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| **World Radiocommunication Conference (WRC-15) Geneva, 2–27 November 2015** |  |
| **INTERNATIONAL TELECOMMUNICATION UNION** |  |
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| PLENARY MEETING | **Addendum 1 to Document 7(Add.23)(Add.1)-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 9.1(9.1.1) | |

9.1(9.1.1) Resolution **205 (Rev.WRC-12)** − Protection of the systems operating in the mobile-satellite service in the band 406-406.1 MHz

**Background**

Resolution **205** invites the ITU-R to conduct, and complete in time for WRC-15, the appropriate regulatory, technical and operational studies with a view to ensuring the adequate protection of mobile-satellite service systems in the frequency band 406-406.1 MHz from any emissions that could cause harmful interference (see No. **5.267**), taking into account the current and future deployment of services in adjacent bands. This Resolution also instructs the Director of the Radiocommunication Bureau to include the results of these studies in his Report to WRC-15.

In the band 406-406.1 MHz, Search and Rescue beacons transmit uplink signals to search and rescue satellite systems such as the Cospas-Sarsat system. Forty-one nations[[1]](#footnote-1) participate in the Cospas-Sarsat program. The objective of the Cospas-Sarsat system is to reduce, as far as possible, delays in the provision of distress alerts to search and rescue services, and the time required for locating and providing assistance to people in distress. Location and response time have a direct impact on the probability of survival of the person in distress at sea or on land.

Currently, search and rescue satellites in low-earth and geostationary orbits (LEOSAR and GEOSAR respectively) carry repeaters which detect emergency beacons operating in the band 406-406.1 MHz and relay the distress signals from emergency beacons, activated by users in distress (aviators, mariners, land-based), to a network of ground stations (Local User Terminals (LUT)) and ultimately to a mission control center (MCC). The MCC processes the distress signal and alerts the appropriate search and rescue authorities to who is in distress and where they are located. The Cospas-Sarsat system is the primary alerting system recognized and mandated by both the International Maritime Organisation (IMO) and the International Civil Aviation Organisation (ICAO). As of December 2013 the Cospas-Sarsat System had provided assistance in rescuing over 37,000 persons in over 10,300 incidents worldwide.

The Cospas-Sarsat system is transitioning to a Medium-altitude Earth Orbiting Search and Rescue (MEOSAR) system which will place repeaters on Global Navigation Satellite Systems (GNSS) in order to provide more accurate and rapid, fully continuous global coverage. In addition to improving accuracy of locations and reducing response times, the new MEOSAR system will use the second-generation beacons and migrate the majority of the processing functions from the space segment to the ground segment. This facilitates the ability to use new technology as it becomes available.

The band 406-406.1 MHz used by Cospas-Sarsat systems is currently protected by Nos. **4.22** and **5.267** and Appendix **15** (Table 15-2) of the Radio Regulations. ITU-R M.1478-2 provides the requirements for protection against broadband out-of-band emissions and narrow-band spurious emissions for various types of Cospas-Sarsat systems. Some Administrations deploy terrestrial systems operating in the frequency band 405.9‑406 MHz and 406.1‑406.2 MHz, and new deployments are expected in the future. Spectrum measurements for a frequency range which spanned from 405.9 MHz to 406.2 MHz using an experimental MEOSAR ground station (PDN Report ITU-R M.[AGENDA ITEM 9.1.1]) has confirmed the existence of such mobile systems in the above frequency bands. With the presence of these systems, it has the potential to add to the noise floor of the Cospas-Sarsat satellites receivers.

The expected increase in noise level experienced by the Cospas-Sarsat systems by further use of the frequencies near the 406-406.1 band may hinder the current LEOSAR and GEOSAR systems ability to detect and/or relay beacon signals. The increased deployment of terrestrial services may have more impact on the MEOSAR system due to its increased worldwide coverage area.

Recent ITU-R studies included in PDN Report ITU-R M.[AGENDA ITEM 9.1.1] have shown that a separation of 100 kHz may be required to protect the Cospas-Sarsat systems against unwanted emissions from potential increased deployment of land mobile stations operating in the 403 MHz-406.0[[2]](#footnote-2) MHz and 406.1-420 MHz band. For the band 390-406 MHz, analogue radiosondes operating above 405 MHz have also been identified as a potential source of interference. Consequently, the CPM text suggests that no new frequency assignment be made in the frequency bands 405.9-406.0 MHz and 406.1-406.2 MHz for new land fixed and mobile stations and that frequency drift be taken into account when deploying radio-sondes systems above 405 MHz. Additionally, it is proposed that administrations be encouraged to take measures to limit the levels of unwanted emissions of stations operating in the vicinity of the 406-406.1 MHz band in order not to cause harmful interference to the Search and Rescue system Measures could include authorizing new stations starting from channels that are further away from 406-406.1 MHz band. Recognizing that SAR satellite service providers should also work within the confines of their existing band, they are also urged to take measures to improve the robustness of the system against harmful interference.

**Proposals**

ARTICLE 5

Frequency allocations

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

MOD IAP/7A23A1A1/1

335.4-410 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 403-406 METEOROLOGICAL AIDS  Fixed  Mobile except aeronautical mobile  ADD 5. A911 | | |
| 406-406.1 MOBILE-SATELLITE (Earth-to-space)  5.266 5.267 ADD 5. A911 | | |
| 406.1-410 FIXED  MOBILE except aeronautical mobile  RADIO ASTRONOMY  5.149 ADD 5.A911 | | |

**Reasons:** This proposal is intended to provide satellite-based search and rescue systems protection against out-of-band emissions originating from services operating in adjacent bands while minimizing impacts to the systems in these services to the greatest extent possible.

ADD IAP/7A23A1A1/2

5. **A911** In the frequency band 403-410 MHz, Resolution **205 (Rev.WRC-15)** applies.

**Reasons:** This proposal is intended to provide satellite-based search and rescue systems protection against out-of-band emissions originating from services operating in adjacent bands while minimizing impacts to the systems in these services to the greatest extent possible.

MOD IAP/7A23A1A1/3

RESOLUTION 205 (Rev.WRC‑15)

Protection of the systems operating in the mobile-  
satellite service in the band 406-406.1 MHz

The World Radiocommunication Conference (Geneva, 2015),

considering

*a)* that WARC‑79 allocated the frequency band 406-406.1 MHz to the mobile-satellite service (MSS) in the Earth-to-space direction;

*b)* that No. **5.266** limits the use of the frequency band 406-406.1 MHz to low-power satellite emergency position-indicating radiobeacons (EPIRBs);

*c)* that WARC Mob-83 made provision in the Radio Regulations for the introduction and development of a global distress and safety system;

*d)* that the use of satellite EPIRBs is an essential element of this system;

*e)* that, like any frequency band reserved for a distress and safety system, the frequency band 406-406.1 MHz is entitled to full protection against all harmful interference;

*f)* that Nos. **5.267** and **4.22** and Appendix **15** (Table **15-2**) require the protection of the MSS within the frequency band 406-406.1 MHz from all emissions of systems, including systems operating in the lower and upper adjacent frequency bands;

*g)* that Recommendation ITU‑R M.1478 provides protection requirements for the various types of instruments mounted on board operational satellites receiving EPIRB signals in the frequency band 406‑406.1 MHz against both broadband out-of-band emissions and narrowband spurious emissions;

*h)* that the PDN Report ITU-R M.[AGENDA ITEM 9.1.1] provides the results of studies covering various scenarios between the MSS and other relevant active services operating in the frequency bands 390-406 MHz and 406.1-420 MHz or in separate parts of these frequency bands;

*i)* that unwanted emissions from services outside 406-406.1 MHz have the potential to cause interference to the MSS receivers within 406-406.1MHz;

*j)* that long-term protection against harmful interference of the Cospas-Sarsat satellite system operating in the MSS in the frequency band 406-406.1 MHz is vital to the response times of emergency services;

*k)* that in most cases, the frequency bands adjacent or nearby to Cospas-Sarsat will continue to be used for various service applications,

considering further

*a)* that some administrations have initially developed and implemented an operational low-altitude, near-polar orbiting satellite system (Cospas-Sarsat) operating in the frequency band 406-406.1 MHz to provide alerting and to aid in the locating of distress incidents;

*b)* that thousands of human lives have been saved through the use of spaceborne distress-beacon detection instruments, initially on 121.5 MHz and 243 MHz, and subsequently in the frequency band 406‑406.1 MHz;

*c)* that the 406 MHz distress transmissions are relayed through many instruments mounted on geostationary, low-Earth and medium-Earth satellite orbits;

*d)* that the digital processing of these emissions provides accurate, timely and reliable distress alert and location data to help search and rescue authorities assist persons in distress;

*e)* that the International Maritime Organization (IMO) has decided that satellite EPIRBs operating in the Cospas-Sarsat system form part of the Global Maritime Distress and Safety System (GMDSS);

*f)* that observations of the use of frequencies in the frequency band 406-406.1 MHz show that they are being used by stations other than those authorized by No. **5.266**, and that these stations have caused harmful interference to the MSS, and particularly to the reception of satellite EPIRB signals by the Cospas-Sarsat system;

*g)* that the results of spectrum monitoring and ITU-R studies contained in the PDN Report ITU-R M.[AGENDA ITEM 9.1.1] indicate that emissions from stations operating in the frequency bands 405.9-406 MHz and 406.1-406.2 MHz have the potential to severely impact the performance of the MSS systems in the frequency band 406‑406.1 MHz;

*h)* that the results of ITU-R studies indicate that increased deployment of land mobile systems operating in the vicinity of the 406–406.1 MHz frequency band may degrade the receiver performance of the mobile-satellite systems operating in the frequency band 406–406.1 MHz;

i) that the maximum permissible level of interference in the 406-406.1 MHz frequency band may be exceeded due to frequency drift of the radiosondes operating above 405 MHz,

recognizing

*a)* that it is essential for the protection of human life and property that frequency bands allocated exclusively to a service for distress and safety purposes be kept free from harmful interference;

*b)* that mobile systems near the frequency band 406-406.1 MHz are currently deployed and more systems are envisaged;

*c)* that increased deployment raises significant concerns on the reliability of future distress and safety communications due to the increases in the noise level measured in many areas of the world for the frequency band 406-406.1 MHz;

*d)* that it is essential to preserve the MSS frequency band 406-406.1 MHz free from out-of-band emissions that would degrade the operation of the 406 MHz satellite transponders and receivers, with the risk that satellite EPIRB signals would go undetected,

noting

*a)* that the 406 MHz search and rescue system will be enhanced by placing 406‑406.1 MHz transponders on global navigation satellite systems such as Galileo, GLONASS and GPS, relaying search and rescue emissions at 406 MHz, in addition to already operational and future low-Earth orbiting and geostationary satellites, thus providing a large constellation of satellites relaying search and rescue messages;

*b)* that this enhanced constellation of spaceborne search and rescue instruments was designed to improve geographic coverage and reduce distress-alert transmission delays because of larger uplink footprints, increased number of satellites and improvement in the accuracy of the location of the distress signal;

*c)* that the characteristics of these spacecraft with larger footprints, and the low power available from satellite EPIRB transmitters, means that aggregate levels of electromagnetic noise, including noise from transmissions in frequency adjacent bands, may present a risk of satellite EPIRB transmissions being undetected, or delayed in reception, or lead to reduced accuracy of the calculated locations, thereby putting lives at risk,

noting further

a) that the mobile-satellite systems contributing to the emergency location system “Cospas-Sarsat” provide a worldwide emergency location system that benefits all countries, even if those mobile-satellite systems are not operated by their country;

b) that many Cospas-Sarsat satellites implement efficient out-of-band filtering, which would be further improved in upcoming satellites,

resolves

1 to request administrations not to make new frequency assignments within the frequency bands 405.9-406.0 MHz and 406.1-406.2 MHz under the mobile and fixed services; 2 that administrations take into account frequency drift characteristics of radiosondes when selecting their operating frequencies above 405 MHz to avoid transmitting in the 406-406.1 MHz frequency band and take all practical steps to avoid frequency drifting close to 406 MHz,

instructs the Director of the Radiocommunication Bureau

1 to continue to organize monitoring programmes in the frequency band 406-406.1 MHz in order to identify the source of any unauthorized emission in that frequency band;

2 to organize monitoring programmes on the impact of the unwanted emissions from systems operating in the frequency bands 405.9-406 MHz and 406.1-406.2 MHz on the MSS reception in the frequency band 406-406.1 MHz in order to assess the effectiveness of this Resolution and to report to subsequent world radiocommunication conferences,

encourages administrations

to take measures such as authorizing new assignments to stations in the fixed and mobile services in priority in channels with greater frequency separation from the 406 to 406.1 MHz frequency band and ensuring that the e.i.r.p. of new fixed and mobile systems at all but low elevation angles is kept to the minimum required level,

urges administrations

1 to take part in monitoring programmes referred to in the *instructs the Director of the Radiocommunication Bureau* above;

2 to ensure that stations other than those operated under No. **5.266** abstain from using frequencies in the frequency band 406-406.1 MHz;

3 to take the appropriate measures to eliminate harmful interference caused to the distress and safety system;

4 when providing Cospas-Sarsat satellite receiver payloads in the 406-406.1 MHz frequency band, to make possible improvement of out-of-band filtering of such receivers, in order to reduce constraints to adjacent services while preserving the ability of the Cospas-Sarsat system to detect all kinds of emergency beacons and to maintain an acceptable rate of detection, which is vital to search and rescue missions;

5 to take all practical steps to limit the levels of unwanted emissions of stations operating within the 403-406 MHz and 406.1-410 MHz frequency ranges in order not to cause harmful interference to mobile-satellite systems operating in the 406-406.1 MHz frequency band;

6 to actively cooperate with the administrations participating in the monitoring programme and the Bureau to resolve reported cases of interference to the Cospas-Sarsat system.

**Reasons:** This proposal is intended to provide satellite-based search and rescue systems protection against out-of-band emissions originating from services operating in adjacent bands while minimizing impacts to the systems in these services to the greatest extent possible.

1. In Region 2, the following countries participate in Cospas-Sarsat: Argentina, Brazil, Canada, Chile, Peru and United States of America [↑](#footnote-ref-1)
2. The band 403 to 406 MHz is allocated to mobile and fixed on a secondary basis according to Article **5** of the Radio Regulations in all three regions and some countries are using this allocation on an extended manner. [↑](#footnote-ref-2)