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| **The 6th Meeting of the APT Conference Preparatory**  **Group for WRC-23 (APG23-6)** | **APG23-6/INP-xx** |
| 14 – 19 August 2023, Brisbane, Australia | xx August 2023 |

Thailand (Kingdom of)

**proposal for the preliminary apt common proposals on wrc-23 agenda items 1.6, 1.7, 1.8, 1.9, 1.10, 1.11 AND Resolution 427 (WRC-19)**

**Agenda Item 1.6:**

*to consider, in accordance with Resolution* ***772 (WRC-19)****, regulatory provisions to facilitate radiocommunications for sub-orbital vehicles.*

**1. Background**

Resolution **772 (WRC-19)**, in preparation for WRC-23 agenda item 1.6, invites the ITU-R to study the spectrum needs for stations on board sub-orbital vehicles, any appropriate modification to the Radio Regulations, excluding any new allocations or changes to the existing allocations in RR Article **5**, and to identify whether there is a need for access to additional spectrum that should be addressed after WRC-23 by a future competent conference.

WRC-23 agenda item 1.6 is intended, among other aspects, to safely integrate sub-orbital vehicles into the airspace used by conventional aircraft and minimize disruption to this controlled airspace during sub-orbital vehicles transition.

In addition, sub-orbital vehicles are intended to operate at higher altitudes than conventional aircraft during short periods of time without permanently entering an orbit as defined in RR No. **1.184** and potentially flying at speeds up to several times the speed of sound.

The following methods are outlined in the CPM Report to satisfy WRC-23 Agenda item 1.6:

* **Method A**: No change to the Radio Regulations and suppression of Resolution **772 (WRC-19)**;
* **Method B**: Proposes a new WRC Resolution containing the provisions to operate radiocommunications for sub-orbital vehicles without any change to RR Article **5**. There are four alternative approaches to this method. All four approaches propose to suppress Resolution **772 (WRC-19)**; and
* **Method C**: Revision of Resolution **772** **(WRC-19)** in order to clarify the list of necessary studies and to extend their duration. In the past study period, no studies according to Resolution **772** **(WRC-19)** in *resolves*2 part concerning compatibility studies, and sharing conditions for transmitting and receiving stations of sub-orbital vehicles during sub-orbital flights were not conducted and the results were not provided. Therefore any decision cannot be taken. Method C provides revision to Resolution **772** **(WRC-19)** in order to clarify the list of possible interference scenarios, including scenarios for the use of ground/earth stations on board a sub-orbital vehicle in the part of the flight path in outer space.

**2. View(s)**

Thailand supports Method B in order to develop a new WRC Resolution containing the provisions to operate radiocommunications for on board sub-orbital vehicles. Method B Approach C is preferred. Thailand is of the view that the definition of sub-orbital flight and sub-orbital vehicle should be provided in the new Resolution.

**Agenda Item 1.7:**

*To consider a new aeronautical mobile-satellite (R) service (AMS(R)S) allocation in accordance with Resolution* ***428 (WRC-19)*** *for both the Earth-to-space and space-to-Earth directions of aeronautical VHF communications in all or part of the frequency band 117.975-137 MHz, while preventing any undue constraints on existing VHF systems operating in the AM(R)S, the ARNS, and in adjacent frequency bands.*

**1. Background**

WRC-23 Agenda Item 1.7 was initiated by APT, CEPT and CITEL to consider a new AMS(R)S allocation that will enable satellite relay of existing aeronautical VHF communications to complement terrestrial infrastructures and extend the direct controller-pilot communications for aircraft operating in remote/oceanic region without having the need to change the existing aircraft equipage.

ITU-R has studied the architecture, parameters, and baseline link budgets of a reference AMS(R)S system for the provision of standardized communications for air traffic management, without modification to aircraft equipment. To support compatibility studies, examples of the link budgets for satellite-to-aircraft (downlink) and aircraft-to-satellite (uplink) VHF links have been developed, based on propagation considerations adopted by ITU-R. Compatibility studies of new AMS(R)S with existing primary services operating in-band/adjacent bands have been conducted with inputs from the relevant ITU-R Working Parties to ensure the protection of existing systems from possible interference resulting from the introduction of a new AMS(R)S.

The following methods are outlined in the CPM Report to satisfy WRC-23 Agenda item 1.7:

* **Method A**:No change to the Radio Regulations;
* **Method B**: This method, which provides general common elements required to be complemented with Methods B1, B2, B3 or B4, proposes to add a new allocation to the AMS(R)S in the frequency band 117.975-137 MHz, or part thereof, limited to non-geostationary-satellite systems and to internationally standardized aeronautical systems and suppression of Resolution **428 (WRC-19)**. This method is not an independent and standalone method as such and thus should be considered together with Methods B1, B2, B3 or B4:
* Method B1: Is containing the elements of Method B, and proposes a new allocation in the range 117.975-137 MHz with the addition of a power flux-density (pfd) limit, on AMS(R)S space stations unwanted emissions falling above 137 MHz, in order to ensure protection of adjacent band services above 137 MHz. Method B1 also proposes coordination for coexistence between AMS(R)S and other primary in-band services according to RR No. **9.11A** with a coordination threshold −140 dB  
  (W/(m2 · 4 kHz)) at the Earth’s surface and within [XX km] from a country’s border ;
* Method B2: Is containing the elements of Method B, and proposes a new allocation in the range 117.975-137 MHz with the addition of a power flux-density (pfd) limit, on AMS(R)S space stations unwanted emissions falling above 137 MHz, in order to ensure protection of adjacent band services above 137 MHz. Method B2 also proposes coordination for coexistence between AMS(R)S and other primary in-band services according to RR No. **9.11A** with a coordination threshold −140 dB  
  (W/(m2 · 4 kHz)) at the Earth’s surface including international waters within [XX km] from the coastline;
* Method B3: Is containing the elements of Method B, and proposes a new allocation in the range 117.975-136.8 MHz and proposes coordination for coexistence between AMS(R)S and other primary in-band services according to RR No. **9.11A** with a coordination threshold −140 dB(W/(m2 · 4 kHz)) at the Earth’s surface on the territory of countries listed in No. **5.201** or No. **5.202**, respectively; and
* Method B4: Is containing the elements of Method B, and proposes a new allocation in the range 117.975-136 MHz and proposes coordination for coexistence between AMS(R)S and other primary in-band services according to RR No. **9.11A** with a coordination threshold −148 dB(W/(m2 · 4 kHz)) at the Earth’s surface and within 480 km of a country’s border.

**2. View(s)**

Thailand supports a new co-primary allocation for the AMS(R)S in the frequency band 117.975-136 MHz, while ensuring no adverse impact to the existing AM(R)S and not constraining its planned usage. Thailand prefers Method B4 in the CPM Report.

**Agenda Item 1.8:**

*to consider, on the basis of ITU-R studies in accordance with Resolution* ***171 (WRC-19)****, appropriate regulatory actions, with a view to reviewing and, if necessary, revising Resolution* ***155 (Rev.WRC-19****) and No.* ***5.484B*** *to accommodate the use of fixed-satellite service (FSS) networks by control and non-payload communications of unmanned aircraft systems.*

**1. Background**

WRC-15 agenda item 1.5 considered the possibility to use fixed-satellite service (FSS) networks to provide control and non-payload communications (CNPC) links of unmanned aircraft system (UAS) and established Resolution **155 (WRC-15)** in order to benefit from the opportunity of using existing satellite transponders. Recognizing the need for further studies on regulatory provisions and technical criteria both within ICAO and ITU, WRC-15 decided that consideration of the outcome of these studies, also taking into account the progress obtained by ICAO in the completion of its Standards and Recommended Practices (SARPs) on the use of FSS for the UAS CNPC links would again be considered by WRC-23.

Accordingly, this agenda item was established by WRC-19, in accordance with Resolution **171 (WRC-19)**, to consider appropriate regulatory actions, with a view to reviewing and, if necessary, revising Resolution **155 (Rev.WRC-19)** and RR No. **5.484B** to accommodate the use of FSS networks by UAS CNPC. The ITU-R is invited to:

1. Continue and complete in time for WRC-23 relevant studies of the technical, operational and regulatory aspects, based on the frequency bands mentioned in resolves 1 of Resolution **155 (Rev.WRC-19)**, in relation to the implementation of Resolution **155 (Rev.WRC-19)**, taking into account the progress obtained by ICAO in the completion of SARPs on use of the FSS for the UAS CNPC links;
2. Review No. **5.484B** and Resolution **155 (Rev.WRC-19)** taking into account the results of the above studies.

The following methods are outlined in the CPM Report to satisfy WRC-23 Agenda item 1.8:

* Method A proposes suppression of RR No. **5.484B**, Resolution **155 (Rev.WRC-19)** and Resolution **171 (WRC-19)**; and
* Method B proposes possible revision of RR No. **5.484B**, revision of Resolution **155** **(Rev.WRC-19)** and suppression of Resolution **171 (WRC-19).** Three alternative texts are provided, labelled Method B1, B2 and B3. The text of Method B1 is a reproduction of the draft CPM text. Methods B2 and B3 are mergers of contributions received at CPM23-2.

**2. View(s)**

Thailand is of the view that WRC-23 should address and agree on the resolution to the issue of safety of life referred to in RR No. **4.10**.

In addition, the approach to revise RR No. **5.484B** and Resolution **155 (Rev.WRC-19)** by taking into account all required technical, operational and regulatory conditions that UAS CNPC links need to comply with can ensure protection of existing and future FSS networks or terrestrial services.

Therefore, Thailand prefers Method B2 in the CPM Report.

**Agenda Item 1.9:**

*to review Appendix* ***27*** *of the Radio Regulations and consider appropriate regulatory actions and updates based on ITU-R studies, in order to accommodate digital technologies for commercial aviation safety-of-life applications in existing HF bands allocated to the aeronautical mobile (route) service and ensure coexistence of current HF systems alongside modernized HF systems, in accordance with Resolution* ***429 (WRC-19)****.*

**1. Background**

HF Radio communications are the long-range communication system supporting safe, efficient air travel over long range routes beyond the range of ground-based VHF radiocommunication systems. However, technology now provides for satellite communications which have also been recognized by regulatory authorities for use in long range communications.

Communications using both satellite and terrestrial means for long-range communication provides diversity and synergy that offers increased availability and reliability.

The current HF voice systems suffer from noise and propagation effects that require skilled and knowledgeable radio operators on the ground to provide reliable HF communications. Existing HF data links do not have the throughput required to sufficiently satisfy the communication needs.

In order to use digital HF aeronautical spectrum which would increase the data rates to reach required performance by modern aeronautical systems, RR Appendix **27** needs to allow the use of multiple contiguous and/or non-contiguous 3 kHz channels simultaneously.

The following methods are outlined in the CPM Report to satisfy WRC-23 Agenda item 1.9:

* **Method A**: No change to the Radio Regulations; and
* **Method B**: Inclusion into RR Appendix **27**, the relevant part of the Rules of Procedure, and explicit recognition of the aggregation of single channels for wideband digital communications.

All these methods propose suppression of Resolution **429 (WRC-19)**.

**2. View(s) and Proposal(s)**

Thailand supports Method B in order to include the relevant part of the Rules of Procedure into RR Appendix **27** and explicit recognition of the aggregation of single channels for wideband digital communications to accommodate the use of wideband HF technologies for the AM(R)S.



**Agenda Item 1.10:**

*to conduct studies on spectrum needs, coexistence with radiocommunication services and regulatory measures for possible new allocations for the aeronautical mobile service for the use of non-safety aeronautical mobile applications, in accordance with Resolution* ***430 (WRC 19)***.

**1. Background**

Resolution **430 (WRC-19)** resolves to invite ITU-R to conduct, and complete in time for WRC-23:

* studies on spectrum needs for new non-safety aeronautical mobile applications for air-to-air, ground-to-air and air-to-ground communications of aircraft systems;
* sharing and compatibility studies in the frequency band 22-22.21 GHz, already allocated on a primary basis to the mobile, except aeronautical mobile, service, in order to evaluate the possible revision or deletion of the “except aeronautical mobile” restriction while ensuring the protection of primary services in the considered frequency bands and, as appropriate, in adjacent frequency bands;
* sharing and compatibility studies on possible new primary allocations to the aeronautical mobile service (AMS) for non-safety aeronautical applications in the frequency band 15.4-15.7 GHz, while ensuring the protection of primary services in the considered frequency bands and, as appropriate, adjacent frequency bands; and
* definition of appropriate protection for passive services and radio astronomy allocated in adjacent bands from unwanted emission of AMS.

ITU-R Working Party 5B has generated the Working Document towards a Preliminary Draft New Report ITU-R M.[NON-SAFETY AMS CHARACTERISTICS AND SHARING STUDIES]. The working document provides various characteristics from ITU-R Recommendations of systems in the incumbent services, recommended propagation models as well as preliminary characteristics and operational concept of systems in the possible new AMS allocation for non-safety application. And various sharing and compatibility studies were incorporated into this working document.

The following methods are outlined in the CPM Report to satisfy WRC-23 Agenda item 1.10:

* **Method A**: No change to the Radio Regulations;
* **Method B**: Proposes to add a new allocation to the AM(OR)S in the frequency band 15.4-15.7 GHz with an associated footnote;
* **Method C**: Proposes to remove the exception of AM(OR)S of the MS allocation in the frequency band 22-22.21 GHz, and to add associated footnotes;
* **Method D**: Proposes to add a new allocation to the AM(OR)S in the frequency band 15.4-15.7 GHz and to remove the exception of AM(OR)S of the MS allocation in the frequency band 22-22.21 GHz, and to add associated footnotes; and
* **Method E**: Proposes to add a new allocation to the AM(OR)S in the frequency band 15.41-15.7 GHz and to remove the exception of AM(OR)S of the MS allocation in the frequency band 22-22.2 GHz, and to add associated footnotes.

All these methods propose suppression of Resolution **430 (WRC-19)**.

**2. View(s) and Proposal(s)**

Thailand supports Method A which proposes no change to the Radio Regulations due to study results showing its impracticality.

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**Agenda Item 1.11:**

*to consider possible regulatory actions to support the modernization of the Global Maritime Distress and Safety System and the implementation of e‑navigation, in accordance with Resolution* ***361 (Rev.WRC‑19)****.*

**1. Background**

Resolution **361 (Rev.WRC-19)** through the section *resolves to invite the 2023 World Radiocommunication Conference* identifies three topics which are studied and solved independently as follows:

**Issue A (*resolves 1*): GMDSS Modernization**

Considering the decisions of IMO and after an analysis of all the RR provisions impacted by these decisions, a unique method proposes as follows:

* The deletion of NBDP for distress and safety communications from GMDSS in RR Appendix **15** and **17** for MF and HF in all bands;
* The implementation of an ACS using DSC technology in frequencies which had previously been used by NBDP for GMDSS in MF and all HF bands in RR Article **5** and Appendix **17** by a footnote;
* The introduction of the NAVDAT frequencies in MF and HF in RR Appendix **15** and modification of the relevant provisions in RR Articles **5**, **32**, **33** and **52**;
* To implement AIS SART for which frequencies are protected by reference in RR Appendix **15**; and
* Regarding the frequency band 1 645.5-1 646.5 MHz:

*Some administrations are of the view that to modify RR No.****5.375*** *and Table 15-2 of RR Appendix****15*** *such that the frequency band 1 645.5-1 646.5 MHz is no longer limited to use exclusively by satellite EPIRBs. The band would be available for use for the GMDSS and, on a non-priority basis, for general maritime radiocommunications.*

*Some other administrations are of the view that minor modification to RR No.****5.375*** *is required and modify Table 15-2 of RR Appendix****15*** *by replacing the phrase “D&S‑OPS” in column 2 with the phrase “SAT-COM.” This action removes the no longer needed EPIRB limitation in the frequency band 1 645.5-1 646.5 MHz while leaving the band available for GMDSS SAT-COM communications.*

*Some further administrations are of the view that any modifications to the Radio Regulations at this stage are premature and hence no change is proposed. Those administrations encourage proper studies to be conducted in this regard to ensure most efficient use of this spectrum.*

**Issue B (*resolves 2*): E-navigation**

The e-navigation is developed by IMO which has concluded that various existing satellite networks already support the e-navigation concept, and usability studies have been conducted. The VHF data exchange system (VDES) and NAVDAT systems, for which IMO has agreed to develop performance standards, would also support e-navigation by means of enabling broadcasting (by NAVDAT) and exchange of digital files (by VDES).

From a spectrum regulatory point of view, the requirements for e-navigation are thus covered. Therefore, a unique method proposes no change to the Radio Regulations.

**Issue C (*resolves 3*): Introduction of additional satellite systems into the GMDSS**

An existing geostationary-satellite system operating at 1 610-1 626.5 MHz (Earth-to-space) and 2 483.5-2 500 MHz (space‑to-Earth) was considered by IMO in order to become a new GMDSS satellite provider. These frequency bands under study contained already primary allocation for the mobile-satellite service (MSS), for this reason no new allocation is necessary by WRC-23 in order to accommodate the GMDSS.

The following methods are outlined in the CPM Report to satisfy Issue C:

* **Method C1**: No change to the Radio Regulations except suppression of resolves 3, Resolution **361 (Rev.WRC‑19)**;
* **Method C2**: Identify spectrum for GMDSS if the candidate GSO MSS system/network has been completely coordinated in accordance with Articles **9** and **11** of the Radio Regulations and recorded in the MIFR in accordance with RR No. **11.37**. Coordination is an outstanding implementation issue that needs to be effected before the commencement of GMDSS services. There are two options associated with the method in relation to the applicability of RR No. **4.10** to GMDSS;
* **Method C3**: Support the requirement of safety of life aspects by the GMDSS and implement applicable provisions of the Radio Regulations, including applicability of RR No. **4.10** to the specific frequency bands used by the additional MSS system for GMDSS. This method proposes an associated new Resolution; and
* **Method C4**: Identify spectrum for GMDSS if the candidate GSO MSS system/network has been completely coordinated in accordance with Articles **9** and **11** of the Radio Regulations and recorded in the MIFR in accordance with RR No. **11.37**. Coordination is an outstanding implementation issue that needs to be effected before the commencement of GMDSS services. Apply RR No.**4.10** to the concrete frequency bands used by the new MSS system for GMDSS.

**2. View(s)**

**Issue A: GMDSS Modernization**

Thailand supports Method A as follows:

* The deletion of the NBDP for distress and safety communications from GMDSS;
* The implementation of an ACS for MF and HF bands;
* The introduction of MF and HF NAVDAT frequencies into Appendix **15** of RR; and
* The implementation of the AIS-SART as locating equipment as alternative to RADAR-SART.

In particular, Thailand supports Alternative A1 for the modification of RR No. **5.375** and RR Appendix **15** Table 15-2 and Alternative B1 for the modification of RR No. **19.11**.

**Issue B: E-navigation**

Thailand supports Method B and proposes no change to the Radio Regulations.

**Issue C: Introduction of additional satellite systems into the GMDSS**

Thailand is considering Method C2 Alternative approach A1 if the following elements are addressed:

* The frequency coordination and notification procedures in accordance with the relevant and applicable provisions of the Radio Regulations need to be completed; and
* The study on spectrum requirement for provision of the GMDSS should be completed.

**Resolution 427 (WRC-19):**

*to study the Articles, limited to Chapters IV, V, VI and VIII of Volume I, of the Radio Regulations and their associated Appendices, as appropriate, in order to identify outdated aeronautical provisions with respect to ICAO standards and recommended practices and to develop examples of regulatory texts for updating these provisions, while ensuring that potential changes to such provisions will not impact any other systems or services operating in accordance with the Radio Regulations.*

**1. Background**

Studies for WRC-19 agenda item 1.10; Global Aeronautical Distress and Safety System; it was identified that there were provisions within the Radio Regulations related to aeronautical services that no longer appeared to be relevant. WRC-19 therefore established Resolution **427 (WRC-19)** to call for studies to be carried out to identify outdated aeronautical provisions contained within Chapters IV, V, VI and VIII of the Radio Regulations with respect to ICAO standards. The Director of the Radiocommunication Bureau was asked to report progress to WRC-23.

**2. View(s)**

Thailand supports the APT preliminary view at APG23-5 noting that the study under ITU-R WP 5B is still on-going and appropriate revision to Resolution **427 (WRC-19)** may be required.

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