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#ITUWRC**

**Earth Stations in Motion
(ESIM)**

**WRC-23 agenda items
1.15 and 1.16**

Giselle Creeser & Mario Neri



AI 1.15 & AI 1.16

- AI 1.15 – *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)**;*
- AI 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)**;*
- ESIM would allow provision of mobile broadband services to aircraft and vessels in existing FSS frequency bands under certain technical, regulatory and operational conditions

In our increasingly connected world, the expectation of being “always on” is no longer bound by geography or location



CPM Report

- Two methods identified for AIs 1.15 and 1.16
 - Method A – NOC
 - Method B – Allow the operation of ESIM on aircraft and vessels

Agenda Item 1.15 – Elements of Method B

- New footnote Article 5 of RR that refers to new WRC Resolution
- Resolution includes conditions for operations and Annexes that address:
 - Procedure for filing for new AP30B ESIMs and examination by the BR
 - Protection of terrestrial services (PFD and Distance)
 - Protection of NGSO FSS systems
 - Methodology for BR examination of PFD limits
 - Required ESIM software and hardware capabilities for interference management

Agenda Item 1.16 – Elements of Method B

- New footnote Article 5 of RR that refers to new WRC Resolution
- Resolution includes conditions for operations and Annexes that address:
 - Protection of primary and secondary terrestrial services (PFD or Distance)
 - Protection of NGSO FSS systems (e/s envelope)
 - Protection of GSO FSS networks (EPFD or e/s envelope)
 - Methodology for BR examination of PFD limits
 - Required ESIM software and hardware capabilities for interference management

AI 1.15 & 1.16 - Regional Proposals



- Regional proposals largely support Method B with the understanding that certain conditions must be fulfilled.
- Key Areas that require more discussion:
 1. Interference management
 - Role and responsibilities of involved administrations
 - Network Control and Monitoring Centre (NCCM)
 - Receiving part of ESIM
 - Any possible role of the RRB in resolving a case of interference
 2. Availability in the MIFR of a list of administrations authorizing ESIM on their territories
 3. Need for an Annex describing the ESIM capabilities for interference management

ANNEX – Regional positions



Part 1: Common position:

*APM23-4 agreed to support **Method B** if the following conditions are fulfilled:*

1. **Ensuring** protection to the existing services and those in the adjacent bands within the frequency band 13.25–13.75 GHz, taking into account the need to protect Appendix 30B and the operation of such earth stations on aircraft and vessels should not impact the usability of the allotments in the Plan and assignments in the List under Appendix 30B of the Radio Regulations and not limit the access of other administrations to their national resources in Appendix 30B as well as implementation of Resolution 170 (WRC 19).
2. **Support** that Aeronautical or maritime earth stations in the 12.75 - 13.25 GHz band need to have the capability to restrict operations in territories of those administrations where agreement under No. 6.6 has been obtained
3. **Support** that the operation of A ESIM and M ESIM within territorial waters and/or airspace under the jurisdiction of an administration shall be carried out only if authorization of that administration is obtained;
4. **Support** that the administrations responsible for notice to use an Appendix 30B assignment in the List in support of the operation of earth stations on aircraft and vessels in the frequency band 12.75-13.25 GHz, to seek the explicit agreement of all the affected administrations from such use.
5. **Support** BR to publish the list of assignments in the Appendix 30B ESIM brought into use with information about its service area and countries authorize such use to assist affected administration to identify source of interference.
6. **Support** usage of [175],150/133 Km as a minimum distance from the low-water mark as officially recognized by the coastal State for protection of terrestrial services from the M-ESIM transmission.
7. **Emphasize** that the notifying administration of the satellite network is the only administration that has the responsibility to notify the ESIMs that will communicate with that network and to resolve any interference incident.



8. **Emphasize** that the receiving part of the ESIM in their associated frequency band shall not adversely affect the allotments in the Plan nor the assignments in the List and not claim protection from other applications of the FSS as well as other radiocommunication services to which the frequency band is allocated. ATU prefer such measures to be included in resolves part;
9. **Completion** of the interference management mechanism and Definition the role of the Network Monitoring and Control Center (NMC), to deal with the interference that occurs from the operation of A-ESIM/M-ESIM of other administrations;
10. **Development** of a methodology to assist the Radiocommunication Bureau in examining the conformity of earth stations on board aircraft and ships in the event that an appropriate flux density is used to protect terrestrial services from moving earth stations, with the need to develop and agree on such a methodology before end of the conference;
11. **Review** which frequency assignments that entered in the List under § 6.17 can be used as supporting assignments by ESIM.

12. **Need** to review any cost associated with the possible implementation of the Draft new resolution under AI 1.15;
13. **Decide** that studies under this agenda item need to equally consider the effect of aggregated interference from ESIMs to ensure long term protection of Fixed and Mobile Service.

Part 2: Way forward

Request ATU administrations to:

Support the AfCP (i.e. Method B) on this agenda item while remaining keen on ensuring that the draft new resolution under Method B addresses all the above listed requirements.

The **proposed** text of the actual AfCP is embedded here below:



ATU, AI 1.16



1/2

Part 1: Common position:

*APM23-4 agreed to support **Method B** if the following conditions are fulfilled:*

1. For the protection of terrestrial services operating in the 27.5-29.1 GHz, transmitting non-GSO ESIMs in the frequency band 27.5-29.1 GHz shall not cause unacceptable interference to terrestrial services to which the frequency band is allocated and that operate in accordance with the Radio Regulations, and Annex 1 to the new Resolution under this Agenda Item shall apply.
2. For the protection of secondary allocation to terrestrial services (No. 5.542) in the 29.5-30 GHz, that transmitting non-GSO ESIMs in the frequency band 29.5-30.0 GHz shall not adversely affect the operations of terrestrial services to which this frequency band is allocated and that operate in accordance with the Radio Regulations, and technical conditions in Annex 1 to the new Resolution under this Agenda Item shall apply with respect to administrations mentioned in RR No. 5.542.
3. 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 to which the frequency band is allocated and operating in accordance with the Radio Regulations.
4. For the protection of space services, non-GSO ESIM characteristics shall remain within the envelope characteristics of typical earth stations associated with the non-GSO satellite system with which these ESIM communicate.
5. For the protection of GSO systems in FSS and BSS, operating in the frequency bands 17.7–18.6 GHz, from non-GSO FSS systems using ESIMs, the RR No. 22.2 is applied.
6. 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.
7. For the protection of GSO systems in FSS and BSS, operating in the frequency bands where epfd limits do not apply:
 - i. 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;
 - ii. Non-GSO ESIM shall not cause more interference and shall not claim more protection than typical earth stations in this non-GSO system;
 - iii. The operation of non-GSO ESIM shall comply with the coordination agreements obtained following the application of provisions under No. 9.11A.



8. Development of a methodology regarding examination by the Bureau of compliance with pfd limits by NGSO aeronautical ESIM to protect terrestrial services from earth station in motion to be agreed before end of the conference.
9. The only administration that could notify the ESIM is the same administration that notified NGSO satellite network with which the ESIM will communicate.
10. The capability of ESIMs to restrict operations to territories of those administrations where authorization for such operations has been granted.
11. The notifying administration is the only administration responsible to resolve any reported interference complaints. In case more than one administration has notified satellites in a single NGSO constellation each of the notifying administrations is responsible to eliminate any unacceptable interference from ESIMs that have been authorized to operate.

12. Support not to impose additional burden to the authorizing administrations
13. Determination of detailed procedures for the interference management mechanism to deal with the interference that occurs from the operation of earth stations in motion of other administrations as there are still several issues on the operation of ESIMs to be clarified and specified in the Draft New Resolution regarding the interference management mechanism and its due functionality.
14. Support publishing by the BR the list of Notifying Administration of NGSO system with which ESIM communicates and countries authorizing using of such ESIM to assist in interference resolution. This list would be provided by the notifying administration.

Part 2: Way forward

Request ATU administrations to:

Support the AfCP (i.e. Method B) on this agenda item on condition that the draft new resolution under Method B addresses all the above listed requirements.

The **proposed** text of the actual AfCP is embedded here below:



CITEL, AI 1.15



Inter-American Proposal (IAP)

- CITEL proposes to adopt a technical and regulatory framework to allow earth station on aircraft (A-ESIM) and vessels (M-ESIM) to operate in the 12.75-13.25 GHz (Earth-to-space) with GSO FSS satellites, consistent with Method B of the CPM Report, the proposal includes:
 - New footnote, **5.A115**, to the Table of Frequency Allocations (Article 5 of RR) in the 12.75-13.25 GHz (Earth-to-space) frequency band that refers to a Draft New Resolution;
 - Draft New Resolution provides the conditions and regulatory framework for the operation of A-ESIM and M-ESIM including Annexes that address the following: submission of filing and examination by the BR for AP30B ESIMs operations (Annex 1); protection of terrestrial services (Annex 2); protection of NGSO FSS systems (Annex 3); and a methodology for the BR to examine compliance with the pfd mask contained in Annex 2 (Annex 4).
 - Suppression of Resolution 172 (WRC-19).



Inter-American Proposal (IAP)

CITEL supports the proposals below:

- Addition of a new footnote, **5.A116**, in RR Article 5, 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), pointing to a new Resolution, also proposed, that provides the conditions for the operation of aeronautical and maritime ESIMs communicating with non-geostationary FSS space stations in these bands, while ensuring the protection of incumbent services, as well propose the suppression of Resolution 173 (WRC 19) in consequence.
- 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:
 - To prevent potential interference to satellite networks or systems from other Administrations, non-GSO ESIM characteristics shall remain within the envelope characteristics of typical earth stations associated with the non-GSO FSS system with which the ESIM communicates;
 - the operation of non-GSO ESIM shall comply with the coordination agreements obtained following the application of provisions under Article 9;
 - the protection of GSO FSS networks 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;



Inter-American Proposal (IAP)

- For the protection of terrestrial services, CITEL proposes that:
 - non-GSO ESIM operating in the frequency bands 17.7-18.6 GHz and 18.8-19.3 GHz and 17.7-20.2 GHz and 27.5-29.1 GHz shall not claim protection from nor cause unacceptable interference to terrestrial services operating in the same frequency bands in accordance with the Radio Regulations;
 - non-GSO ESIM operating in the frequency band 29.5-30 GHz shall not adversely affect the operation of terrestrial services to which the frequency band is allocated on a secondary basis and that operate in accordance with the Radio Regulations;
 - the PFD limits contained in Annex 3 to Resolution 169 (WRC-19) be applicable to aeronautical and maritime ESIMs communicating with non-GSO systems operating in the frequency band 27.5-29;
 - the limits contained in Annex 3 to Resolution 169 (WRC-19) be used to protect stations in the fixed and mobile services operating in the frequency band 29.5-30 GHz on the entire territories of administrations mentioned in No. 5.542.
- For the protection of EESS (passive) sensors in the frequency band 18.6-18.8 GHz, Citel proposes a pfd limit over the oceans of -118 dBW/m²/200 MHz for Non-GSO space stations operating with an orbit apogee of more than 2 000 km and less than 20 000 km and -110 dBW/m²/200 MHz for Non-GSO space stations operating with an orbit apogee less than or equal to 2 000 km.

ASMG, AI 1.15



1.15) 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)

METHOD B : DRAFT NEW RESOLUTION [A115] (WRC-23) to refer to appendix in article 5 of the Radio Regulations to allow the operation of (A-ESIMS AND M-ESIMS) operating with geostationary satellite networks in the fixed-satellite service, if the following conditions are :

The protection of the Appendix 30B plan allotments:

- To ensure the protection of existing services and those in adjacent bands within the frequency band 13.25-13.75 GHz, taking into account the need for Appendix (30B) protection, the operation of such ground stations on aircraft and ships shall not affect the use of the assignments contained in the Plan and the assignments contained in the List under Appendix (30B) of the Radio Regulations and does not limit the access of other administrations to their national resources in Appendix (30B) as well as the implementation of Resolution 170 (WRC 19).
- Earth stations operating on board aircraft and ships in the frequency band 12.75 - 13.25 GHz need to be able to restrict operations in the territories of those administrations where approval for partial or total inclusion in their territory in the service area has been obtained under provision No. 6.6 of the Appendix (30B) of Radio Regulations.
- Instructs the Director of the Radiocommunication Bureau to publish the list of assignments in the Appendix 30B ESIM brought into use with information about its service area and countries authorize such use if any; this information shall be updated regularly,
- The downlink of the earth stations in motion shall not claim protection in the frequency bands 10.7-10.95 GHz and 11.2-11.45 GHz from terrestrial services that have allocations in the same frequency bands, operate in accordance with the Radio Regulations, and must not adversely affect the assignments in the Plan or the assignments in the list.

- Develop a methodology to assist the Radiocommunication Bureau in checking the conformity of GSO A-ESIM and M-ESIM in the event that an appropriate PFD is used to protect terrestrial services ESIMs, with the need to develop and agree on such a methodology before the adoption of the decision at the WRC-23.
- That the operation of A ESIM and M ESIM within territorial waters and/or airspace under the jurisdiction of an administration shall be carried out only if a licence from that administration is obtained;
- Only the notifying administration of the GSO FSS network with which the GSO A-ESIM and M-ESIM communicate is responsible for resolving the case of unacceptable interference;
- The minimum distance from the low-water mark as officially recognized by the coastal State beyond which an M ESIM can operate without the prior agreement of any administration is 150 km;
- Support strict (pfd) mask values for A ESIM and to ensure protection of existing terrestrial services;
- Completing the interference management mechanism to deal with the interference that occurs from the operation of A ESIM and M ESIM, and agreeing on it before adopting the decision at the conference.
- Instruct the ITU Council to examine any cost arising from the potential implementation of Resolution 172.
- Include the ON/OFF feature and the need to define the role of the Network Control and Monitoring Center (NCCM), emphasizing that the reporting administration of the satellite network bears responsibility for operating mobile ground stations on board aircraft and ships to resolve any interference incident. The administrations licensed to operate these stations to provide services in their territories are not responsible for resolving interference incidents.

ASMG, AI 1.16



1.16) 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

Method B: Adding new Footnote in Article 5 of the Radio Regulations that refers to the NEW RESOLUTION [A116] (WRC 23), and suppression of the Resolution 173, IF THE FOLLOWING CONDITIONS ARE MET:

1. That NGSO ESIMs in the fixed-satellite service shall not claim protection from other services and to not impose unnecessary restrictions on their future developments in those frequency bands as well as adjacent bands, including terrestrial services as mentioned in footnote (5.542) in the frequency band 29.5-30 GHz. With a focus on establishing strict procedures to ensure the protection of other services in other frequency bands under study and the adjacent bands.
2. The provisions in this Resolution, including Annex 1, set the conditions for the purpose of protecting terrestrial services from unacceptable interference from non-GSO ESIMs in neighboring countries in the frequency band 27.5-29.1 GHz and in the frequency band 29.5-30.0 GHz with respect to administrations mentioned in No. 5.542
3. NGSO ESIMs 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 to which the frequency band has been allocated and operated in accordance with the Radio Regulations.
4. **That the operation of A ESIM and M ESIM within territorial waters and/or airspace under the jurisdiction of an administration shall be carried out only if a licence from that administration is obtained;**
5. To prevent potential interference with respect to satellite networks or systems of other administrations, non-GSO (A-ESIMs) and (M-ESIMs) characteristics shall remain within the envelope characteristics of typical earth stations associated with the non-GSO FSS system with which these (A-ESIMs) and (M-ESIMs) communicate;
6. Ensure the existence of an appropriate Examination methodology by the Bureau for (A-ESIMs) and (M-ESIMs) with non-GSO satellite networks to ensure the protection of terrestrial services to which frequency bands are allocated and operated in accordance with the Radio Regulations and agreed upon prior to the adoption of the decision at the Conference.
7. That ESIMs should have the ability to limit their operations to the territories of those administrations in which permission has been granted to operate NGSO ESIMs.
8. That the provisions of No. 22.2 apply to non-GSO FSS satellite systems with which (A-ESIMs) and (M-ESIMs) operate in the frequency band 17.7-18.6 GHz (space-to-Earth) with respect to GSO FSS and GSO BSS networks;
9. Notifying administration of the non-GSO FSS system with which the (A-ESIMs) and (M-ESIMs) communicate shall ensure that non-GSO (A-ESIMs) and (M-ESIMs) comply with the efd limits referred to in Nos. 22.5C, 22.5D and 22.5F for the protection of GSO FSS networks operating in the frequency bands 17.8-18.6 GHz, 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz and 29.5-30 GHz (Earth-to-space));
10. That (A-ESIMs) and (M-ESIMs) shall not cause unacceptable interference to nor claim protection from other services. Its operation shall be compatible with coordination agreements obtained after applying the provisions under provision (9.11) of the Radio Regulations.
11. Instructs the Secretary-General to bring this Resolution to the attention of the Council with a view to consider if cost recovery should be applied to A-ESIM and M-ESIM;
12. Only the notifying administration of the non-GSO FSS system with which (A-ESIMs) and (M-ESIMs) communicate is responsible for resolving the case of unacceptable interference;
13. Instruct the Bureau to periodically publish a list of non-geostationary satellite networks that have been brought into use and with which ESIMs stations communicate, and information about the service area and the countries that have licensed those networks to help affected countries determine the source of interference, provided that this information is provided to the Bureau through the notifying Administration.
14. Include the ON/OFF switching facility function and the need to define the role of the Network Control and Monitoring Center (NCMC), emphasizing that the notifying administration of the satellite network is the responsible for operating A-ESIMs and M-ESIMs to resolve any interference incident. The licensing administrations to operate these stations to provide services in their territories are not responsible for resolving interferences.



APT Views on WRC-23 Agenda Items: AI 1.15

◆ APT Views:

- In view of all problems, difficulties, inconsistencies, limitation of service area that according to the review by the BR of the service areas of the RR Appendix 30B assignments recorded in the Master International Frequency Register (MIFR) showed that generally the service areas of RR Appendix 30B networks applied Article 6 and recorded in the List or MIFR are non-contiguous and the number of countries in these service areas ranges from one to fifty countries. Additionally, § 6.16 of RR Appendix 30B provides that an administration may at any time exclude its territory from the service area of an AP30B assignment. Therefore, A-ESIM and M-ESIMs in the 12.75 13.25 GHz band subject to this agenda item need to have the capability to restrict operations in territories of those administrations the agreement of which under § 6.6 has been obtained and authorization for A-ESIM and M-ESIM operations has been granted. Also, distinctive and specific aspects of RR AP30B including but not limited to Reference situations for all Plan allotments and assignments in the List.
- APT members are considering to support Method A.
- APT members could consider to support Method B provided that the remaining elements and part of that method as referred to in attachment of Resolution relating to agenda item 1.15 need to be successfully resolved and agreed including but not limited to the following:

DG Chair: Mr. Phung
Nguyen Phuong
(VTN)





APT Views on WRC-23 Agenda Items: AI 1.15

◆ APT Views (cont'd):

- Interference management mechanism to deal with interference occurs from operation of ESIM to other administrations;
 - Switching facility allowing transmission over these territories of countries which agreed to be included in the service area and/or authorized operation of the service on the territory under jurisdiction and no transmission over these countries if they are not in the service areas or they have not given their authorization for operation of that ESIM;
 - Lack of contiguous service area on regional and/ or worldwide, except merely one satellite network having regional service area;
 - Submission of the a firm objective, enforceable and measurable with actionable commitment at the time of submission of Appendix 4 data element for planned ESIM(s);
 - Review by the RRB, as an enforceable mechanism in case of raising any problem during the implementation raised, by any administration in particular occurrence and persistence of unacceptable interference;
 - Deciding on responsibilities issues to be attributed to one single entity i.e. the notifying adm of the GSO satellite network if the ESIM is associated with that single GSO satellite network. In case that there are more than one satellite use for operation of ESIM and responsibility should be assigned or attributed to only notifying adm of these satellite;
 - Avoiding to impose any mandatory action(s) to the administration(s) authorizing the operation of ESIM in the territory under its jurisdiction to resolve the interferences occur;
 - Methodology to enable BR to verify compliance with PFD limit as contained in Annex 4.
- APT Members also have views which are similar as APG23-5.



APT Views on WRC-23 Agenda Items: AI 1.15

◆ Preliminary APT Common Proposal (PACP) :

- APT members are considering to support Methods A or B.
- However, when Method B is considered at WRC-23, APT common proposals for WRC-23 agenda item 1.15 are as shown below:

Provisions	Supported Options
recognizing m) and n)	Support option 2 and delete recognizing m) and n)
resolves 1.2.5-1.2.7	Support to keep option 2 and make some modifications for resolves 1.2.7
resolves 1.2.9	Modify resolves 1.2.9,
resolves 9.1	Support option 2
resolves 9.4	Delete option 2
resolves 11	Support option 2
resolves further <i>8bis</i>	Support option 1
Annex 4	Update Methodology with respect to the examination of compliance of A ESIM with pfd limits in Part II of Annex 2



APT Views on WRC-23 Agenda Items: AI 1.16

◆ APT Views:

- The APT has considered agenda item 1.16 and agreed a Preliminary APT Common Proposal on the matter. Moreover, the APT Members agreed the following view(s) on the agenda item 1.16.
- APT Members are considering Method A.
- APT Members are also considering Method B under the conditions that all the issues raised in the attached resolution are successfully resolved and agreed upon at the Conference.
- In addition, APT Members raised the question whether the aggregate interference effect from multi-AESIMs is necessary to be taken into account or not at the Conference.

DG Chair: Mr. Yusuke
FUKUI (Japan)





APT Views on WRC-23 Agenda Items: AI 1.16

◆ Preliminary APT Common Proposal (PACP) :

- It is noted that Method B can be acceptable if every and all problems, difficulties, inconsistencies, ambiguities and not yet addressed issues as well as those contained in the associated attached Resolution for this agenda item are dully and fully addressed and successfully resolved and agreed by consensus.
- The PACP is agreed by APT Members under the conditions that those sections (resolves 1.2.5/1.2.5.1/1.2.6/1.2.7/1.2.8/2/3/4/6/7, resolves further 6/7/8/9/10/11/12, instructs the Director of the Radiocommunication Bureau 1/2/3/4/5, invites administrations, instructs the Secretary-General, ANNEX 1, ANNEX 2, ANNEX 3, ANNEX 4) which were not discussed at CPM23-2 would be considered by the Conference resulting satisfactory resolutions to those items.

Provisions	Supported Options
Title of Resolution	Add a NOTE: The title of the Resolution 173 is in line with Option 1.
considering d)	Support option 1
considering further a)	Support option 3
recognizing h) and i)	Support option 2
resolves 1.1 <i>bis</i>	Support option 1
resolves 1.2.2 <i>bis</i>	New addition, align with AI 1.15
resolves 1.2.4	Delete option 1 and make modifications for original option 2 and 3
resolves 1.3.1	Support option 1
resolves 1.3.4	Support option 1
resolves 5	Support option 1
resolves 8	Support option 2
resolves further 1 and 4	Make editorial changes



CEPT position

CEPT supports establishing a regulatory framework and technical requirements for operation of earth stations on aircraft and vessels in the frequency band 12.75-13.25 GHz (Earth-to-space) with conditions that protect the services currently allocated in this frequency band and bands adjacent to it, taking into account ECC Decision (19)04.

CEPT considers that earth stations on aircraft and vessels in the frequency band 12.75-13.25 GHz shall operate consistent with the Appendix **30B** procedures, protect the Appendix **30B** allotments in the Plan, assignments in the List and in the new proposed Appendix **30B** ESIM List (if adopted at WRC-23) and respect Resolution **170 (WRC-19)**.

CEPT supports the operation of these earth stations in the territories (air space and territorial waters) of administrations which have given agreement under No. **6.6** of Article 6 of Appendix **30B** and have authorised such operation within their territories. The characteristics of these earth stations should remain in the envelope of notified earth station characteristics.

CEPT supports the application of on-axis (depending on the maximum antenna gain) and off-axis e.i.r.p. density limits for the purpose of the protection of non-GSO FSS systems.





CEPT position (cont.)

CEPT supports the use of power flux density (PFD) limits on the earth surface for earth stations on aircraft to ensure the protection of Mobile and Fixed Services, and also supports the development of a methodology to verify compliance with PFD limits by GSO earth stations on aircraft or of adequate transitional measures in case WRC-23 could not finalise the methodology.

CEPT is of the view that the notifying administration of the GSO network with which the earth stations on aircraft and vessels communicate should be identifiable to address the potential cases of harmful interference caused by any earth station on aircraft and vessels 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 earth station on aircraft and vessels 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 an earth station.

CEPT is of the view that, unless specified otherwise in the Radio Regulations, the receiving part of these earth stations in the associated frequency bands shall not claim protection from terrestrial services having allocations in the same frequency bands and operating in accordance with the Radio Regulations.



CEPT position

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 position (cont.)

- 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 position (cont.)

- 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 supports the use of the limits contained in Annex 3 to Resolution **169 (WRC-19)** to protect stations in the fixed and mobile services operating in the frequency band 29.5-30 GHz on the entire territories of administrations mentioned in No. **5.542**.



CEPT position (cont.)

- 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 through an unwanted emission pfd limit over the oceans of $-118 \text{ dBW/m}^2/200 \text{ MHz}$ for MEO FSS satellites and $-110 \text{ dBW/m}^2/200 \text{ MHz}$ for LEO FSS satellites communicating with aeronautical and maritime ESIM. In addition, CEPT supports that no specific measure is required for non-GSO systems operating in LEO orbits that make use of frequency reuse schemes employing at least three colours.

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The RCC Administrations, based on carried out studies, are in favor of developing technical requirements to ESIMs on aircraft and vessels and regulatory provisions to ensure harmonized operation of such earth stations, communicating with GSO FSS space stations in the frequency band 12.75-13.25 GHz (Earth-to-space), while ensuring protection to existing services and the services operated in adjacent frequency bands (particularly, EESS (active) in the frequency band 13.25–13.75 GHz), taking into account the provisions of Appendix **30B**.

The RCC Administrations are in favor of the need to ensure protection of allotments in the Plan and assignments in the List of Appendix **30B** RR, in accordance with criteria provided in Annex 4 to Appendix **30B**, when considering the possibility to use A-ESIM and M-ESIM, communicating with GSO FSS space stations in the frequency band 12.75-13.25 GHz. Such use of the frequency band 12.75-13.25 GHz (Earth-to-space) by A-ESIM and M-ESIM shall not result in any restrictions or changes to the existing allotments/assignments in the Plan/List and shall not adversely affect the criteria set forth in Annex 4, including the cumulative effect of multiple earth stations on aircraft and vessels.

The RCC Administrations are of the view that ESIMs on aircraft and vessels shall operate in the frequency band 12.75-13.25 GHz (Earth-to-space) within the characteristics of earth stations, notified within the base satellite network (supporting assignment), and also within the agreements reached by administrations under §§ 6.5, 6.6 and 6.16 of Article 6 of Appendix **30B** RR.



The RCC Administrations are of the view that the use of ESIMs on aircraft and vessels in the frequency band 12.75-13.25 GHz (Earth-to-space) is allowed within frequency assignments of base satellite networks, i.e. included into the List, in accordance with Article 6 of Appendix **30B** RR, as well as included in accordance with §6.25 (taking into account §6.26), and registered in MIFR with favorable conclusion, in accordance with §8.11 of Article 8 of Appendix **30B** RR.

The RCC Administration are of the view that Administrations which are planning to use ESIMs on aircraft and vessels in the frequency band 12.75-13.25 GHz (Earth-to-space) in international airspace and/or waters, irrespective of the inclusion in the contour of the agreed service area of the base network of international spaces, shall submit to the BR the information on ESIMs together with information on re-notification of the base network for such ESIMs. Such submissions shall be considered as new notifications of frequency assignments to satellite networks with a new date of receiving by the BR, and they are subject to be examined by the BR with a view to protect frequency allotments/assignments of the Plan and List of Appendix **30B** RR against interference, carried out at BR-generated uplink nodes everywhere within the service area in international spaces of the corresponding A-ESIM and M-ESIM assignments, assuming that A-ESIM and M-ESIM are located at these uplink nodes



The RCC Administrations support the definition of compatibility conditions for Earth Stations In Motion (ESIMs) planned for operation in non-GSO FSS systems in the 17.7–18.6 GHz, 18.8–19.3 GHz, 19.7–20.2 GHz (space-to-Earth) and 27.5–29.1 GHz, 29.5–30 GHz (Earth-to-space) frequency bands, or parts thereof, with the services to which the indicated and adjacent frequency bands are allocated, without imposing additional restrictions on those services, based on the development of the methodologies and procedures specified in considering further section of Resolution **173 (WRC-19)**.

The RCC Administrations are of the view that ESIMs, operating in non-GSO FSS systems in the 17.7–18.6 GHz, 18.8–19.3 GHz (space-to-Earth) frequency bands shall not claim protection from terrestrial services, which have allocations in the same frequency bands and are operating in accordance to the Radio Regulations.

The RCC Administrations are of the view that the use of ESIMs in non-GSO FSS systems is only possible if the following conditions are met:

- any frequency assignment for operation of ESIM shall be notified to the Radiocommunication Bureau by the administration notifying the non-GSO FSS system with which ESIM will communicate;
- technical and operational measures as well as possible regulatory changes to be established according to results of ITU-R studies shall not weaken the provisions of Article **22** of the RR regarding the protection of GSO networks from non-GSO FSS systems;



- ESIMs operation in non-GSO FSS systems shall be carried out within the specifications and in accordance with the conditions specified for frequency assignments to typical earth stations of non-GSO FSS systems as published in BR IFIC **Part II-S**, as well as within the framework of coordination agreements between administrations;
- the frequency assignments of ESIMs in non-GSO FSS systems shall not cause more interference and shall not require more protection than it has been specified for frequency assignments of typical earth stations of non-GSO FSS systems as published in BR IFIC **Part II-S**, as well as within the framework of coordination agreements between administrations;
- ESIMs in non-GSO FSS systems shall not be used or relied upon by safety-of-life applications, except in cases where RR clause No. **4.9** applies;
- for the protection of GSO FSS and GSO BSS networks operating in the 17.7–18.6/19.7–20.2 GHz and 27.5–28.6/29.5–30 GHz frequency bands, non-GSO FSS systems, using ESIMs shall comply with the applicable limitations of RR Article **22**, including epfd limits referred to in Nos. **22.5C**, **22.5D** and **22.5F**;
- RR clause No. **22.2** shall be applied to protect the GSO FSS and GSO BSS networks operating in the 17.7-17.8 GHz (space-to-Earth) frequency band from non-GSO FSS systems using ESIM,



- to protect terrestrial services from aeronautical and maritime ESIMs in the 27.5-29.1 GHz and 29.5-30.0 GHz frequency bands, the following limits shall be met:

- for maritime ESIMs, the power flux-density limit towards the territory of any coastal State and the minimum guard distance from the low water mark officially recognized by the coastal State;

- for aeronautical ESIMs, power flux-density limits on the Earth's surface within the territory of any administration;

- use of ESIMs in non-GSO FSS systems shall not increase the level of interference to EESS (passive) sensors operating in the 18.6-18.8 GHz frequency band. To ensure compatibility with EESS (passive) in the 18.6-18.8 GHz frequency band, it is suggested to introduce power flux-density limits for unwanted emission at the surface of the oceans produced by the non-GSO FSS satellites with which the ESIMs communicate. The RCC Administrations do not object to the adoption of uniform power flux-density limits for unwanted emission from non-GSO FSS satellites under WRC-23 Agenda Items 1.16 and 1.17;

- when operating ESIMs in non-GSO FSS systems, measures shall be taken to prevent unauthorized use of ESIMs in the territory of states that have not issued the appropriate authorizations (licenses).

The RCC Administrations are considering **Method B** of the CPM Report, which provides for the addition of the new footnote 5.A116 to RR Article 5 that refers to a new Resolution [**RCC-A116**] (**WRC-23**), containing technical and regulatory limitations for operation of ESIMs with the non-GSO FSS system, under the conditions that the regulatory and technical measures for operation of ESIM proposed in this Resolution will be considered and agreed upon at the Conference.

The RCC Administrations are also considering **Method A** of the CPM Report (**NOC**), provided that the proposals of the RCC Administrations are not agreed upon at the Conference.

Thank you!

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