronautical radionavigation service is protected from harmful interference, coordination is required for feeder-link earth stations of the non-geostationary satellite systems in the mobile-satellite service which are separated by less than 450 km from the territory of an administration operating ground stations in the aeronautical radionavigation service.     (WRC‑15)

**Reasons:** To remove time-limits from the fixed-satellite service allocation (limited to feeder links of non-geostationary systems in the mobile-satellite service), while keeping all the other applicable regulatory provisions, i.e. No. 9.11A and Resolution 114 (Rev.WRC‑15).

APPENDIX 7 (REV.WRC‑12)

Methods for the determination of the coordination area around an earth  
station in frequency bands between 100 MHz and 105 GHz

ANNEX 7

System parameters and predetermined coordination distances for determination of the coordination area around an earth station

# 3 Horizon antenna gain for a receiving earth station with respect to a transmitting earth station

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TABLE 10     (WRC‑15)

Predetermined coordination distances

|  |  |  |
| --- | --- | --- |
| Frequency sharing situation | | Coordination distance (in sharing situations involving services allocated with equal rights) (km) |
| Type of earth station | Type of terrestrial station |
| Ground-based in the bands below 1 GHz to which No. **9.11A** applies. Ground-based mobile in the bands within the range 1‑3 GHz to which No. **9.11A** applies | Mobile (aircraft) | 500 |
| Aircraft (mobile) (all bands) | Ground-based | 500 |
| Aircraft (mobile) (all bands) | Mobile (aircraft) | 1 000 |
| Ground-based in the bands:  400.15-401 MHz 1 668.4-1 675 MHz | Station in the meteorological aids service (radiosonde) | 580 |
| Aircraft (mobile) in the bands:  400.15-401 MHz 1 668.4-1 675 MHz | Station in the meteorological aids service (radiosonde) | 1 080 |
| Ground-based in the radiodetermination-satellite service (RDSS) in the bands:  1 610-1 626.5 MHz 2 483.5-2 500 MHz  2 500-2 516.5 MHz | Ground-based | 100 |
| Airborne earth station in the radiodetermination-satellite service (RDSS) in the bands:  1 610-1 626.5 MHz 2 483.5-2 500 MHz 2 500-2 516.5 MHz | Ground-based | 400 |
| Receiving earth stations in the meteorological-satellite service | Station in the meteorological aids service | The coordination distance is considered to be the visibility distance as a function of the earth station horizon elevation angle for a radiosonde at an altitude of 20 km above mean sea level, assuming 4/3 Earth radius (see Note 1) |
| Non-GSO MSS feeder‑link earth stations (all bands) | Mobile (aircraft) | 500  (see Note 2) |
| Ground-based in the bands in which the frequency sharing situation is not covered in the rows above | Mobile (aircraft) | 500 |
| NOTE 1 – The coordination distance, *d* (km), for fixed earth stations in the meteorological-satellite service vis-à-vis stations in the meteorological aids service assumes a radiosonde altitude of 20 km and is determined as a function of the physical horizon elevation angle ε*h* (degrees) for each azimuth, as follows:  for          ε*h*  ≥  11°  for 0° < ε*h*  <  11°  for          ε*h*  ≤  0°  The minimum and maximum coordination distances are 100 km and 582 km, and correspond to physical horizon angles greater than 11° and less than 0°. (WRC‑2000)  NOTE 2 – For the coordination distance in the band 5 091-5 150 MHz vis-à-vis stations in the aeronautical radionavigation service, see. No. **5.444A**.     (WRC‑15) | | |

**Reasons:** In order to avoid any confusion the coordination distance vis-à-vis a specific service determined by a specific footnote (i.e. No. 5.444A) needs to be specified.

MOD IAP/7A7/4

RESOLUTION 114 (Rev.WRC‑15)

Compatibility between the aeronautical radionavigation service and the fixed-satellite service (Earth-to-space)   
(limited to feeder links of the non-geostationary mobile-satellite   
systems in the mobile-satellite service) in the   
frequency band 5 091-5 150 MHz

The World Radiocommunication Conference (Geneva, 2015),

considering

*a)* the current allocation of the frequency band 5 000-5 250 MHz to the aeronautical radionavigation service;

*b)* the requirements of both the aeronautical radionavigation and the fixed-satellite (FSS) (Earth-to-space) (limited to feeder links of non-geostationary satellite (non‑GSO) systems in the mobile-satellite service (MSS)) services in the above-mentioned band,

recognizing

*a)* that priority must be given to the microwave landing system (MLS) in accordance with No. **5.444** and to other international standard systems of the aeronautical radionavigation service in the frequency band 5 030-5 091 MHz;

*b)* that, in accordance with Annex 10 of the Convention of the International Civil Aviation Organization (ICAO) on international civil aviation, it may be necessary to use the frequency band 5 091-5 150 MHz for the MLS if its requirements cannot be satisfied in the frequency band 5 030-5 091 MHz;

*c)* that the FSS providing feeder links for non-GSO systems in the MSS will need continuing access to the frequency band 5 091-5 150 MHz,

noting

*a)* that Recommendation ITU‑R S.1342 describes a method for determining coordination distances between international standard MLS stations operating in the band 5 030-5 091 MHz and FSS earth stations providing Earth-to-space feeder links in the band 5 091-5 150 MHz;

*b)* the small number of FSS stations to be considered,

resolves

that administrations authorizing stations providing feeder links for non-GSO systems in the MSS in the frequency band 5 091-5 150 MHz shall ensure that they do not cause harmful interference to stations of the aeronautical radionavigation service,

invites administrations

when assigning frequencies in the band 5 091-5 150 MHz to stations of the aeronautical radionavigation service or to stations of the FSS providing feeder links of the non-GSO systems in the MSS (Earth-to-space), to take all practicable steps to avoid mutual interference between them,

instructs the Secretary-General

to bring this Resolution to the attention of ICAO.

**Reasons:** Consequential changes as a result of rendering the fixed-satellite service allocation (limited to feeder links of non-geostationary systems in the mobile-satellite service) without time limits.

MOD IAP/7A7/5

RESOLUTION 748 (REV.WRC‑15)

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

The World Radiocommunication Conference (Geneva, 2015),

considering

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

*b)* that the frequency band 5 000-5 150 MHz is currently allocated to the aeronautical mobile-satellite (R) service (AMS(R)S), subject to agreement obtained under No. **9.21**, and to the aeronautical radionavigation service (ARNS);

*c)* that WRC‑07 allocated the band 5 091-5 150 MHz to the aeronautical mobile service (AMS) on a primary basis subject to No. **5.444B**;

*d)* that the International Civil Aviation Organization (ICAO) is in the process of identifying the technical and operating characteristics of new systems operating in the AM(R)S in the band 5 091-5 150 MHz;

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

*f)* that ITU‑R studies have examined potential sharing among aeronautical applications and the FSS in the band 5 091-5 150 MHz;

*g)* that the frequency band 117.975-137 MHz currently allocated to the AM(R)S is reaching saturation in certain areas of the world, and therefore that band would not be available to support additional surface applications at airports;

*h)* that this new allocation is intended to support the introduction of applications and concepts in air traffic management which are data intensive, and which will support data links that carry safety-critical aeronautical data,

recognizing

*a)* that in the frequency band 5 030-5 091 MHz priority is to be given to the microwave landing system (MLS) in accordance with No. **5.444**;

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

*c)* that Resolution **114 (Rev.WRC‑15)** applies to the sharing conditions between the FSS and ARNS in the 5 091-5 150 MHz band,

noting

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

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

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

resolves

1 that any AM(R)S systems operating in the band 5 091-5 150 MHz shall not cause harmful interference to, nor claim protection from, systems operating in the ARNS;

2 that any AM(R)S systems operating in the frequency band 5 091-5 150 MHz shall meet the SARPs requirements published in Annex 10 of the ICAO Convention on International Civil Aviation and the requirements of Recommendation ITU‑R M.1827‑1, to ensure compatibility with FSS systems operating in that band;

3 that, in part to meet the provisions of No. **4.10**, the coordination distance with respect to stations in the FSS operating in the band 5 091-5 150 MHz shall be based on ensuring that the signal received at the AM(R)S station from the FSS transmitter does not exceed −143 dB(W/MHz), where the required basic transmission loss shall be determined using the methods described in Recommendations ITU‑R P.525‑2 and ITU‑R P.526‑11,

invites

1 administrations to supply technical and operational criteria necessary for sharing studies for the AM(R)S, and to participate actively in such studies;

2 ICAO and other organizations to actively participate in such studies,

instructs the Secretary-General

to bring this Resolution to the attention of ICAO.

**Reasons:** To improve the operational flexibility of the aeronautical mobile (Route) service and to reflect the revision of Recommendation ITU-R M.1827.

NOTE – Resolution 748 (Rev.WRC-12) is referred to in *recognizing c)* of Resolution 418 (Rev.WRC-12). Should WRC-15 revise Resolution 748 (Rev.WRC-12), a consequential update of the reference would be needed in Resolution 418 (Rev.WRC-12).

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1. Resolution 419 (WRC-07) was suppressed at WRC-12. [↑](#footnote-ref-1)