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| **The 5th Meeting of the APT Conference Preparatory****Group for WRC-23 (APG23-5)** | **APG23-5/INP-xx** |
| 20 – 25 February 2023, Busan, Republic of Korea | xx February 2022 |

Thailand (Kingdom of)

**preliminary views on WRC-23 agenda items 1.15, 1.16, 1.17 AND 7**

**Agenda Item 1.15:**

*to harmonize the use of the frequency band 12.75-13.25 GHz (Earth-to-space) by earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service globally, in accordance with Resolution* ***172 (WRC-​19)****.*

**1. Background**

World Radiocommunication Conference 2019 (WRC-19) adopted agenda item 1.15 that calls for studies on the possible operation of earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service in the frequency band 12.75-13.25 GHz (Earth-to-space), in accordance with Resolution **172 (WRC-19)**.

The ITU has addressed aeronautical and maritime earth stations operating with GSO FSS satellites in Study Group 4 and at several WRCs that adopted technical and regulatory regimes to allow such operations. In the Radio Regulations, Resolution **902 (WRC-03)** and Resolution **169 (WRC-19)** define technical and regulatory rules to allow GSO FSS networks to communicate with earth stations on aircraft or vessels to provide broadband communications.

In addition, Resolution **172 (WRC-19)** calls for studies to ensure that AP30B allotments and assignments as well as other allocated services are protected.

At the lastest Working Party 4A, in preparation of WRC-23 Agenda item 1.15, has consider sharing and compatibility studies and finalize drft CPM text. In addition, two methods have been proposed to satisfy this agenda item:

**Method A**

No changes to the Radio Regulations and suppression of Resolution **172 (WRC-19)**.

The no change method stems from the fact that, *inter alia*, the existence of various uncertainties in the implementation of several courses of action referred to in the potential Resolution associated with Method B. In particular, the manner in which interference will be managed and removed as called for in that Resolution.

**Method B**

Add a new footnote in RR Article **5** that refers to a new WRC Resolution with technical, operational and regulatory conditions for the operation of A-ESIM and M-ESIM communicating with GSO space stations in the fixed-satellite service in the frequency band 12.75-13.25 GHz (Earth-to-space) while ensuring protection of allocated services *inter alia* protection of terrestrial services with both a minimum distance from the low-water mark and maximum e.i.r.p. density towards the horizon for M-ESIM, and pfd mask[s] for A-ESIM and consequential suppression of Resolution **172 (WRC-19)**.

**2. Preliminary Views**

Thailand supports Method B in the current draft CPM text, in order to allow usage of frequency band 12.75-13.25 GHz (Earth-to-space) by earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service, in accordance with Resolution **172 (WRC-19)**.

Thailand also supports in principle to define responsibilities of the notifying administration related to the operation of earth stations on aircraft and vessels in the frequency band 12.75-13.25 GHz (Earth-to-space) as agreed in ITU-R WP-4A and reflected in the current draft CPM text.

Thailand is of the view that further ITU-R developments of, among other things, the regulatory provisions, appropriate technical conditions and a methodology to examine earth stations on aircraft with respect to the compliance with power flux-density (pfd) masks by the Bureau should ensure the protection of existing services, including their future developments, in the same frequency band and adjacent frequency bands.

**Agenda Item 1.16:**

*to study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7- 20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by non-geostationary fixed-satellite service earth stations in motion, while ensuring due protection of existing services in those frequency bands, in accordance with Resolution* ***173 (WRC-19)****.*

**1. Background**

Resolution **173 (WRC-19)** invites such consideration use of earth stations in motion (ESIM) communicating with non-geostationary satellites (non-GSO) in the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space), or parts thereof.

Under this agenda item, Resolution **173 (WRC-19)** invites the ITU-R to study:

* study the technical and operational characteristics and user requirements of the different types of ESIMs that plan to operate within non-GSO FSS systems in the frequency bands mentioned above;
* study on the sharing and compatibility between ESIMs operating with non-GSO FSS systems and current and planned stations of primary services allocated in the above frequency bands;
* development of the technical and regulatory provisions for the operation of aeronautical and maritime ESIMs with non-GSO FSS systems, taking into account the results of studies.

At the latest Working Party 4A, in preparation of WRC-23 Agenda item 1.16, has consider sharing and compatibility studies and finalize draft CPM text. In addition, two methods have been proposed to satisfy this agenda item:

**Method A**

No changes to the Radio Regulations and suppression of Resolution **173 (WRC-19)**.

**Method B**

Add a new footnote in RR Article **5** that refers to a new WRC Resolution with technical, operational and regulatory conditions for the operation of non-GSO maritime and aeronautical ESIMs while ensuring protection of allocated services and consequential suppression of Resolution **173 (WRC-19)**.

**2. Preliminary Views**

Thailand supports Method B in the current draft CPM text, in order to facilitate the use of the frequency bands 17.7-18.6 GHz and 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by non-GSO FSS earth stations in motion, in accordance with Resolution 173 (WRC-19).

Thailand also supports in principle to define responsibilities of the notifying administration related to the operation of NGSO ESIM in those frequency bands as agreed in ITU-R WP-4A and reflected in the current draft CPM text.

Thailand is of the view that further ITU-R developments of, among other things, the regulatory provisions, appropriate technical conditions and a methodology to examine power flux-density (pfd) limits of NGSO ESIM by the Bureau should ensure the protection of existing services, including their future developments, in those frequency bands and adjacent frequency bands.

**Agenda Item 1.17:**

*to determine and carry out, on the basis of the ITU R studies in accordance with Resolution* ***773 (WRC-19)****, the appropriate regulatory actions for the provision of inter-satellite links in specific frequency bands, or portions thereof, by adding an inter-satellite service allocation where appropriate.*

**1. Background**

Under this agenda item, Resolution **773 (WRC-19)** invites the ITU-R:

* to develop the technical and operational characteristics of different types of space stations that plan satellite-to-satellite transmissions in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz;
* to study the technical and operational characteristics, including spectrum requirements, off-axis equivalent isotropically radiated power (e.i.r.p.) values and out-of-band emission limits, for transmissions between space stations in the frequency bands
11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz;
* to study sharing and compatibility between satellite-to-satellite links intending to operate between space stations in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz and current and planned stations in the FSS and other existing services allocated in the same frequency bands and adjacent frequency bands, including passive services, with a view to ensuring protection of the primary services referred to above;
* to develop, for different types of space stations, the technical conditions and regulatory provisions for satellite-to-satellite operations in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz, or portions thereof, including new ISS allocations, as appropriate, taking into account the results of the studies above.

At the lastest Working Party 4A, in preparation of WRC-23 Agenda item 1.17, has consider sharing and compatibility studies and finalize draft CPM text. In addition, two methods have been proposed to satisfy this agenda item:

**Method A**

No changes to the Radio Regulations and suppression of Resolution **773 (WRC-19)**.

**Method B1**

This method proposes to allow satellite-to-satellite operation through a fixed-satellite service (space-to-space) allocation where such operations use the “within the cone” concept.

**Method B2**

This method proposes to allow satellite-to-satellite operation through an inter-satellite service allocation where such operations use the “within the cone” concept.

**Method B3**

This method proposes to allow satellite-to-satellite operation through a fixed-satellite service (space-to-space) where such operations use the “expanded-cone” concept.

**Method B4**

This method proposes to allow satellite-to-satellite operation through an inter-satellite service allocation where such operations use the “expanded-cone” concept.

**Method B5**

This method would be identical to any of the above Methods B1 to B4 with the exclusion of the frequency band 11.7-12.7 GHz. No regulatory text is included in section 4/1.17/5 due to similarity.

**2. Preliminary Views**

Thailand supports method B1 in the current draft CPM text, in order to allow the use of satellite-to-satellite operations in the 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz frequency bands or portions thereof, in accordance with Resolution 773 (WRC-19).

Thailand is of the view that further ITU-R developments of, among other things, the regulatory provisions and appropriate technical conditions should ensure the protection of existing primary services, including their future developments, in those frequency bands and adjacent frequency bands.

**Agenda Item 7:**

*to consider possible changes, in response to Resolution* ***86 (Rev. Marrakesh, 2002)*** *of the Plenipotentiary Conference, on advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution* ***86 (Rev.WRC-07)****, in order to facilitate the rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit;*

**1. Background**

* In the implementation of Resolution **86 (Rev. Marrakesh, 2002)**, WRC-23 is invited by Resolution **86 (Rev. WRC-07)** to consider, under the standing Agenda Item 7, any proposals which deal with deficiencies and improvements in the Regulatory/Procedural matters for frequency assignments pertaining to space service, ensuring these procedures, and the related Appendices of the Radio Regulations support latest technologies and regulatory practices, as far as possible.
* At the lastest Working Party 4A, the eleven agreed Topics under WRC-23 Agenda item 7 has been considered and finalize draft CPM text are as follows:

Topic A: Tolerances for certain orbital characteristics of non-GSO space stations

Topic B: Post milestone reporting

Topic C: Protection of GSO MSS from non-GSO emissions in 7/8 & 20/30 GHz

Topic D: D1 Modifications to Appendix 1 to Annex 4 of RR Appendix 30B

 D2 New Appendix 4 parameters for Recommendation S.1503 update

 D3 BR reminders for BIU/BBIU

Topic E: Improved procedures under RR Appendix 30B for new ITU Member States

Topic F: Excluding uplink service areas in Appendix 30A (Regions 1& 3) and Appendix 30B

Topic G: Amendments to Resolution **770 (WRC-19)**

Topic H: Implicit agreement in Appendices 30/30A/30B

Topic I: Special agreements under RR Appendix 30B

Topic J: Modifications to Resolution **76 (Rev.WRC-15)**

Topic K: Modifications to Resolution **553 (Rev. WRC-15)**

Thailand’s preliminary views on Topics A, D1, D2, D3, I, J and K are as follows:

**Topic A - Tolerances for certain orbital characteristics of non-GSO space stations in the FSS, BSS, and MSS**

**Background**

WRC-19 invited the ITU-R to study “as a matter of urgency, tolerances for certain orbital characteristics of non-GSO space stations of the fixed-satellite, mobile-satellite or broadcasting satellite services to account for potential differences between the notified and deployed orbital characteristics for the inclination of the orbital plane, the altitude of the apogee of the space station, the altitude of the perigee of the space station and the argument of the perigee of the orbital plane.”

At the latest Working Party 4A, in preparation of WRC-23 Agenda item 7 Topic A, has consider sharing and compatibility studies and finalize draft CPM text. In addition, four methods have been proposed to satisfy this Topic:

**Method A1**

No changes to the Radio Regulations.

**Method A2**

A draft new WRC-23 Resolution on the implementation of tolerances for certain orbital characteristics of satellites of non-GSO FSS/BSS or MSS systems to be referred to in RR Nos. 11.44C.1, 11.49.2 and 11.51

Two options are proposed under this method for the Resolution:

* Option A proposes to apply these tolerances, including temporary variation, for satellites of non-GSO FSS/BSS or MSS systems;
* Option B proposes to apply these tolerances, including temporary variation, for satellites of non-GSO FSS/BSS or MSS systems subject to Resolution **35 (WRC-19)**.

**Method A3**

Modify RR Appendix 4 data items related to the planned tolerances for each of the four orbital characteristics for non-GSO systems subject to RR No. 11.44C and refer to them in the relevant provisions of RR Article 11 and in Resolution 35 (WRC-19)

**Method A4**

New footnotes in RR Article 11 pointing to a draft new WRC-23 Resolution, applicable to the Resolution 35 (WRC-19) frequency bands, calling for periodic reporting on the altitude and inclination of deployed satellites and providing provisions for ensuring that deviations, excluding temporary deviations, do not increase interference or require additional protection

**Preliminary Views**

Thailand supports Method A2 contained in the current draft CPM text with a draft new WRC-23 Resolution on the implementation of tolerances for certain orbital characteristics of satellites of non-GSO FSS/BSS or MSS systems to be referred to in RR Nos. 11.44C.1, 11.49.2 and 11.51, where relevant

Thailand is of the views that:

* taking into account the existing NGSO systems subject to Resolution **35 (WRC-19)** that may operate beyond the allowable orbital tolerances, appropriate regulatory consequences need to be developed; and
* appropriate transitional measures after the decision of WRC-23 should also be developed.

**Topic D – Topics for which consensus was achieved in ITU-R**

### **Topic D1 - Modifications to Appendix 1 to Annex 4 of RR Appendix 30B**

**Background**

WRC-19 adopted modifications to § 1.1 and § 1.2 of Annex 4 of RR Appendix30B by replacing 10 and 9 degrees as the minimum orbital separation by 7 and 6 degrees, respectively. However, these modifications were not reflected in § 2 of Appendix 1 to Annex 4 of RR Appendix 30B where 10 and 9 degrees are still referred to for the calculation of the aggregate *C/I* ratio at any given downlink test point.

WRC-23 Agenda item 7, Topic D1, considers this discrepancy and a method as outlined in a single method and regulatory and procedural consideration has been developed, which is to modify § 2 of Appendix 1 to Annex 4 of RR Appendix 30B to align the values of orbital separation with those in § 1.1 and § 1.2 of the Annex adopted by WRC-19.

**Method D1**

The method is to modify Section 2 of Appendix 1 to Annex 4 of RR Appendix **30B** to reflect the values of the minimum orbital separation as adopted by WRC-19 in sections 1.1 and 1.2 of Annex 4 of RR Appendix **30B**.

**Preliminary View**

Thailand supports Method D1 contained in the current draft CPM text to modify Section 2 of Appendix 1 to Annex 4 of RR Appendix 30B to reflect the values of the minimal orbital separation as adopted by WRC-19 in Section 1.1 and Section 1.2 of Annex 4 of RR Appendix 30B.

**Topic D2 – New RR Appendix 4 parameters for Recommendation ITU-R S.1503 updates**

**Background**

WRC-23 agenda item 7 Topic D2 addresses modification of RR Appendix **4** data items to support implementation of agreed revisions to Recommendation ITU-R S.1503-3.

**Method D2**

Modification of RR Appendix **4** to support the implementation of agreed revisions to Recommendation ITU-R S.1503-3, including new data elements and modified data items.

**Preliminary View**

Thailand supports Method D2 contained in the current draft CPM text to modify RR Appendix **4** to support the implementation of agreed revisions to Recommendation ITU-R S.1503-3, including new data elements and modified data items.

**Topic D3 – BR Reminders for BIU and BBIU**

**Background**

WRC-23 agenda item 7 Topic D3 addresses the establishment of reminders for confirming the bringing into use (or bringing back into use) of a satellite network or system under RR Nos. **11.44B**, **11.44C**, **11.49** (**11.49.1** and **11.49.2**), RR Appendices **30/30A** §5.2.10 (20*bis* and 24*bis*) and RR Appendix **30B** §8.17 (14*ter*).

**Method D3**

Addition of footnotes to RR Nos. **11.44B**, **11.44C**, **11.49**, RR Appendices **30/30A** §5.2.10, and RR Appendix **30B** §8.17providing a formal reminder of the deadline for informing the Bureau of completion of BIU/BBIU in cases not subject to RR No. **11.47** or RR Appendices **30/30A** §5.2.7 or RR Appendix **30B** §8.16, as applicable, and for bringing into use or bringing back into use initiated within 120 days of the end of the regulatory deadline to be sent by the Bureau to the notifying administration.

**Preliminary View**

Thailand supports Method D3 contained in the current draft CPM text to add of footnotes to RR Nos. **11.44B**, **11.44C**, **11.49**, RR Appendices **30/30A** §5.2.10, and RR Appendix **30B** §8.17providing a formal reminder of the deadline for informing the Bureau of completion of BIU/BBIU in cases not subject to RR No. **11.47** or RR Appendices **30/30A** §5.2.7 or RR Appendix **30B** §8.16, as applicable, and for bringing into use or bringing back into use initiated within 120 days of the end of the regulatory deadline to be sent by the Bureau to the notifying administration.

**Topic I – Special agreements under RR Appendix 30B**

**Background**

When an administration intends to convert an allotment into an assignment or when an administration, or one acting on behalf of a group of named administrations, intends to introduce an additional system or modify the characteristics of assignments in the List that have been brought into use in RR Appendix **30B**, the administration shall submit to the Radiocommunication Bureau all required information as specified in RR Appendix **4**. Then, the Bureau determines administrations whose allotments in the Plan, or assignments in the List or pending assignments are considered as being affected by this assignment under § 6.5 of RR Appendix **30B**.

Affected administrations have 4 months after the publication of the Special Section of this assignment to comment it (§ 6.10) plus an additional period of 1 month subject to application of § 6.13. If, after this period, despite several reminders sent by the Bureau (i.e., § 6.9, § 6.11, § 6.14, § 6.14*bis*), the affected administration has not given a decision, this administration is considered as given its implicit agreement to this assignment under § 6.15.

At the time of the Part B submission of this assignment under § 6.17 or § 6.25, as appropriate, the final characteristics of this assignment could impact the overall aggregate carrier-to-interference levels of the allotment of the administration which didn’t give their decision in due time. These overall aggregate carrier-to-interference levels are used to determine the protection of this allotment or assignment for future submissions under § 6.1 and if an allotment can still be put into operation with decent services. Implicit agreements could lead to a situation that no decent services can be provided because of very low overall aggregate carrier-to-interference levels.

It is also important to note that the same consequence would occur if the affected administration signed an explicit agreement and the targeting area for the assignment submitted under § 6.1 is close to the territory of this administration which signed an explicit agreement.

Currently, there are two methods shown in the preliminary draft CPM text derived from WP 4A, WRC23-7 hybrid meeting (14 – 22 September 2022) as follows:

**Method I1**

No changes to the Radio Regulations.

**Method I2**

* define a new type of agreement between a notifying administrations of a national allotment and of an assignment, respectively. Under such agreement, the administration of the national allotment allows the assignment to operate until the bringing into use of its national allotment. At that time, the administration of the assignment commits to respect the section 2.2 of Annex 4 pfd levels over the territory of the national allotment. As the national allotment and the assignment will not operate simultaneously the same frequency over the same area, mutual interference is not considered.

- develop a new Resolution allowing the notifying administration of a national allotment, subject to agreements under § 6.15 of RR Appendix **30B**:

• to sign this new type of agreement with the notifying administration of the concerned assignments;

• to request the Bureau to update the reference situation without reviewing the previous examinations, and

• to request the notifying administrations of assignments for which the procedures of Article 6 of RR Appendix **30B** have not yet been completed and which have been examined by the Bureau before the signature of such agreement to make their utmost efforts to take into account the new reference situation of this national allotment.

**Preliminary View**

Thailand supports Method I2 contained in the current draft CPM text to define a new type of agreement between a notifying administrations of a national allotment and of an assignment, respectively, and develop a new Resolution allowing the notifying administration of a national allotment, subject to agreements under § 6.15 of RR Appendix **30B**.

**Topic J – Modifications to Resolution 76 (Rev.WRC-15)**

**Background**

Resolution **76 (Rev.WRC-15)** calls for the development of a Recommendation on procedures for reducing the aggregate epfd levels and calls for negotiations among administrations to jointly reduce such levels. While the aggregate epfd limits are specified in Tables 1A to 1D of the Resolution, there is no clear regulatory framework nor procedures outlined for the involved administrations to collaboratively determine whether these aggregate levels are exceeded.

At the latest Working Party 4A, in preparation of WRC-23 Agenda item 7 Topic J, has consider sharing and compatibility studies and finalize draft CPM text. In addition, five methods have been proposed to satisfy this Topic:

**Method J1**

No change to Resolution **76 (Rev.WRC-15).**

**Method J2**

Modify Resolution **76 (Rev.WRC-15)** to introduce the concept of “consultation process/meetings”

**Method J3**

Amend Resolution **76 (Rev.WRC-15)**, as appropriate, to make administrations able to comply with the aggregate epfd levels included in the same Resolution through a consultation process/meetings.

**Method J4**

Modify Resolution **76 (Rev.WRC-15)** to introduce the concept of “consultation process/meetings”

**Method J5**

Modify Resolution **76 (Rev.WRC-15)** to call for further study on a consultation process

**Preliminary View**

Thailand supports the possible modification of Resolution **76 (Rev.WRC-15)** in order to introduce the concept of consultation process/meetings to provide a means for administrations to evaluate aggregate epfd of NGSO FSS systems and assure the compliance with the aggregate epfd limits in connection with Tables 1A to 1D of the Resolution.

**Topic K – Modification to Resolution 553 (Rev.WRC-15) to remove certain restrictions that prevent administrations from taking effective advantage of the Resolution**

**Background**

Resolution **553 (Rev.WRC-15)** titled *Additional regulatory measures for broadcasting-satellite networks in the frequency band 21.4-22 GHz in Regions 1 and 3* has been adopted to enhance equitable access to this frequency band.

Resolution **553 (Rev.WRC-15)** was adopted to provide a better situation regarding equitable access compared with the planning approach. As stated in *considering further a)* to this Resolution a priori planning for BSS networks in this frequency band was avoided as it “freezes access according to technological assumptions at the time of planning and then prevents flexible use taking account of real world demand and technical developments”.

Some of the current provisions could contradict the above objective of the Resolution and could permanently deprive administrations of being effectively benefited from the Resolution without even once having a notified network in this frequency band.

At the latest Working Party 4A, in preparation of WRC-23 Agenda item 7 Topic K, has consider sharing and compatibility studies and finalize draft CPM text. In addition, two methods have been proposed to satisfy this Topic:

**Method K1**

No changes to Resolution **553 (Rev.WRC-15)**.

**Method K2**

Modify paragraphs 1 and 2 of the Attachment to Resolution **553 (Rev.WRC-15)** to remove the intended restrictions in the Resolution.

**Preliminary View**

Thailand supports Method K2 contained in the current draft CPM text to modify paragraphs 1 and 2 of the Attachment to Resolution **553 (Rev.WRC-15)** to remove the intended restrictions in this resolution.