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| Summary:  |
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| Proposal: |
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Editor’s Note: The following pages are intended to be compiled in one CEPT Brief on AI 9

DRAFT CEPT BRIEF ON AGENDA ITEM 9.1 – ISSUE 9.1.1 – RESOLUTION 205 (Rev.WRC-12)

# ISSUE

Resolution 205 (Rev.WRC-12) “Protection of the systems operating in the mobile-satellite service in the band 406-406.1 MHz”

“resolves to invite ITU-R

1. 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 MSS 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 as noted in considering f);
2. to consider whether there is a need for regulatory action, based on the studies carried out under resolves 1, to facilitate the protection of MSS systems in the frequency band 406-406.1 MHz, or whether it is sufficient to include the results of the above studies in appropriate ITU-R Recommendations and/or Reports,”

# Preliminary CEPT position

In order to ensure adequate protection of MSS systems in the frequency band 406-406.1 MHz, CEPT supports a revision of Resolution 205 (Rev WRC-12) containing mitigation measures. However, it should also be ensured that existing stations/systems duly authorized in adjacent frequency bands will not experience undue constraints.

# Background

Recently, some Administrations announced their intent to continue to deploy commercial land mobile systems operating in the vicinity of the 406-406.1 MHz MSS band to a greater extent, which has significantly enhanced concerns regarding possible harmful interference caused by adjacent band emissions. It is expected that other terrestrial operators (mainly in Europe but also anywhere in the world) ask for extended spectrum capacities in UHF band in the future. In any case, it is necessary to ensure compliance with RR No. 5.267, “Any emission capable of causing harmful interference to the authorized uses of the band 406-406.1 MHz is prohibited”.

According to Resolution 205 (Rev.WRC-12), the frequency band 406-406.1 MHz is constantly monitored. Measurements performed by the SARP (Search And Rescue Processor) instrument on-board the satellite Metop-A at 830 km of altitude show that the level of noise as seen by the instrument depends highly on the area where the beacon is deployed and is transmitting. For most of the areas on the Earth (mainly over oceans), a distress beacon can be correctly received and processed by the SARP even for low levels.

Several noise measurements have been conducted using all the three space components. The measurements of the 406-406.1 MHz band must be carefully examined, as Cospas Sarsat has a general concern on the reception and processing of weak distress signals, in certain areas caused by an increase of noise especially in the Europe and Asia.

Analysis of observations show that over certain years, this noise (measured in the 406-406.1 MHz band) has increased by 15 to 20 dB above the permissible interference level in Europe and Asia. This noise might be caused by terrestrial systems deployed in many countries and transmitting in the frequency ranges between 390 MHz to 406 MHz and from 406.1 MHz to 420 MHz. Geostationary MSG-1 MSG-2 and MSG-3 meteorological satellites carry on-board 406 MHz transponders, which allowed the computation of radio noise levels in this band. The GALILEO, GLONASS and GPS constellations will offer additional capability at 406 MHz.

Observations performed with GLONASS and GALILEO confirm the presence of noise providing additional evidence of emissions near the 406-406.1 MHz band potentially causing harmful interference in the 406.0‑406.1 MHz band, further justifying the need for technical and regulatory studies, and ensuring that distress signals can continue to be detected and successfully processed by the Cospas-Sarsat system. Recommendation ITU-R M.1478-2 provides the latest 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. This Recommendation should be the technical basis of all further calculation concerning the protection of the frequency band 406-406.1 MHz. This recommendation is under revision (to be approved next SG4) and is supposed to contain most of the characteristics and the 406-406.1 MHz protection criteria of the Search-And-Rescue Repeaters/Processors on board the three space segments. Taking into account the larger footprints of MEO satellites, it is of the utmost importance to make sure that the instruments at 406 MHz that will be in operation will be able to process all kinds of beacons, even those transmitted in challenging situations and therefore having quite low levels.

Technical studies are needed to adequately address the consequence of aggregate emissions from a large number of transmitters operating in adjacent bands and the consequent risk to space receivers intended to detect low-power distress-beacon transmissions. Emissions in adjacent bands, if not adequately controlled, could raise the level of noise captured by the Cospas-Sarsat systems and hinder their abilities to detect and/or relay signal from beacons. One goal of these studies is to indicate what should be the most appropriate regulatory regime.

The preliminary draft new Report developed within ITU-R WP 4C provides the permissible levels of interference for both narrow band emissions and wide band emissions, for the three categories of the space segment of the Cospas-Sarsat system: LEO (NOAA, METOP satellites), MEO (GALILEO, GLONASS) and GSO (MSG).

Preliminary analysis has shown that for data collection platforms in operation within the frequency band 401 to 403 MHz, the aggregate transmitter power does not exceed the broadband interference threshold, assuming a maximum load of the Earth exploration-satellite systems. The operation of the EESS (Earth-to-space) data collection system would contribute only with a small fractional to the wide band interference budget for the LEO satellites (0.0185%) and 3.435 % for the geostationary satellite receivers. The results are significantly different between the two MEO satellites systems. The report calculated that the data collection platforms only contribute up to 4.861% of the wideband interference threshold for the Galileo satellite. Due to the higher sensitivity of GLONASS receivers, the data collection platforms contribute to 87.24% of the wideband interference to GLONASS receivers.

Operation of radiosondes in the meteorological aids service will not exceed the broadband measured sensitivity levels of the search-and-rescue receivers for LEO, MEO or GEO satellites. In all cases the percentage of interference power to the SAR receivers is less than 6 x10-3 percent of the interference threshold. Older, less-stable, analogue radiosondes could have the carrier drift into the SAR receiver band. However, this does not contribute to the overall increase in the SAR receiver noise background.

The impact of mobile systems in operation above 406.1 MHz has been assessed performing simulation using deployment (based on answers provided through a questionnaire sent to CEPT administrations and sector members last April 2013) within the CEPT countries. Simulations show that the LEO component experiences interference due to mobile deployment from 406.1 to 407 MHz, while the MEO component receives interference up to 410 MHz depending on the MEO satellite constellations. The geostationary component shows severe interference due to mobile deployment within the 406.1 to 406.2 MHz band. Concerning the impact of spurious emissions in the 406-406.1 MHz band, no impact has been demonstrated.

It is to be noted that the set of paired bands (380-385 MHz) / 390-395 MHz, are dedicated to Public Protection and Disaster Relief and the corresponding systems have been extensively implemented in many European countries. PPDR radio solutions are an essential element for Public Safety operations, they require reliable, available, secure systems provided by dedicated systems permanently available and covering all necessary wide areas (regional, country, and continent) on a permanent basis. PPDR systems need to be effective and adequate in their operation, nationally, cross border and regionally.

ITU-R Resolution 646, states that in Region 1: 380-470 MHz as the frequency range within which the band 380 385/390 395 MHz is a referred core harmonized band for permanent public protection activities within certain countries of Region 1, which have given their agreement. The implementation of PPDR systems could be constrained by proposals within the ITU-R Directors Report to WRC15 and the WRC15 outcomes. PPDR systems should be effective in their operation nationally, cross border and regionally,

CEPT should be careful to ensure that in balancing the interference protection needs of Cospas-Sarsat that radio regulatory provisions do not then constrain PPDR. However, specific technical studies should be undertaken to evaluate the impact of these systems on the MSS operation within the band 406 to 406.1 MHz.

ITU-R WP4C continued drafting CPM text suggesting that “WRC-15 could revise WRC Resolution 205 with a view of having an adequate protection of the MSS in the band 406-406.1 MHz in order to detect and successfully process 406 MHz distress signals taking into account the current and future deployment of services in adjacent bands”. The following mitigation techniques have been discussed.

1. LEOSAR, GEOSAR and MEOSAR systems space receivers could be designed with improved filters, which are planned for future generation of satellites.
2. A guard band would provide some protection, and its implementation would likely require regulatory measures such as licensing new systems outside of the guard band. Taking into account that there may be a large number of existing land mobile systems already operating in above 406.1 MHz, this mitigation measure would only apply to new stations/systems for mobile and fixed services. Therefore, such a mechanism may be beneficial to MSS systems on a long-term basis, and administrations are invited to make new stations/systems to mobile and fixed services to frequency bands outside this guard band. The size of the guard band needs to be carefully calculated and defined within the range of some kHz up to 300 kHz. It is assumed that this guard band is not applicable to existing stations/system but to new ones. It is understood that a larger guard band would provide a better noise reduction, while a larger guard band would constrain administrations to implement stations/systems of the mobile/fixed services under the conditions of this guard band.
3. Reduction in e.i.r.p. levels radiated by terrestrial systems towards space may be another measure to protect MSS systems in the 406-406.1 MHz. However, taking into account that there are already thousands of terrestrial systems already in use throughout CEPT countries, it is not realistic to expect that the operators/users of these systems would/could modify their existing networks. Thus this mitigation measure is not feasible due to the high number of existing systems operating in the 406.1-410 MHz, but might be considered for existing systems operating over
	1. geographical areas with low deployment of terrestrial systems
	2. a very limited portion of that band such as 406.1-406.2 MHz

More details are expected to be provided regarding the use of the band by terrestrial systems in CEPT countries and the US.

1. Additional regulatory measures on adjacent bands may be needed. These measures could include voluntary measures such as encouraging administrations to authorize new stations starting from channels that are further away from the band edges 406-406.1 MHz.
2. Below 406 MHz, mitigation techniques are necessary (to be completed). In particular, the activity within the band 405.9-406 MHz should be further examined.

# List of relevant documents

ITU-Documentation (Recommendations, Reports, other)

* ITU-R Resolution 646 (WRC‑03) for Public Protection and Disaster Relief
* ITU-R Report ITU‑R M.2033 Radiocommunication objectives and requirements for public protection and disaster relief
* Revised Recommendation ITU-R M.1478-2 “Protection criteria for Cospas-Sarsat search and rescue instruments in the band 406-406.1 MHz” (see also Annex 1 to Document 4C/289)
* Report ITU-R SM.2258 “Overview of interference source detection and geolocation affecting the 406.0-406.1 MHz band used by emergency beacons” (see [Revision 1 to Document 1/35](http://www.itu.int/md/R12-SG01-C-0035/en))
* Annex 5 to Document 4C/289 ”Preliminary draft new Report ITU-R M.[AGENDA ITEM 9.1.1] – Protection of the 406-406.1 MHz band”
* Annex 13 to Document 4C/289 ”Working document - Draft CPM text on WRC-15 agenda item 9.1, issue 9.1.1”

CEPT and/or ECC Documentation (Decisions, Recommendations, Reports)

* ECC Decision (04)06 The availability of frequency bands for the introduction of wideband digital land mobile PMR/PAMR in the 400 MHz and 800/900 MHz bands
* ECC Decision (08)05 on the harmonization of frequency bands for the implementation of digital Public Protection and Disaster Relief (PPDR) radio applications in the bands within 380-470 MHz
* ECC Decision (06)06 on the availability of frequency bands for the introduction of Narrowband Digital Land Mobile PMR/PAMR in the 80/160/400 MHz
* ECC Report 102 Public Protection and Disaster Relief Spectrum Requirements Helsinki January 2007

ETSI References

* ETSI TR 102 491 (TETRA TEDS system reference document) and ETSI TR 102 485 (PPDR system reference document), which are requests to develop spectrum requirements for Public Protection and Disaster Relief for wideband applications and/or broadband applications.
* EU Documentation (Directives, Decisions, Recommendations, other), if applicable
* COSPAS SARSAT relevant documentation
* Description of the Payloads Used in the Cospas-Sarsat LEOSAR System, T.003
* Description of the 406 MHz Payloads Used in the Cospas-Sarsat GEOSAR System, T.011

# Actions to be taken

CEPT should continually review the developing conclusions and recommendations of the ITU-R WP4C study report for possible impact on affected radio services.

# Relevant information from outside CEPT

## European Union (date of proposal)

## Regional telecommunication organisations:

APT (December 2013)

Further studies are required. APT members are invited monitor and evaluate the studies conducted in ITU-R and submit their contributions for further considerations in future meetings. All incumbent servicers to which the relevant bands are allocated to exiting and planed operation should be protected.

* Australian Preliminary View (July 2013)
* Australia supports appropriate regulatory, technical and operational studies with a view to ensuring the adequate protection of MSS systems in the frequency band 406-406.1 MHz from any emissions that could cause harmful interference.

ATU (date of proposal)

Arab Group (December 2013)

Support the protection of the systems operating in the mobile-satellite service in the band 406-406.1 MHz.

CITEL (April 2013)

Protection of the Cospas-Sarsat system from out-of-band emissions of adjacent bands is required in order to maintain an acceptable rate of detection, which is vital to search and rescue missions.

* Canada/US (December 2013)
* Supports the ongoing ITU-R studies with a view of having an adequate protection of the MSS band 406-406.1 MHz in order to detect and successfully process 406 MHz distress signals, which is vital to search and rescue missions.

RCC (December 2013)

The RCC Administrations recognize the importance of Cospas-Sarsat system used for search and rescue operations

The RCC Administrations support activities aimed at ensuring the adequate protection of the Cospas-Sarsat system in the frequency band 406-406.1 MHz from emissions, which could cause harmful interference to the authorized uses in that frequency band (RR Nos. 5.267, 5.266), taking into account existing and future deployment of services in adjacent (390-406 MHz and 406.1-420 MHz) frequency bands.

Aggregate effect of emissions from stations operating in the adjacent frequency bands should be taken into consideration when conducting the relevant studies.

## International organisations

IATA (date of proposal)

ICAO (December 2013)

Support increased protection of COSPAS-SARSAT system in the frequency band 406 – 406.1 MHz.

IMO (November 2013)

It is essential to preserve the MSS frequency band 406-406.1 MHz free from any emissions that would degrade the operation of the 406 MHz satellite transponders and receivers, with the risk that satellite Emergency Position Indicating Radio Beacon (EPIRB) signals would go undetected.

NATO (June 2013)

NATO supports the protection of the MSS band 406-406.1 MHz.

SFCG (July 2013)

SFCG supports the development of the studies with a view of having an adequate protection of the MSS in the band 406-406.1 MHz in order to detect and successfully process 406 MHz distress signals while not putting undue constraints to existing and planned systems in the adjacent 390-406 MHz and 406.1-420 MHz frequency bands. Regulatory provisions should be developed accordingly with their possible inclusion into a WRC Resolution.

WMO (June 2013)

WMO supports studies and regulatory measures towards ensuring the adequate protection to Cospas-Sarsat receivers against emissions from adjacent bands, noting that, to a large extent, those receivers are implemented on meteorological satellites.

## Regional organisations

ESA (date of proposal)

Same as SFCG position

EUMETNET (November 2012)

EUMETNET does not oppose studies and regulatory measures towards ensuring better protection to COSPAS-SARSAT receivers, noting that, to a large extent, those receivers are implemented on meteorological satellites.

Eurocontrol (date of proposal)

## OTHER INTERNATIONAL AND REGIONAL ORGANISATIONS

EBU (date of proposal)

GSMA (date of proposal)