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| **The 4th Meeting of the APT Conference Preparatory**  **Group for WRC-23 (APG23-4)** | **APG23-4/OUT-29**  **(Rev.1)** |
| 15 – 20 August 2022, Bangkok, Thailand | 20 August 2022 |

Working Party 4

**PRELIMINARY VIEWs on WRC-23 agenda item 1.16**

**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 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, while ensuring due protection of existing services in those frequency bands, in accordance with Resolution* ***173(WRC‑19)***

**1. Background**

In *resolves* 1.16of Resolution **811 (WRC-19)**, the 2019 World Radiocommunication Conference (WRC-19) resolved “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)**” as part of the agenda for WRC-23.

The last two WRCs have adopted regulatory frameworks for the operations of GSO ESIM in Ka-band. WRC-15 adopted Resolution **156 (WRC-15),** allowing the use of ESIM communicating with GSO FSS networks in the 19.7-20.2 GHz and 29.5-30.0 GHz bands and WRC-19 adopted Resolution **169 (WRC-19),** allowing the use of ESIM communicating with GSO FSS networks in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz. It is necessary to conduct relevant studies on the sharing situations between non-GSO ESIM and the incumbent services in the Ka band. The parameters of non-GSO ESIM and GSO ESIM have some similarities but also differences, which need to be paid attention to and considered in the follow-up studies under WRC‑23 agenda item 1.16.

WP 4A is the responsible group, according to the CPM23-1 results (CA/215), to address the ITU-R preparatory work for WRC-23 and established Correspondence Group (CG) and Sub-Working Group (SWG), both chaired by Mr. Mario Neri, who was the chairman of AI 1.5(WRC-19). The WP 4A meeting in May 2022 developed the following documents.

1. Preliminary draft CPM text and draft new resolution for WRC-23 agenda item 1.16 (4A/691 Annex 29)
2. Working document on WRC-23 agenda item 1.16 [NON-GSO\_ESIM] (4A/691 Annex 19)
3. Work plan for WRC-23 agenda item 1.16 (4A/691 Annex 39)

The current preliminary draft CPM text includes methods below 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).

The preliminary draft CPM text was partially discussed and is yet to be agreed upon. It needs to be finalized in the next WP 4A meeting in September.

**2. Documents**

* Input Documents:

[APG23-4/INP-10 (Japan)](https://apt.int/sites/default/files/2022/08/APG23-4-INP-10_J-4_WP4_Preliminary_Views_on_WRC-23_Agenda_Items_1.15_1.16_1.17_1.18_1.19_and_7.docx)

[APG23-4/INP-17 (Australia)](https://apt.int/sites/default/files/2022/08/APG23-4-INP-17_AUS_WP4_Preliminary_Views_on_WRC-23_Agenda_Items_1.15_1.16_1.17_1.18_1.19_and_7.docx)

[APG23-4/INP-22 (Bangladesh (People's Republic of))](https://d.docs.live.net/3553e0fb3f32fec6/ITU-R/APG23-4/PREP/Aug%2019/APG23-4/INP-22)

[APG23-4/INP-26 (Iran (Islamic Republic of))](https://apt.int/sites/default/files/2022/08/APG23-4-INP-26_IRN_WP4_Preliminary_Views_on_WRC-23_Agenda_Items_1.15_1.16_1.17_1.18_and_1.19.docx)

[APG23-4/INP-37 (Korea (Republic of))](https://apt.int/sites/default/files/2022/08/APG23-4-INP-37_KOR_WP4_Preliminary_Views_on_WRC-23_Agenda_Items_1.15_1.16_1.17_1.18_and_7.docx)

[APG23-4/INP-43 (China (People's Republic of))](https://apt.int/sites/default/files/2022/08/APG23-4-INP-43_China_WP4_Preliminary_Views_on_WRC-23_Agenda_Items_1.15_1.16_1.17_1.18_1.19_and_7.docx)

[APG23-4/INP-53 (New Zealand)](https://apt.int/sites/default/files/2022/08/APG23-4-INP-53_NZL_WP4_Preliminary_Views_on_WRC-23_Agenda_Items_1.16_and_1.18.docx)

[APG23-4/INP-57 (Singapore (Republic of))](https://apt.int/sites/default/files/2022/08/APG23-4-INP-57_SNG_WP4_Preliminary_Views_on_WRC-23_Agenda_Items_1.15_1.16_1.17_and_7.docx)

[APG23-4/INP-64 (India (Republic of))](https://apt.int/sites/default/files/2022/08/APG23-4-INP-64_India_WP4_Preliminary_Views_on_WRC-23_Agenda_Items_1.16_1.17_1.18_and_1.19.docx)

[APG23-4/INP-69 (Malaysia)](https://apt.int/sites/default/files/2022/08/APG23-4-INP-69_MLA_WP4_Preliminary_Views_on_WRC-23_Agenda_Items_1.16_and_7D.docx)

[APG23-4/INP-77 (Viet Nam (Socialist Republic of))](https://apt.int/sites/default/files/2022/08/APG23-4-INP-77_VTN_WP4_Preliminary_Views_on_WRC-23_Agenda_Items_1.15_1.16_1.18_and_1.19.docx)

[APG23-4/INP-82 (Indonesia (Republic of))](https://apt.int/sites/default/files/2022/08/APG23-4-INP-82_Indonesia_WP4_Preliminary_Views_on_WRC-23_Agenda_Items_1.15_1.16_1.17_and_7.docx)

* Information Documents:

[APG23-4/INF-02 (ATU)](https://apt.int/sites/default/files/2022/07/APG23-4-INF-02_ATU_preparation.docx)

[APG23-4/INF-03 (WMO)](https://apt.int/sites/default/files/2022/07/APG23-4-INF-03_WMO_Positions.docx)

[APG23-4/INF-21 (ASMG)](https://apt.int/sites/default/files/2022/08/APG23-4-INF-21_ASMG_Preparation_for_WRC-23.pdf)

[APG23-4/INF-28 (CITEL)](https://apt.int/sites/default/files/2022/08/APG23-4-INF-28Rev.1_CITEL_Preparation_for_WRC-23.pdf)

[APG23-4/INF-36 (Chair, DG AI1.16)](https://apt.int/sites/default/files/2022/08/APG23-4-INF-36_Brief_on_AI1.16.docx)

[APG23-4/INF-44 (RCC)](https://apt.int/sites/default/files/2022/08/APG23-4-INF-44_Status_of_RCC_preparation_to_the_World_Radio_Conference_and_Radio_Assembly_2023.pdf)

[APG23-4/INF-48 (CEPT)](https://apt.int/sites/default/files/2022/08/APG23-4-INF-48_Status_of_CEPT_preparation_for_WRC-23_and_RA-23.pdf)

**3. Summary of discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 Japan** - **Document APG23-4/INP-10**

* Japan supports ITU-R study activities regarding the Agenda Item 1.16 to ensure protection of the existing FS, MS and the other FSS and not to impose constraints for future use on these services.

**3.1.2 Australia** - **Document APG23-4/INP-17**

* Australia supports the establishment of a harmonised regulatory framework and technical and operational measures that facilitate the use of non-geostationary (non-GSO) earth-stations in motion (ESIM) in the fixed-satellite service in the 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) frequency bands.
* The regulatory framework must ensure protection of services allocated in the bands and, as appropriate, in the adjacent bands, and shall not cause unacceptable interference to territories of those administrations mentioned in No. 5.542 operating in the 29.5 - 30.0 GHz band as an additional secondary allocation.
* Sharing studies should be finalised and results of the studies transferred to the Draft New Resolution. Under this agenda item, this administration supports the use of PFD limits for the purpose of providing protection to terrestrial services. Further, studies to ensure non-GSO FSS ESIM deployment in the bands 17.7 - 18.6 GHz and 18.8 - 19.3 GHz (space-to-Earth) will not result in increased adjacent band interference to EESS (passive) operations in the 18.6 - 18.8GHz band should be finalised.
* The non-GSO ESIM must comply with all provisions applicable to the typical earth station, including: epfd limit, pfd limit, GSO arc exclusion zone etc such that ESIM will not cause more interference and will not need more protection than a typical earth station.
* Australia supports the development of a methodology regarding examination by the Bureau of compliance with PFD limits by non‐GSO aeronautical ESIM, or of adequate transitional measures in case WRC‐23 could not finalise the methodology. Australia is of the view that the progress on this WRC‐23 agenda item not be conditional upon the development of the methodology under Resolution 169 (WRC‐19).

**3.1.3 Bangladesh (People's Republic of)** - **Document APG23-4/INP-22**

* Bangladesh supports to conduct sharing and compatibility studies for the establishment of a harmonized regulatory framework and technical and operational measures that facilitate the use of non-geostationary (non-GSO) earth-stations in motion (ESIM) in the fixed-satellite service in the 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) frequency bands. However, sharing and compatibility studies need to consider the protection of existing services while not imposing additional constraints.

**3.1.4 Iran (Islamic Republic of)** - **Document APG23-4/INP-26**

* The preliminary view of the Islamic Republic of Iran is as follows:
  + In order to make it possible to use the aeronautical and maritime earth stations communicating with non-GSO FSS 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), it is required to continue studies to develop technical/ regulatory solution(s) for all concerns that are currently raised. Completion of studies and decisions shall be made to ensure the protection of the existing services.
  + ESIMs operating with non-GSO FSS system shall not cause unacceptable interference to the terrestrial services in those frequency bands and in adjacent frequency bands and not adversely affect these terrestrial services, and ESIMs shall not claim protection from existing radiocommunication services (including terrestrial services) in those frequency bands and adjacent bands.

With respect to other space services, it shall operate within the envelope of technical characteristic and envelope of coordination agreement.

* The only administration that could notify ESIM is the same administration as the one notifying the GSO network to which the ESIM communicate. Thus, notification of any frequency assignment for ESIMs shall only be made by one single administration, which will be responsible for ESIM operation.
* Interference management mechanism and operation mechanism of ESIMs shall be clearly defined by completing relevant studies for inclusion in the draft new Resolution.
* The use of PFD mask in order to protect terrestrial services, that shall be prepared based on studies including different operating conditions (comprising the range of aircraft altitude change), can be considered as guidance regarding possible interferences resulting from operation of ESIM; and PFD limit criteria cannot be assumed sufficient to protect the terrestrial services.
* Generally, there are still several issues on the operation of ESIMs operating with non-GSO space stations to be clarified and specified in the Draft New Resolution. The next meeting of WP 4A would be extremely busy to address all the pending issues.

**3.1.5 Korea (Republic of)** - **Document APG23-4/INP-37**

* The Republic of Korea has preliminary views as follows:
* the ESIMs operating with non-GSO FSS system shall not cause unacceptable interference to the terrestrial services in those frequency bands and in adjacent frequency bands and not adversely affect these terrestrial services,
* appropriate examination method for aeronautical non-GSO ESIMs with respect to the conformity with the PFD limits should be developed in the ITU-R taking into account ensuring the protection of the terrestrial services and be included in the new Resolution on WRC-23 agenda item 1.16,
* With respect to the sharing/compatibility studies and PFD examination method for aeronautical non-GSO ESIM studies, the protection of terrestrial services shall be ensured at any case in various sharing scenarios without exceptional case.
* that frequency assignments to ESIMs shall be notified by the notifying administration of the satellite system with which ESIM communicate and the notifying administration shall be responsible to comply with all relevant regulatory and administrative provisions.

**3.1.6 China (People's Republic of) - Document APG23-4/INP-43**

* This administration supports the development of a regulatory framework for the operation of ESIM communicating with non-GSO satellite systems in the FSS 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) while ensuring the protection of the incumbent services in accordance with Resolution 173 (WRC-19).

This administration is also of the view that:

* to protect GSO networks in the fixed satellite service operation in the frequency bands 17.8-18.6 GHz,19.7-20.2 GHz，27.5-28.6 GHz and 29.5-30 GHz, non-GSO ESIM shall comply with EPFD limits referred to in Nos. 22.5C,22.5D and 22.5F. The methodology included in Recommendation ITU-R S.1503 for determination of compliance with EPFD limits in Article 22 is applicable.
* to protect GSO networks in those bands where epfd limits do not apply and non-GSO systems in the FSS:
* Non-GSO ESIM characteristics shall remain within the envelope characteristics of typical earth stations associated the non-GSO satellite system with which the ESIM communicates;
* Non-GSO ESIM characteristics shall not cause more interference and shall not claim more protection than typical earth stations in this non-GSO system;
* the operation of non-GSO ESIM shall comply with the coordination agreements obtained following the application of provisions under No 9.11A.
* to protect terrestrial services:
* Sharing and compatibility studies should be conducted in accordance with Resolution 173 (WRC-19)；
* Similar technical, operational, and regulatory provisions as those applied to GSO ESIM to protect terrestrial services could be also applicable for non-GSO ESIM;
* Technical and operational measures with appropriate examination methodology by the Bureau for non-GSO ESIM should be established. In the absence of such methodology, necessary transitional measures should be developed and agreed by WRC-23.
* the protection of EESS (passive) sensors in the frequency band 18.6-18.8 GHz should be ensured.

**3.1.7 New Zealand - Document APG23-4/INP-53**

* New Zealand supports ITU-R studies with a view to enable and establish a harmonised framework to support non-GSO Earth stations in motion (ESIMs) in the 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) frequency bands. This framework may be similar to that for GSO ESIMs, as appropriate. Sharing and compatibility studies need to consider the protection of existing services while not imposing additional constraints. New Zealand considers that it is not normal ITU-R practice to consider protection of secondary service allocations from primary service allocations (either existing or under study for potential allocation).

**3.1.8 Singapore (Republic of) - Document APG23-4/INP-57**

* Singapore has the following preliminary views:
* The on-going sharing and compatibility studies between earth stations in motion (ESIM) communicating with non-GSO FSS 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) and the existing services including passive services allocated in those frequency bands and the adjacent bands should be conducted to ensure the protection of existing services.
* The operation of secondary services as allocated by previous WRCs and currently contained in the Radio Regulations shall/should not be adversely affected by the potential operation of ESIM being studied under this agenda item.
* The regulatory provision, and technical and operational measures with appropriate examination methodology by the Bureau for non-GSO ESIM should be established to ensure the protection of services to which the frequency bands are allocated and operated in accordance with the Radio Regulations. In the absence of such methodology necessary transitional measures should be developed and agreed by WRC-23.
* For the protection of other space services, non-GSO ESIM characteristics shall remain within the envelope characteristics of typical earth stations associated with the non-GSO satellite system within which these ESIM communicate.
* For the protection of GSO FSS networks operating in the 17.8-18.6 GHz, 19.7-20.2 GHz, 27.5-28.6 GHz, and 29.5-30.0 GHz the relevant EPFD limits in Nos. 22.5C, 22.5D and 22.5F shall apply. The methodology included in Recommendation ITU-R S.1503 for determination of compliance with EPFD limits in Article 22 is applicable to ESIM communication with non-GSO FSS systems.
* The ESIM operating with non-GSO FSS system shall not cause unacceptable interference to the terrestrial services in those frequency bands and in adjacent frequency bands and not adversely affect these terrestrial services. For the protection of terrestrial services operating in the 27.5-29.1 GHz from non-GSO ESIM, technical conditions similar to Resolution169 (WRC-19) could be developed based on sharing studies (PFD limits for A-ESIM; min distance from the coast and max EIRP spectral density towards the horizon for M-ESIM). The same technical conditions could be applied, as appropriate, for guidance to administrations to protect terrestrial services operating in accordance with the Radio Regulations in the frequency band 29.5-30 GHz (See No. 5.542).
* The non-GSO ESIM operating in the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (see No. 5.524) shall not claim protection from terrestrial services.
* The notifying administration of the non-GSO satellite networks with which the non-GSO ESIM communicates is responsible for the operation of ESIM including resolving cases of potential interference.

**3.1.9 India (Republic of)- Document APG23-4/INP-64**

* India supports the ITU-R studies for developing appropriate technical, operational, and regulatory measures 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, while ensuring due protection to the existing services and their applications in these frequency bands and adjacent bands.
* Earth Stations in Motion should be permitted to operate only with the specified technical, operational, and regulatory conditions to ensure that their deployment do not cause interference or put constraints on the existing stations operating in accordance with the provisions of the Radio Regulations.

**3.1.10 Malaysia - Document APG23-4/INP-69**

* Malaysia supports the development of regulatory framework and operational conditions to facilitate the use of non-GSO FSS earth stations in motion 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), while ensuring protection of, and not adversely affect the existing services.

**3.1.11 Viet Nam (Socialist Republic of) - Document APG23-4/INP-77**

* Viet Nam supports on-going ITU-R studies to 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-GSO FSS ESIM, while ensuring the protection of existing services in those frequency bands and the adjacent bands in accordance with Resolution 173 (WRC-19).
* Viet Nam supports the development of an appropriate examination methodology by the Bureau for non-GSO ESIM to ensure the protection of services to which the frequency bands are allocated and operated in accordance with the Radio Regulations.

**3.1.12 Indonesia (Republic of) - Document APG23-4/INP-82**

* Indonesia is of the view that the protection of current and planned stations of primary services allocated in the frequency band 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, and in adjacent frequency bands, including passive services, should be fully ensured during sharing and compatibility studies of non-GSO FSS ESIMs which are planned for operation in those frequency bands.

**3.2 Summary of issues raised during the meeting**

* APT Members recognized 29.5-30 GHz was allocated to terrestrial services on a secondary basis in accordance with **No.** **5.542**, while a view was expressed that it is not normal ITU-R practice to consider the protection of secondary service allocations from primary service allocation, another view was also expressed that the use of the frequency by non-GSO ESIM is not regarded as primary allocation.
* It is noted that the operation of non-GSO ESIM needs facilities with high-quality performance to enable the non-GSO ESIM to stop transmission over territories of those countries where non-GSO ESIM has not been authorized to receive the service. The operation of those facilities and the performance need to be clarified and addressed in the Draft New Resolution for this agenda.
* It is noted that the results of ITU-R studies should be agreed by WRC-23.
* It is emphasized that the coordination of non-GSO system is governed by No. 9.11A, which has no criteria to identify the affected stations except frequency overlap, which is not sufficient. Moreover, in case of no reply within four months period, the agreement is considered to be given, that needs to be confirmed by the Conference.

**4. APT Preliminary View(s)**

* APT Members are of the view that in order to make it possible to use the aeronautical and maritime ESIM communicating with non-GSO FSS 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), it is required to continue studies to develop technical and regulatory solution(s) for all concerns that are currently raised. Completion of studies and decisions shall be made to ensure the protection of the existing services in accordance with Resolution 173 (WRC-19).
* APT Members are also of the view that sharing studies should be finalized and results of the studies transferred to the Draft New Resolution.
* APT Members are also of the view that regulatory provision, and technical and operational measures with appropriate examination methodology by the Bureau for non-GSO ESIM should be established to ensure the protection of services to which the frequency bands are allocated and operated in accordance with the Radio Regulations. In the absence of such methodology necessary transitional measures should be developed and agreed by WRC-23.
* APT Members are also of the view that the only administration that could notify ESIM is the same administration as the one notifying the non-GSO system to which the ESIM communicate. Thus, notification of any frequency assignment for ESIMs shall only be made by one single administration, which will be responsible for ESIM operation.
* APT Members are also of the view that interference management mechanism and operation mechanism of ESIMs shall be clearly defined by completing relevant studies for inclusion in the Draft New Resolution.
* APT Members are also of the view that studies to ensure non-GSO FSS ESIM deployment in the bands 17.7 - 18.6 GHz and 18.8 - 19.3 GHz (space-to-Earth) will not result in increased adjacent band interference to EESS (passive) operations in the 18.6 - 18.8GHz band should be finalized.
* APT Members are also of the view that with respect to the sharing/compatibility studies and PFD examination method for aeronautical non-GSO ESIM studies, the protection of terrestrial services shall be ensured in accordance with Resolution 173 (WRC-19).
* APT Members are of the view that the non-GSO ESIM operating in the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz, and 19.7-20.2 GHz (see No.5.524) shall not claim protection from terrestrial services as contained in the Radio Regulations.
* APT Members are also of the view that for the protection of other space services, non-GSO ESIM characteristics shall remain within the envelope characteristics of typical earth stations associated with the non-GSO satellite system within which these ESIM communicate.
* APT Members are also of the view that for the protection of GSO FSS networks operating in the 17.8-18.6 GHz, 19.7-20.2 GHz, 27.5-28.6 GHz, and 29.5-30.0 GHz the relevant EPFD limits in Nos. 22.5C, 22.5D and 22.5F shall apply.
* APT Members are also of the view that there are still several issues on the operation of ESIMs operating with non-GSO space stations to be clarified and specified in the Draft New Resolution by ITU-R WP 4A.

**5. Other View(s) from APT Members**

* Notwithstanding No. 5.28 to No. 5.31 of RR, some APT Members are of the view that no additional constraints are imposed by the operation of any non-GSO ESIM in the frequency bands in this Resolution on the secondary service operating in this band in accordance with the Radio Regulations.
* Some APT Members are of the view that the use of PFD mask in order to protect terrestrial services, which shall be prepared based on studies including different operating conditions (comprising the range of aircraft altitude change), can be considered as guidance regarding possible interferences resulting from the operation of ESIM; and PFD limit criteria cannot be assumed sufficient to protect the terrestrial services.
* Some APT Members are of the view that to protect terrestrial services similar technical, operational, and regulatory provisions as those applied to GSO ESIM to protect terrestrial services could also be applicable for non-GSO ESIM;
* Some APT Members are of the view that for the protection of terrestrial services operating in the 27.5-29.1 GHz from non-GSO ESIM, technical conditions similar to Resolution 169 (WRC-19) could be developed based on sharing studies (PFD limits for A-ESIM; min distance from the coast and max EIRP spectral density towards the horizon for M-ESIM).
* Some APT Members are of the view that similar technical conditions could be applied, as appropriate, for guidance to administrations to protect terrestrial services operating in accordance with the Radio Regulations in the frequency band 29.5-30 GHz (See No. 5.542).
* Some APT Members are of the view that the methodology included in the latest version of Recommendation ITU-R S.1503 for the determination of compliance with EPFD limits in Article 22 could be applicable to ESIM communications with non-GSO FSS systems.
* Some APT Members are of the view that to protect GSO networks in those bands where epfd limits do not apply and non-GSO systems in the FSS:
  + Non-GSO ESIM shall not cause more interference and shall not claim more protection than typical earth stations in this non-GSO system;
  + The operation of non-GSO ESIM shall comply with the coordination agreement obtained following the application of provisions under No 9.11A.

**6. Issues for Consideration at Next APG Meeting**

* APT Members are encouraged to review the text in section 5 with a view to possibly move to section 4.
* APT Members are encouraged to consider the protection of secondary allocation (see RR 5.542) in the band 29.5 - 30 GHz from the operation of non-GSO ESIM based on the result of ITU-R WP 4A meeting in September 2022, and to prepare for the discussion at next APG meeting.
* APT Members are encouraged to follow the relevant WP 4A meetings and submit contributions, if necessary, for consideration at the next APG meeting.

**7. Views from Other Organisations** (as provided in the information documents to

APG23-4)

**7.1 Regional Groups**

**7.1.1 ATU** - **Document APG23-4/INF-02**

*No* information *on AI1.16*

* + 1. **ASMG** - **Document APG23-4/INF-21**
* Follow-up studies, provided that mobile earth stations communicating with Non-GSO satellite networks in the fixed satellite service would not claim protection from other services and their future developments in those and adjacent frequency bands, including the terrestrial services as stated in footnote (5.542) in the frequency band 29.5-30 GHz. With an emphasis on establishing strict procedures to ensure protection of other services in bands under consideration and the adjacent bands.
* To ensure the protection of all satellite services, the characteristics of mobile earth stations communicating with non geostationary systems must remain within the envelope of the characteristics of typical earth stations communicating with non-geostationary satellites to protect.
* The EPFD values as stipulated in Article 22 of the Radio Regulations should be applied for the protection of GSO networks in the FSS operating in the frequency bands 17.8-18.6 GHz, 19.7-20.2 GHz, 27.5-28.6 GHz and 29.5-30.0 GHz.
* Define the role of the Network Control and Monitoring Center (NCMC), while emphasizing that the notifying administration of the satellite network holds the responsibility for operating the mobile earth stations on board aircraft and vessel to resolve any interference incident. In that regard, the administrations issue operating licenses for these stations to provide services in their territories should not be responsible for resolving interference incidents.
* Invite the Arab administrations to provide their views on Recommendation ITU-R Recommendation S.1503 to verify that the Non-GSO networks under this agenda item comply with the EPFD values as stipulated in Article 22 of the Radio Regulations to ensure protection of the GSO networks in frequency bands 17.8-18.6 GHz, 19.7-20.2 GHz, 27.5-28.6 GHz, 29.5-30 GHz.
* The Radiocommunication Bureau should develop an appropriate methodology to examine the compliance of mobile earth stations communicating with Non-GSO systems to ensure the protection and operation of services to which frequency bands have been allocated in accordance with the Radio Regulations. In the absence of such a methodology, the necessary transitional measures should be developed and approved at WRC-23, in addition to simple and clear procedures for administrations to implement the new resolution.
  + 1. **CITEL** - **Document APG23-4/INF-28**

**Draft American Proposal**

* Add a new footnote in RR Article 5 providing the conditions for the operation of NGSO ESIM.
* 5.A116 The operation of earth stations in motion communicating with non-geostationary FSS space stations in the 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) shall be subject to draft new Resolution [A116] (WRC-23).
* The objective of this footnote is to make draft new Resolution [A116] (WRC-23) mandatory.

**Preliminary Views**

* Some administrations support studies on the technical and operational characteristics of ESIMs and sharing and compatibility studies to develop technical and regulatory provisions for the operation of ESIM with non-GSO FSS systems in accordance with Resolution 173 (WRC-19) with a view to ensuring the protection of and not impose additional constraints on existing services, including terrestrial services and GSO FSS, in those frequency bands and in adjacent bands, including passive services.
* One administration is of the view that the studies conducted in preparation of WRC-15 and WRC-19 to support the deployment of GSO ESIM in the Ka-band have many similarities with those being carried out under Resolution 173 (WRC-19). This administration is of the view that there is no potential for interference in bands in the bands where non-GSO ESIM would only receive. In the bands 27.5-29.1 GHz and 29.5- 30.0 GHz, this administration is of the view that WRC-23 should aim to establish the same technical, operational and regulatory provisions as those applicable to GSO ESIM, such as remaining within the technical and coordination envelope, complying with relevant epfd, pfd, distance and EIRP spectral density limits as appropriate, to the extent possible and pending the results of the studies.

**7.1.4 RCC** - **Document APG23-4/INF-44**

Support development of regulatory provisions and technical requirements for aeronautical and maritime ESIMs in non-GSO FSS in the bands 18/19/20 GHz (s-to-E) and 29/30 GHz (E-to-s). Non-GSO ESIMs could be used only if the following conditions are met:

* Non-GSO ESIMs in the bands 18/19 GHz (s-to-E) shall not claim protection from terrestrial services.
* Maintain relevant RR provisions for the protection of GSO networks from nonGSO FSS systems;
* Non-GSO FSS ESIMs are within the characteristics for typical ES of non-GSO FSS networks published in Part II-S of the BR IFIC, as well as comply with agreements between administrations,
* Non-GSO FSS ESIMs shall not be used for applications related to safety of life,
* ESIM shall comply with the e.p.f.d. limits specified in RR Nos. 22.5C, 22.5D and 22.5F,
* In the band 17.7-17.8 GHz RR No. 22.2 applies,
* Unauthorized use of ESIMs shall be excluded by the provisions of RR.

**7.1.5 CEPT - Document APG23-4/INF-48**

CEPT supports the development of a regulatory framework for the operation of aeronautical and maritime ESIMs communicating with non‐GSO satellite systems in the FSS 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).

CEPT also supports the operations of Land ESIMs in the frequency bands above and recognizes that they are subject to national regulations. Such operations shall not cause unacceptable interference to terrestrial services in neighbouring countries.

CEPT supports that the technical and operational requirements for the use of non‐GSO ESIM shall ensure the protection of GSO networks and other services operating in the same frequency bands and in adjacent bands:

* CEPT is of the view that the protection of GSO networks in the fixed‐satellite service operating in the frequency bands 17.8‐18.6 GHz, 19.7‐20.2 GHz, 27.5‐28.6 GHz and 29.5‐30 GHz from non‐GSO ESIM can be achieved by requiring that links involving non‐GSO ESIM comply with epfd limits referred to in Nos. 22.5C, 22.5D and 22.5F and that the methodology included in Recommendation ITU‐R S.1503 for determination of compliance with epfd limits in Article 22 is applicable to ESIM communicating with non‐GSO FSS systems.
* CEPT is of the view that to protect GSO networks – in those bands where epfd limits do not apply ‐ and non‐GSO systems in the FSS:
  + non‐GSO ESIM characteristics shall remain within the envelope characteristics of typical earth stations associated with the non‐GSO satellite system with which the ESIM communicates;
  + non‐GSO ESIM shall not cause more interference and shall not claim more protection than typical earth stations in this non‐GSO system;
  + the operation of non‐GSO ESIM shall comply with the coordination agreements obtained following the application of provisions under No 9.11A.

CEPT supports that the technical and operational requirements for the use of non‐GSO ESIM shall ensure the protection of fixed and mobile services with allocations in the frequency bands considered in this agenda item:

* CEPT is of the view that non‐GSO ESIM operating in the frequency bands 17.7‐18.6 GHz and 18.8-19.3 GHz (space‐to-Earth) shall not claim protection from stations in the fixed and mobile services operating in the same frequency bands in accordance with the Radio Regulations.
* CEPT supports the use of PFD (power flux density) limits on the Earth’s surface for aeronautical ESIMs to ensure the protection of fixed and mobile services. CEPT supports also the use of the methodology under development to examine compliance with the pfd limits by non‐GSO aeronautical ESIM or transitional measures in case WRC‐23 could not agree on the methodology.
* CEPT supports the applicability of the limits contained in Annex 3 to Resolution 169 (WRC‐19) to aeronautical and maritime ESIMs communicating with non‐GSO systems operating in the frequency band 27.5‐29.1 GHz; such ESIMs shall not cause unacceptable interference to fixed and mobile services operating in the same frequency band.
* CEPT is of the view that the notifying administration of the non‐GSO system with which the ESIMs communicate should be identifiable to address the potential cases of harmful interference caused by any ESIM to fixed and mobile services. This identification could be done thanks to i) the license issued by / authorization of the administration for the operation of the ESIM on its territory; ii) the assistance of the flag nation of aircraft/vessel; iii) the on‐board radio license of the aircraft or vessel equipped with the ESIM.

CEPT supports the protection of EESS (passive) sensors in the frequency band 18.6‐18.8 GHz, and compatibility studies with related non‐GSO systems to define necessary protection measures. In particular, CEPT is of the view that enabling the operations of non‐GSO ESIM should not result in an increase of the interference to EESS (passive) sensors operating in the 18.6‐18.8 GHz band. Any measure on non‐GSO space stations communicating with aeronautical ESIM and maritime ESIM that may be needed to limit the interference to EESS (passive) sensors operating in the 18.6‐18.8 GHz band shall be applicable only to those non‐GSO systems notified/brought into use after the last day of WRC‐23.

**7.2 International Organisations**

**7.2.1 WMO** - **Document APG23-4/INF-03**

* WMO supports studies, as necessary, to ensure non-GSO FSS ESIM deployment will protect the co-frequency band MetSat allocation and that the operation of non-GSO FSS ESIM in the frequency bands adjacent to 18.6-18.8 GHz will not result in increased adjacent band interference to EESS (passive) operations.

**7.2.2 ICAO - Document APG23-3/INF-15**

To ensure that any radio regulatory action taken as a result of this agenda item:

* do not adversely affect the provision of UAS CNPC under Resolution 155 (Rev. WRC-19);
* make a clear regulatory distinction between satellite networks or satellite network resources providing UAS CNPC and those providing non-safety ESIMs applications;
* do not set a precedent that could adversely affect the provision of aeronautical safety-of-life services.

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