

## Counter Comments

w.r.t  
TRAI  
CP<sup>1</sup>PR<sup>2,3,4,5</sup>

1. The COMMENTS by stakeholders in response to extant CP<sup>6</sup> ‘Consultation Paper on Assignment of Spectrum for Space-based Communication Services’ are<sup>7</sup>.
2. The comments are spread over ‘64’ stake holders.<sup>8</sup>
3. Some stake holders are in favour of administrative assignment, others are in favour of auction based assignment, a few are neutral on the issue.<sup>9</sup>
4. Reproduced below is an **Office Memorandum** of G.O.I. Para 3,1 of the said Memorandum is ominous in the context of the extant CP<sup>10</sup>.

**“Government of India**  
**Ministry of Communications**  
**Wireless Planning & Coordination Wing**  
**Sanchar Bhawan, 20-Ashoka Road, New Delhi-110 001**  
No. R-11014/15/2012-NT (Pt.) Date: 17th January, 2023

### **OFFICE MEMORANDUM**

It has been decided, as an interim measure, for a period of Six months with effect from 13.01.2023, to continue to make frequency assignments for broadcasting (including community radio), H/V/UHF/SHF fixed/mobile networks (including CMRTS), radars, experimentation, demonstration and satellite based applications (including DTH, Teleport, DSNG, VSAT, NLD, ILD, INMARSAT).

2. The annual spectrum usage charges shall be continued to be levied as per Orders No. P-11014/34/2009-PP(I), (II), (III) & (IV) dated 22nd March, 2012 and VSAT Orders No. R-11014/9/2001-LR dated 16th April, 2003 & J19045/03/2018-SAT dated 13 the September, 2021 and Inmarsat based Global Satellite Phone Services order No. J-19044/03/2015-SAT dated 28 th June, 2021, unless otherwise amended.

3. The allotment of the spectrum would be made with the following conditions and upon obtaining an undertaking from applicants that they would agree for assignment of frequencies with the following conditions:

- i. The allotment of spectrum is provisional and subject to Govt’s decision on allotment & pricing of spectrum;
- ii. In the event of final decision to allot spectrum only through auction process, the provisional allotment of spectrum shall be withdrawn;
- iii. In case the provisional allotment of spectrum is withdrawn, payment made towards spectrum charges or part thereof shall not be refunded;
- iv. In case the provisional allotment of spectrum is withdrawn, respective wireless users would obtain Non Dealer Possession Licence (NDPL) for possessing the wireless equipment or return the equipment to a DPL holder or shall be disposed-off the same as per procedure.

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v. The respective wireless users would be required to give an undertaking to pay the revised spectrum charges, as finally determined through market related mechanism or otherwise as may be applicable, from the date of Letter of Intent (LoI) for provisional allotment of spectrum.

3.1. Upon shift/ change in policy from administrative allotment, due notice of 3 months of such change, time to make appropriate arrangements, etc. will be given and the same has to be complied with by the wireless users. R-11014/15/2012-NT(Pt.) I/3080080/2023

4. The above conditions in Para 3 and 3.1 will be added in the Letter of Intent (LoI), Decision to grant License (D/L) and the Wireless Operating Licence (WOL) also.

(Khagendra Singh) Deputy  
Wireless Adviser  
to the Government of India

Ph- 011 2303 6633

To,

All concerned

Copy for information to:

I. DDG (WPF), Wireless Finance Division.

II. Director, Wireless Monitoring Organisation.

III. JWA WPC (HQ)/ JWA, RLO (WR/ER/NR/SR)/ Sr. DWA, RLO(NE)

IV. All Sr. DWAs, WPC Wing, DoT HQ.

V. Sr. DWA (IT&SACFA) for uploading on DoT's website."<sup>11</sup>

5. The entry "**3 ii. In the event of final decision to allot spectrum only through auction process, the provisional allotment of spectrum shall be withdrawn;**" in the said memorandum is quite clear indication of Administrative assignment of spectrum may not remain a policy in future.

**And**

"Use of Planned Bands by foreign GSO satellites is not permitted in India."<sup>12</sup> lead to a situation that INDIA as a Sovereign State may keep both options of auction as primary & administrative assignments of SPECTRUM as secondary open case to case basis guided by:

**National:**

\*Legislatory Framework

\*\*Legal Framework

\*\*\*Regulatory Framework

&

\*\*\*\*International Obligations

6. The scope of National Frameworks as gathered from CP is extracted below (representative not exhaustive).

**Acts:**

Telegraph Act, 1885.<sup>13</sup>

TRAI Act, 1997 as amended by TRAI Amendment Act 2000.<sup>14</sup>

**Policy:**

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Spacecom Policy pages.<sup>15</sup>

### Guidelines

(MIB):<sup>16</sup>

(DoT):<sup>17</sup>

7. There are references to Acts for DoT<sup>18</sup> & TRAI<sup>19</sup>, however, no Acts have been mentioned regarding MIB & DoS and also there is no mention of the same in Guide Lines, Policy Guide Lines/Policy of MIB<sup>20</sup> & DoS<sup>21</sup>.

8. A few nudges, acting in the background & tilting the scale of spectrum assignment in favour of auction rather than in favour of administrative, are listed below:

(i) same service same rules<sup>22,23,24,25</sup>

(ii) Level playing field<sup>26</sup>

“One of the main objectives of TRAI is to provide a fair and transparent policy environment which promotes a level playing field and facilitates fair competition.”<sup>27</sup>

(iii) 2G Case:

(a) ‘2G JUDGMENT4 – RATIO OF DECISION BINDING ONLY QUA PARTIES TO THE LITIGATION:’<sup>28</sup>

(b) “Even the Supreme Court, in the Presidential Reference to the 2G spectrum judgement, emphasised that “Auction may be the best way of maximising revenue, but revenue maximisation may not always be the best way to serve public good.”<sup>29</sup>

(c) ‘in light of the supreme Court judgment made in the 2G case in 2012 -----.’

‘Indeed, the above seems to assume that spectrum for use by satellite communication services must be auctioned. As is explained more fully below, Amazon respectfully disagrees with this assumption and submits that the 2G Judgment, when viewed in the broader context of a subsequent 2012 five-judge Presidential Reference ruling<sup>3</sup> and several other Supreme Court judgments, does not bind the Indian Government to assign spectrum only through auctions.’<sup>30</sup>

(d) ‘It may be not out of context to note herein that even in the constitutional reference made to the Hon’ble Supreme Court in the 2G case, the Hon’ble Supreme Court had observed that “auction as a method of disposal of natural resource cannot be declared to be a constitutional mandate under Art. 14” and that while “auction may be best way of maximising revenue, but revenue maximisation may not always be the best way to serve public interest’.<sup>31</sup>

(e) ‘The Constitution Bench of the Hon’ble Supreme Court of India in answering the reference under Article 143 (1) of the Constitution of India, occasioned by the decision of the Hon’ble Supreme Court, rendered by a two-judge bench on 2nd February 2012 in Centre for Public Interest Litigation & Ors. Vs. Union of India & Ors<sup>1</sup> [famously known as ‘2G case’], inter-alia, clarified and held that it was not a requirement of Article 14, nor a requirement of administrative law, that

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natural resources must invariably be distributed through public auction or tender, and that while revenue maximization may be a legitimate goal in some cases, there are myriad other situations where there may be priorities other than revenue maximization, where preferential allocation or allotment of scarce resources may be made without resorting to public auction or tender.<sup>32</sup>

(f)“Auction may not be the best way of maximizing revenue, but revenue maximization may not be always be 2 the best way to serve public interest.”<sup>33</sup>

(g) In extant consultation paper (para no. 3.76 to 3.78), TRAI has referred the Hon’ble Supreme Court Judgment in the context of 2G.<sup>34</sup>

9. Below are a few clarifications regarding entries in stakeholders’ comments:

(a) **Entry:** ‘TRAI is supposed to give its recommendations with reference to ToR’<sup>35</sup>

**Clarification:** TRAI can go beyond ToR suo moto as per section 11.(1)(a) of TRAI Act.

(b)**Entry:** ‘Indian Administration may take the lead for necessary changes in ITU Radio Regulations’<sup>36</sup>

**Clarification:** The stakeholder may take up the issue with WPC(DoT).

(c)**Entry:** Present ITU studies (at WP 4A and WP5D) don’t take into consideration parameters of state of art satellite radio technology used by satellite systems. These studies are based on age-old satellite communications radio technologies and related protection criteria<sup>37</sup>

**Clarification:** The stakeholder may take up the issue with WPC(DoT).

(d)**Entry:** No such reference has been issued by the MIB which is the licensing authority for the Broadcasting industry and hence the consultation process should be limited to telecom operators and ISPs and not extended to Broadcasting<sup>38</sup>

**Clarification:** TRAI can go beyond ToR suo moto as per section 11.(1)(a) of TRAI Act.

(e)**Entry:** The administrative process for satellite bandwidth is not an allocation.<sup>39</sup>

**Clarification:** Yes. But it is an ‘assignment’ and CP is about the same.

(f)**Entry:**“As per the International Space Laws, satellites are considered “space objects”<sup>40</sup> 6.31.

**Clarification:** The said ‘objects’ are located in orbits beyond land, sea, air jurisdiction of all NATIONS but do have owners on earth Article VIII<sup>41</sup>.

(g) **Entry:** ‘The phrase “SPACE SPECTRUM”/“SATELLITE SPECTRUM” appears in CP, stake holders, a few examples<sup>42,43,44</sup>.

**Clarification:** Notwithstanding the use of quoted phrases Radio Spectrum is Radio Spectrum irrespective how & where the same is used.<sup>45,46,47</sup>

(h) **Entry:** ‘The principle of designating a band for the use by specified radiocommunication services is referred to as frequency allocation’.<sup>48</sup>

**Clarification:** ‘allocation (of a frequency band): Entry in the Table of Frequency Allocations of a given frequency band for the purpose of its use by one or more terrestrial or space

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radiocommunication services or the radio astronomy service under specified conditions. This term shall also be applied to the frequency band concerned.<sup>49</sup>

10. Radio Spectrum bands in extant CP are appearing in Agenda<sup>50</sup> for **WRC-2023** also.

### ISSUES FOR CONSULTATION

**Q1.** For space-based communication services, what are the appropriate frequency bands for (a) gateway links and (b) user links, that should be considered under this consultation process for different types of licensed telecommunications and broadcasting services? Kindly justify your response with relevant details.

**Q2.** What quantum of spectrum for

(a) gateway links and

(b) user links in the appropriate frequency bands is required to meet the demand of space-based communication services? Information on present demand and likely demand after about five years may kindly be provided in two separate tables as per the proforma given below:

Type of service Name of the satellite system Type of satellite (GSO/ LEO/ MEO) Frequency range and quantum of spectrum required User Link (Earth to space UL) User Link (Space to Earth DL) Gateway Link (Earth to space UL) Gateway Link (Space to Earth DL) Frequency range Quantum (in MHz) Frequency range Quantum (in MHz) Frequency range Quantum (in MHz) Frequency range Quantum (in MHz) Access Internet NLD ILD GMPCS 121 VSAT CUG (Commercial) Captive VSAT CUG Machine to Machine (M2M) DTH Teleport DSNG HITS IFMC Any other relevant service (please specify)

**Q3.** Whether there is any practical limit on the number of Non-Geo Stationary Orbit (NGSO) satellite systems in Low Earth Orbit (LEO) and Medium Earth Orbit (MEO), which can work in a coordinated manner on an equitable basis using the same frequency range? Kindly justify your response.

**Q4.** For space-based communication services, whether frequency spectrum in higher bands such as C band, Ku band and Ka band, should be assigned to licensees on an exclusive basis? Kindly justify your response. Do you foresee any challenges due to exclusive assignment? If yes, in what manner can the challenges be overcome? Kindly elaborate the challenges and the ways to overcome them.

**Q5.** In case it is decided to assign spectrum in higher frequency bands such as C band, Ku band and Ka band for space-based communication services to licensees on an exclusive basis,

(a) What should be the block size, minimum number of blocks for bidding and spectrum cap per bidder? Response may be provided separately for each spectrum band.

(b) Whether intra-band sharing of frequency spectrum with other satellite communication service providers holding spectrum up to the prescribed spectrum cap, needs to be mandated? (c) Whether a framework for mandatory spectrum sharing needs to be prescribed? If yes, kindly suggest a broad framework and the elements to be included in the guidelines.

(d) Any other suggestions to ensure that the satellite communication ecosystem is not adversely impacted due to exclusive spectrum assignment, may kindly be made with detailed justification. Kindly justify your response.

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Q6. What provisions should be made applicable on any new entrant or any entity who could not acquire spectrum in the auction process/assignment cycle?

(a) Whether such entity should take part in the next auction/ assignment cycle after expiry of the validity period of the assigned spectrum? If yes, what should be the validity period of the auctioned/assigned spectrum?

(b) Whether spectrum acquired through auction be permitted to be shared with any entity which does not hold spectrum/ or has not been successful in auction in the said band? If yes, what measures should be taken to ensure rationale of spectrum auction and to avoid adverse impact on the dynamics of the spectrum auction?

(c) In case an auction based on exclusive assignment is held in a spectrum band, whether the same spectrum may again be put to auction after certain number of years to any new entrant including the entities which could not acquire spectrum in the previous auction? If yes,

(i) After how many years the same spectrum band should be put to auction for the potential bidders?

(ii) What should be the validity of spectrum for the first conducted auction in a band? Whether the validity period for the subsequent auctions in that band should be co-terminus with the validity period of the first held auction? Kindly justify your response.

Q7. Whether any entity which acquired the satellite spectrum through auction/assignment should be permitted to trade and/or lease their partial or entire satellite spectrum holding to other eligible service licensees, including the licensees which do not hold any spectrum in the concerned spectrum band? If yes, what measures should be taken to ensure rationale of spectrum auction and to avoid adverse impact on the dynamics of the spectrum auction? Kindly justify your response.

Q8. For the existing service licensees providing space-based communication services, whether there is a need to create enabling provisions for assignment of the currently held spectrum frequency range by them, such that if the service licensee is successful in acquiring required quantum of spectrum through auction/ assignment cycle in the relevant band, its services are not disrupted? If yes, what mechanism should be prescribed? Kindly justify your response. Q9. In case you are of the opinion that the frequency spectrum in higher frequency bands such as C band, Ku band and Ka band for space based communication services should be assigned on shared (non-exclusive) basis,

(a) Whether a broad framework for sharing of frequency spectrum among satellite communication service providers needs to be prescribed or it should be left to mutual coordination? In case you are of the opinion that broad framework should be prescribed, kindly suggest the framework and elements to be included in such a framework.

(b) Any other suggestions may kindly be made with detailed justification. Kindly justify your response. Q10. In the frequency range 27.5-28.5 GHz, whether the spectrum assignee should be permitted to utilize the frequency spectrum for IMT services as well as space-based communication services, in a flexible manner? Do you foresee any challenges arising out of such flexible use? If yes, in what manner can the challenges be overcome? Kindly elaborate the challenges and the ways to overcome them.

Q11. In case it is decided to permit flexible use in the frequency range of 27.5 – 28.5 GHz for space-based communication services and IMT services, what should be the associated terms and

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conditions including eligibility conditions for such assignment of spectrum? Kindly justify your response.

Q12. Whether there is a requirement for permitting flexible use between CNPN and space-based communication services in the frequency range 28.5-29.5 GHz? Kindly justify your response. Q13.

Do you foresee any challenges in case the spectrum assignee is permitted to utilize the frequency spectrum in the range 28.5-29.5 GHz for cellular based CNPN as well as space-based communication services, in a flexible manner? What could be the measures to mitigate such challenges? Suggestions may kindly be made with justification. 125 Q14. Whether space-based communication services should be categorized into different classes of services requiring different treatment for spectrum assignment? If yes, what should be the classification of services and which type of services should fall under each class of service? Kindly justify your response. Please provide the following details: a) Service provider-wise details regarding financial and market parameters such as total revenue, total subscriber base, total capital expenditure etc. for each type of service (as mentioned in the Table 1.3 of this consultation paper) for the financial year 2018-19, 2019-20, 2020-21, 2021-22, and 2022-23 in the format given below: Type of service: \_\_\_\_\_

Financial Year Revenue (Rs. lakh) Subscriber base CAPEX for the year (Rs. lakh) Depreciation for the year (Rs. lakh) 2018-19 2019-20 2020-21 2021-22 2022-23 b) Projections on revenue, subscriber base and capital expenditure for each type of service (as mentioned in the Table 1.3 of this consultation paper) for the whole industry for the next five years starting from financial year 2023-24, in the format given below:

Type of service: \_\_\_\_\_ Financial Year Revenue (Rs. lakh) Subscriber base CAPEX for the year (Rs. lakh) 2023-24 2024-25 2025-26 2026-27 2027-28 Q15. What should be the methodology for assignment of spectrum for user links for space-based communication services in L-band and S-band, such as- (a) Auction-based (b) Administrative (c) Any other? Please provide your response with detailed justification.

Q16. What should be the methodology for assignment of spectrum for user links for space-based communication services in higher spectrum bands like C-band, Ku-band and Ka-band, such as (a) Auction-based (b) Administrative (c) Any other? Please provide your response in respect of different types of services (as mentioned in Table 1.3 of this consultation paper). Please support your response with detailed justification.

Q17. Whether spectrum for user links should be assigned at the national level, or telecom circle/metro-wise? Kindly justify your response.

Q18. In case it is decided to auction user link frequency spectrum for different types of services, should separate auctions be conducted for each type of services? Kindly justify your response with detailed methodology.

Q19. What should be the methodology for assignment of spectrum for gateway links for space-based communication services, such as (a) Auction-based (b) Administrative (c) Any other? Please provide your response in respect of different types of services. Please support your response with detailed justification.

Q20. Whether spectrum for gateway links should be assigned at the national level, or telecom circle/metro-wise? Kindly justify your response.

Q21. In case it is decided to auction gateway link frequency spectrum for different types of services, should separate auctions be conducted for each type of services? Kindly justify your response with detailed methodology.

Q22. What should be the methodology for assignment of spectrum for gateway links for space-based communication services, such as (a) Auction-based (b) Administrative (c) Any other? Please provide your response in respect of different types of services. Please support your response with detailed justification.

Q23. Whether spectrum for gateway links should be assigned at the national level, or telecom circle/metro-wise? Kindly justify your response.

Q24. In case it is decided to auction gateway link frequency spectrum for different types of services, should separate auctions be conducted for each type of services? Kindly justify your response with detailed methodology.

Q25. What should be the methodology for assignment of spectrum for gateway links for space-based communication services, such as (a) Auction-based (b) Administrative (c) Any other? Please provide your response in respect of different types of services. Please support your response with detailed justification.

Q26. Whether spectrum for gateway links should be assigned at the national level, or telecom circle/metro-wise? Kindly justify your response.

Q27. In case it is decided to auction gateway link frequency spectrum for different types of services, should separate auctions be conducted for each type of services? Kindly justify your response with detailed methodology.

Q28. What should be the methodology for assignment of spectrum for gateway links for space-based communication services, such as (a) Auction-based (b) Administrative (c) Any other? Please provide your response in respect of different types of services. Please support your response with detailed justification.

Q29. Whether spectrum for gateway links should be assigned at the national level, or telecom circle/metro-wise? Kindly justify your response.

Q30. In case it is decided to auction gateway link frequency spectrum for different types of services, should separate auctions be conducted for each type of services? Kindly justify your response with detailed methodology.

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Q20. In case it is decided to auction gateway link frequency spectrum for different types of services, should separate auctions be conducted for each type of services? Kindly justify your response with detailed methodology.

Q21. In case it is decided to assign frequency spectrum for space-based communication services through auction, (a) What should be the validity period of the auctioned spectrum? (b) What should be the periodicity of the auction for any unsold/ available spectrum? (c) Whether some mechanism needs to be put in place to permit the service licensee to shift to another satellite system and to change the frequency spectrum within a frequency band (such as Ka band, Ku-band, etc.) or across frequency bands for the remaining validity period of the spectrum held by it? If yes, what process should be adopted and whether some fee should be charged for this purpose? Kindly justify your response.

Q22. Considering that (a) space-based communication services require spectrum in both user link as well as gateway link, (b) use of frequency spectrum for different types of links may be different for different satellite systems, and (c) requirement of frequency 128 spectrum may also vary depending on the services being envisaged to be provided, which of the following would be appropriate: (i) to assign spectrum for gateway links and user links separately to give flexibility to the stakeholders? In case your response is in the affirmative, what mechanism should be adopted such that the successful bidder gets spectrum for user links as well as gateway links. or (ii) to assign spectrum for gateway links and user links in a bundled manner, such that the successful bidder gets spectrum for user link as well as gateway link? In case your response is in the affirmative, kindly suggest appropriate assignment methodology, including auction so that the successful bidder gets spectrum for user links as well as gateway links.

Q23. Whether any protection distance would be required around the satellite earth station gateway to avoid interference from other satellite earth station gateways for GSO/ NGSO satellites using the same frequency band? If yes, what would be the protection distance (radius) for the protection zone for GSO/ NGSO satellites?

Q24. What should be the eligibility conditions for assignment of spectrum for each type of space-based communication service (as mentioned in the Table 1.3 of this Consultation Paper)? Among other things, please provide your inputs with respect to the following eligibility conditions: (a) Minimum Net Worth (b) Requirement of existing agreement with satellite operator(s) (c) Requirement of holding license/ authorization under Unified License prior to taking part in the auction process. Kindly justify your response

Q25. What should be the terms and conditions for assignment of frequency spectrum for both user links as well as gateway links for each type of space-based communication service? Among other things, please provide your detailed inputs with respect to roll-out obligations on space-based communication service providers. Kindly provide response for both scenarios viz. exclusive assignment and non-exclusive (shared) assignment with justification.

Q26. Whether the provisions contained in the Chapter-VII (Spectrum Allotment and Use) of Unified License relating to restriction on cross holding of equity should also be made applicable for satellite based service licensees? If yes, whether these provisions should be made applicable for each type of service separately? Kindly justify your response.

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**Q27.** Keeping in view the provisions of ITU's Radio Regulations on coexistence of terrestrial services and space-based communication services for sharing of same frequency range, do you foresee any challenges in ensuring interference-free operation of space-based communication network and terrestrial networks (i.e., microwave access (MWA) and microwave backbone (MWB) point to point links) using the same frequency range in the same geographical area? What could be the measures to mitigate such challenges? Suggestions may kindly be made with justification.

**Q28.** In what manner should the practice of assignment of a frequency range in two polarizations should be taken into account in the present exercise for assignment and valuation of spectrum? Kindly justify your response.

**Q29.** What could be the likely issues, that may arise, if the following auction design models (described in para 3.127 to 3.139) are implemented for assignment of spectrum for user links in higher bands (such as C band, Ku band and Ka band)? 130 a. Model #1: Exclusive spectrum assignment b. Model#2: Auction design model based on non-exclusive spectrum assignment to only a limited number of bidders What changes should be made in the above models to mitigate any possible issues, including ways and means to ensure competitive bidding? Response on each model may kindly be made with justification.

**Q30.** In your opinion, which of the two models mentioned in Question 29 above, should be used? Kindly justify your response.

**Q31.** In case it is decided to assign spectrum for user links using model # 2 i.e., non-exclusive spectrum assignment to limited bidders ( $n + \Delta$ ), then what should be (a) the value of  $\Delta$ , in case it is decided to conduct a combined auction for all services (b) the values of  $\Delta$ , in case it is decided to conduct separate auction for each type of service Please provide detailed justification.

**Q32.** Kindly suggest any other auction design model(s) for user links including the terms and conditions? Kindly provide a detailed response with justification as to how it will satisfy the requirement of fair auction i.e., market discovery of price.

**Q33.** What could be the likely issues, that may arise, if Option # 1: (Area specific assignment of gateway spectrum on administrative basis) is implemented for assignment of spectrum for gateway links? What changes could be made in the proposed option to mitigate any possible issues?

**Q34.** What could be the likely issues, that may arise, if Option # 2: Assignment of gateway spectrum through auction for identified areas/ regions/ districts is implemented for assignment of spectrum 131 for gateway links? What changes could be made in the proposed option to mitigate any possible issues? In what manner, areas/ regions/ districts should be identified?

**Q35.** In your view, which spectrum assignment option for gateway links should be implemented? Kindly justify your response.

**Q36.** Kindly suggest any other auction design model(s) for gateway links including the terms and conditions? Kindly provide a detailed response with justification as to how it will satisfy the requirement of fair auction i.e., market discovery of price?

**Q37.** Any other issues/suggestions relevant to the subject, may be submitted with proper explanation and justification.

**Q38.** In case it is decided for assignment of spectrum on administrative basis, what should be the spectrum charging mechanism for assignment of spectrum for space-based communications

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services i. For User Link ii. For Gateway Link Please support your answer with detailed justification.

**Q39.** Should the auction determined prices of spectrum bands for IMT /5G services be used as a basis for valuation of space-based communication spectrum bands i. For user link ii. For gateway link Please support your answer with detailed justification.

**Q40.** If response to the above question is yes, please specify the detailed methodology to be used in this regard?

**Q41.** Whether the value of space-based communication spectrum bands 132 i. For user link ii For gateway link be derived by relating it to the value of other bands by using a spectral efficiency factor? If yes, with which spectrum bands should these bands be related to and what efficiency factor or formula should be used? Please support your response with detailed justification.

**Q42.** In case of an auction, should the current method of levying spectrum fees/charges for satellite spectrum bands on formula basis/ AGR basis as followed by DoT, serve as a basis for the purpose of valuation of satellite spectrum i. For user link ii. For gateway link If yes, please specify in detail what methodology may be used in this regard.

**Q43.** Should revenue surplus model be used for the valuation of space based spectrum bands i. For user link ii. For gateway link Please support your answer with detailed justification.

**Q44.** Whether international benchmarking by comparing the auction determined prices of countries where auctions have been concluded for space-based communication services, if any, be used for arriving at the value of space-based communication spectrum bands: i. For user link ii For gateway link If yes, what methodology should be followed in this regard? Please give country-wise details of auctions including the spectrum band 133 /quantity put to auction, quantity bid, reserve price, auction determined price etc. Please support your response with detailed justification.

**Q45.** Should the international administrative spectrum charges/fees serve as a basis/technique for the purpose of valuation in the case of satellite spectrum bands i. For user link ii. For gateway link Please give country-wise details of administrative price being charged for each spectrum band. Please specify in detail terms and conditions in this regard.

**Q46.** If the answer to above question is yes, should the administrative spectrum charges/fees be normalized for cross country differences? If yes, please specify in detail the methodology to be used in this regard?

**Q47.** Apart from the approaches highlighted above which other valuation approaches can be adopted for the valuation of space-based communication spectrum bands? Please support your suggestions with detailed methodology, related assumptions and other relevant factors.

**Q48.** Should the valuation arrived for spectrum for user link be used for valuation for spectrum for gateway links as well? Please justify.

**Q49.** If the answer to the above is no, what should be the basis for distinction as well as the methodology that may be used for arriving at the valuation of satellite spectrum for gateway links? Please provide detailed justification.

**Q50.** Whether the value arrived at by using any single valuation approach for a particular spectrum band should be taken as the appropriate value of that band? If yes, please suggest which single approach/ method should be used. Please support your answer with detailed justification.

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**Q51.** In case your response to the above question is negative, will it be appropriate to take the average valuation (simple mean) of the valuations obtained through the different approaches attempted for valuation of a particular spectrum band, or some other approach like taking weighted mean, median etc. should be followed? Please support your answer with detailed justification.

**Q52.** Should the reserve price for spectrum for user link and gateway link be taken as 70% of the valuation of spectrum for shared as well as for exclusive assignment? If not, then what ratio should be adopted between the reserve price for the auction and the valuation of the spectrum in different spectrum bands in case of (i) exclusive (ii) shared assignment and why? Please support your answer with detailed justification.

**Q53.** If it is decided to conduct separate auctions for different class of services, should reserve price for the auction of spectrum for each service class be distinct? If yes, on what parameter basis such as revenue, subscriber base etc. this distinction be made? Please support your answer with detailed justification for each class of service.

**Q54.** In case of auction based and/or administrative assignment of spectrum, what should the payment terms and associated conditions for the assignment of spectrum for space-based communication services relating to:

- i. Upfront payment 135
- ii. Moratorium period
- iii. Total number of instalments to recover deferred payments
- iv. Rate of discount in respect of deferred payment and prepayment Please support your answer with detailed justification.

**Ans. Q1. to Q54.** There are no specific comments. Kindly refer to suggestions below.

## Suggestions

The suggestion below are submitted for kind consideration:

### **1.Legislative Framework:**

In view of para '7' above, the Legislative Framework for the following may be put in public domain ASAP:

- (i) For the work assigned to MIB as per Allocation of Business Rules.<sup>51</sup>
- (ii) For the work assigned to DoS as per Allocation of Business Rules.<sup>52</sup>

### **2. Auction vs Administrative:**

In view of para '8'(i),(ii),(iii) above:

**(a)** There is no definition for 'Same Service Same Rules'. Stakeholders advocate this approach for services licensed under section '4' of Telegraph Act.<sup>53</sup>

**Definition of 'Same Service Same Rules' under Legislative Frame Work by incorporating the same in proper ACT.**

**(b)** Level Playing is advocated by the stakeholders. TRAI has made the same as its objective. But had indicated earlier that:

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“2.64 Further, DoT has made a reference to TRAI regarding, convergence of carriage of broadcasting services and telecommunication services which is already under active consideration. Therefore, the Authority, after due consideration will deal with the issue of level playing field separately.” page ‘39’ of.<sup>54</sup>

**The consideration of issue of ‘Level Playing Field’ may be expedited and results put in Public Domain.**

(c) The stakeholders are pro and against Auction. And some have indicated that ‘2G’ case decision is no bar to deviate from ‘Auction’ for assignment of SPECTRUM citing decision after further consideration of the said case.

For the extant CP following **methodology** is submitted for kind consideration:

(i). In case The transfers of ownership and control of a space object of Indian Space objects/activities with INDIA:

Method: All- Auction or Administrative or Mixed

(ii). In case of Indian Space objects/activities ownership transferred to another non Indian entity:

Method: All- Auction or Administrative or Mixed+ landing charges and subject to relevant Space Laws.<sup>55</sup>

(iii). Subject to the condition that:

**‘Use of Planned Bands by foreign GSO satellites is not permitted in India.’<sup>56</sup>**

For Foreign space objects/activities in non-planned bands:

Method: landing charges+ auction for ground spectrum needs

3. Kindly refer to para 9(h) above. The definition of ‘Allocation’ given in CP is different from the one given in RR ITU. The definition of ‘Allocation’ may be changed to be in line with the one RR or the one in CP may made part of Legislative Framework of DoT. Just to repeat the obvious, ITU of which INDIA is a member, is an organ of UN and so works accordingly.<sup>57,58</sup>

4. Kindly refer para ‘10’ above.<sup>59</sup>

The following may please be noted:

(a) Conference Preparatory Meeting (CPM) Report<sup>60</sup> for WRC-23 is about some of the specific items of Agenda of WRC 2003.

(b) 12.75-13.25 GHz Radio Spectrum Band appears in CP as one of several bands of ‘a list of frequency bands to be considered by TRAI for providing recommendations with respect to space-based communication services’ provided by DoT to TRAI.

(c) This appears as Agenda item 1.15<sup>61</sup> which is ‘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)’.

(d) There are many issues with this band as brought out in CPM<sup>62</sup> Report and the same will be discussed for a decision in WRC-23. For example: ‘There are several areas in which there is **no consensus** either on the text or how to proceed with the implementation of the draft new Resolution

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contained in Section 4/1.15/5.2. Consequently the text below is not consistent with resolves 9 of Resolution 172 (WRC-19) as shown below.’<sup>63</sup>

(e) There may be other bands of CP which may be forming part of AGENDA for WRC-23.

**It is suggested that:**

(i) In view of the observations of Director, Radiocommunication Bureau ITU below<sup>64</sup> regarding CPM Report, **The Radio Spectrum bands common in extant CP and CPM**, may be kept in view **while considering the same in the context of extant CP**. May be the consideration of these bands may be proceeded further after outcome of WRC-23.

(ii) In case of remaining bands of CP<sup>65</sup> the basis like any reports of studies done forming basis of proposed use of such bands may be ascertained as no such studies have been mentioned in the CP<sup>66</sup>.

5. Kindly refer 2.(b) above:

In the meantime TRAI may provide a definition of “**LEVEL PLAYING FIELD**” according to which TRAI has been functioning since its inception.

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**“2nd Session of the Conference Preparatory Meeting for WRC-23 Report of the CPM on%9 technical, operational and regulatory/ procedural matters to be considered by the World Radiocommunication Conference 2023”**

‘Director, Radiocommunication Bureau ITU has observed that ‘This Report of the CPM to the World Radiocommunication Conference 2023 (WRC-23) was prepared in response to Resolution 1399 (C20) of the ITU Council to assist those who will be involved in the preparations for and deliberations at WRC-23. The Report was prepared and approved by the Conference Preparatory Meeting (CPM) at its Second Session held in Geneva from 27 March to 6 April 2023. The Report is structured to follow the topics of the WRC-23 Agenda and its content follows the outline approved by the First Session of the CPM, which was held during the week following WRC-19. A cross-reference list is provided to facilitate finding specific topics within the framework of the WRC-23 Agenda. **This Report comprises five Chapters and two Annexes. The Report represents the most up-to-date information on technical, operational and regulatory/procedural issues relevant to the WRC-23 Agenda** available at the time of its preparation and should provide a good basis for the discussions at the Conference’<sup>67</sup>

**Agenda item 1.15**<sup>68</sup>

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### **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);**

Resolution 172 (WRC-19) – 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)

Note: The understanding of this agenda item is that it addresses the 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), consistent with the title of Resolution 172 (WRC-19). There are several areas in which there is **no consensus** either on the text or how to proceed with the implementation of the draft new Resolution contained in Section 4/1.15/5.2. Consequently the text below is not consistent with resolves 9 of Resolution 172 (WRC-19) as shown below. 4/1.15/1

#### **Executive summary**

WRC-23 agenda item 1.15 considers 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. The studies under this agenda item considered only two types of earth station in motion (ESIM): aeronautical (A-ESIM) and maritime (M-ESIM), depending on the type of platform on which they are installed. **Studies** have been carried out on sharing and compatibility between ESIM and terrestrial as well as space services allocated in the frequency bands above. The studies carried out so far have identified provisions to protect such services and guidelines to assist an administration wishing to authorize ESIM to operate on the territory under its jurisdiction. For this agenda item, two methods have been identified:

- **Method A:** This method proposes no changes to the RR and suppression of Resolution 172 (WRC-19) due to the existence of various **uncertainties** in the implementation of several courses of action referred to in the potential Resolution associated with Method B.
- **Method B:** This method **proposes to add a new footnote No. 5.A115 in RR Article 5** and a reference to a new WRC Resolution providing the conditions for the operation of ESIM and protection of the services to which the frequency bands are allocated, and consequential **suppression of Resolution 172 (WRC-19)**.

4/1.15/2 Background ITU has addressed earth stations on aircraft and vessels at previous WRCs. WRC-23 agenda item 1.15 calls for studies on the possible operation of A-ESIM and M-ESIM communicating with geostationary space stations in the fixed-satellite service in the frequency band 12.75-13.25 GHz (Earth-to-space). The use of the frequency band 12.75-13.25 GHz by geostationary-satellite networks in the fixed-satellite service is subject to **RR Appendix 30B**, which contains a worldwide fixed-satellite service allotment Plan and assignments in the List and has its own regulatory procedures and technical criteria. In RR Appendix 30B, the explicit agreement of an administration for the inclusion partially or wholly of its territory in the service area of a proposed RR Appendix 30B assignment (§ 6.6 of RR Appendix 30B)

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is required. A review by the BR of the service areas of the RR Appendix 30B assignments recorded in the MIFR showed that generally the service areas of RR Appendix 30B networks 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 RR Appendix 30B assignment. Therefore, A-ESIM and M-ESIM in the frequency band 12.75-13.25 GHz need to have the capability to restrict operations as discussed below in Section 3.2 to territories of those administrations where agreement under § 6.6 of RR Appendix 30B has been obtained and authorization for such operations has been granted. Also, a distinctive aspect of RR Appendix 30B is the existence of a Reference situation for all Plan allotments and assignments in the List. Moreover, for the operation of A-ESIM and M-ESIM, the technical, operational and regulatory provisions including responsibilities of administrations and entities responsible for the operation, authorization and the interference management system of these earth stations need to be defined. 4/1.15/3 Summary and analysis of the results of ITU-R studies 4/1.15/3.1 User requirements of A-ESIM and M-ESIM operating with GSO FSS satellites A-ESIM and M-ESIM routes may in some cases and under certain circumstances be out of reach of terrestrial networks and must rely on satellite connectivity. In addition, ships and air planes need automating data processes and digitalizing their operations. 4/1.15/3.2 Control and monitoring of ESIMs The three elements consisting of interference management mechanism, switching facility for ON/OFF function and the functions of NCMC and their relations with each other are critical elements for the proper operation of ESIMs. Therefore, the text provided below requires careful consideration by administrations. The only administration that could notify ESIM is the same administration notifying the GSO satellite network with which ESIM communicates. Therefore, the notifying administration of the GSO satellite network is responsible for the compliance of ESIM with all relevant regulatory and administrative provisions, including cases of interferences. The notifying administration of the GSO satellite network is also responsible for ensuring that ESIMs operate only in territories for which their operations are authorized by the administration having the jurisdiction on that territory. Upon receipt of an interference report from the affected administration, the notifying administration of the GSO satellite network responsible for the operation of ESIMs shall work with the NCMC to resolve the unacceptable interference. Should unacceptable interference occur to station(s) in the territory of an administration other than the notifying administration of the satellite network under which the ESIM would operate. View 1 was expressed that the notifying administration of the satellite network with which the ESIM communicates gathers all information about an interference case from the affected administration and resolves the case of interference. The affected administration is invited to provide any available information to the best of their abilities without any additional burden. View 2 was expressed that the course of action of how to address an interference case should be described more in detail, one possible example is provided below. This text below needs to be carefully examined, verified and validated to ensure that its application would contribute to the resolution of interference, taking into account that there is no time element associated with the steps in the text.

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i) Interference occurrence to station(s) in the territory of an administration other than the notifying administration of the satellite network under which the ESIM would operate. ii) The affected administration, in cooperation with the notifying administration of the satellite network under which the ESIM would operate, detects the location of the source of the interference. iii) The affected administration informs the notifying administration of the satellite network under which the ESIM would operate. iv) The notifying administration of the satellite network under which the ESIM would operate shall request immediately to the point of contact for the NCMC all available information necessary to resolve the interference case. v) The NCMC commands the ESIM to disable the transmission or reduce the interference to an acceptable level. vi) The notifying administration of the satellite network under which the ESIM would operate informs the affected administration about the actions taken in iv). vii) The notifying administration of the satellite network under which the ESIM would operate investigates the root cause of the unacceptable interference and takes action from the following options based on the reason of the interference: a) request the NCMC to make transmission level adjustment, frequency or modulation change, antenna pointing accuracy change or others; b) submit to the BR, for information purposes only, the result of the investigation and interference analysis.

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FIGURE 4/1.15/3-2

Proposed ESIM **interference mitigation** process 4/1.15/3.3 System overview and responsibility of the entities involved in the operation of A-ESIM and M-ESIM 4/1.15/3.3.1 System overview From a system configuration perspective, the communications from A-ESIM and M-ESIM communicating with a GSO FSS satellite involve the transmission links depicted in Figure 4/1.15/3-4.

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FIGURE 4/1.15/3-4

System operation in the context of operation under RR Appendix 30B Operation of these links under the regulatory procedures of RR Appendix 30B requires the following: a) that the administration had a filing recorded in the List or MIFR with favourable finding (see also recognizing g) and resolves 2 of the draft new Resolution [A115] (WRC-23)); b) that the satellite has coverage of the relevant location of the earth station; c) that the territory of administration is in the service area of the RR Appendix 30B GSO network; and d) that authorization has been obtained from the administration in whose territory, national airspace and territorial waterways the earth stations operate. For condition c) above, it is necessary for an administration to explicitly agree to be in the service area of that network. For additional clarification, this is depicted in Figure 4/1.15/3-4, where the blue shaded area represents the territory, territorial waters and airspace of a given administration that has explicitly agreed to be in the service area of a network. The operation of link 3 is the subject of WRC-23 agenda item 1.15. The operation of links 1 and 4, i.e. signals to/from fixed earth stations and the RR Appendix 30B network, are currently covered and allowed under RR Appendix 30B network ITU filing. The status of these links and their function will not be different if the RR Appendix 30B satellite also communicates with A-ESIM and M-ESIM, which is being studied under WRC-23 agenda item 1.15. Link 2 operations in the frequency bands 10.7-

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10.95 GHz and 11.2-11.45 GHz may be used for reception at an A-ESIM and M-ESIM to provide broadband service to the end user on aircraft and vessels. Such operation is subject to not claiming protection from other applications of the FSS as well as other radiocommunication services to which the frequency band is allocated as indicated in considering e) of Resolution 172 (WRC-19).

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Link 3 operations in the frequency band 12.75-13.25 GHz (Earth-to-space) are for transmission from an A-ESIM or M-ESIM to a GSO RR Appendix 30B space station. This link has the potential to cause interference to other RR Appendix 30B FSS allotments and assignments as well as other services allocated in the band in addition to services in the adjacent bands, including terrestrial services.

4/1.15/3.3.2 Responsibility of the entities involved in the operation of ESIM For the operation of A-ESIM and M-ESIM the responsibilities of the entities involved was studied. It was agreed that the most practical and pragmatic way with which ESIM could be notified is under the provisions of Annex 1 of draft new Resolution [A115] (WRC-23). In accordance with these provisions, the only administration that could notify an ESIM is the same administration as the one notifying the GSO network with which the ESIM communicates.

4/1.15/3.4 Operation of A-ESIM and M-ESIM communicating with GSO FSS satellites in the frequency band 12.75-13.25 GHz As mentioned in recognizing c) of Resolution 172 (WRC-19), A-ESIM and M-ESIM need to protect the existing services to which the frequency band 12.75-13.25 GHz is allocated as well as services in adjacent frequency bands and not adversely affect assignment of those services and their future development. The frequency band 12.75-13.25 GHz is allocated on a primary basis to the fixed-satellite (FSS) (Earth-to-space), fixed and mobile services, and on a secondary basis to the space research (deep space) (space-to-Earth) service globally. In the adjacent frequency band 13.25-13.4 GHz A-ESIM and M-ESIM shall protect Earth exploration-satellite (active), aeronautical radionavigation and space research (active) services. The following sections describe how A-ESIM and M-ESIM need to protect assignments of services to which the frequency band 12.75-13.25 GHz is allocated and in adjacent frequency bands as called for in Resolution 172 (WRC-19).

4/1.15/3.5 Sharing with terrestrial services (fixed and mobile services) The use of A-ESIM and M-ESIM within the territory of one administration needs to protect terrestrial services in the territories of other administrations. Studies carried out under WRC-23 agenda item 1.15, focused on the following scenarios:

4/1.15/3.5.1 Sharing between A-ESIM and terrestrial services Studies have been considered on the protection of the terrestrial services from A-ESIM. All studies except one used a similar approach which included simulations of multiple A-ESIM and examined the long-term and short-term protection criteria to protect terrestrial stations. These studies demonstrated that the pfd levels provided below, if met at the surface of the Earth by emissions from a single A-ESIM operating at altitudes from 0 km and up to 10 km, allow to meet the protection criteria for terrestrial services.  $-123.5 \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$  for  $\theta \leq 5^\circ$   $-128.5 + \theta \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$  for  $5^\circ < \theta \leq 40^\circ$   $-88.5 \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$  for  $40^\circ < \theta \leq 90^\circ$  where  $\theta$  is the angle of arrival of the radio-frequency wave (degrees above the horizon). These limits take into account only free-space attenuation and no polarization mismatch was considered.

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One of these studies considered aircraft altitudes up to 12 km, which increases the number of A-ESIM considered in the simulation. Atmospheric gases attenuation along the path from the earth station to the terrestrial station was not taken into account. For altitudes above 10 km, this study showed a slight exceedance to the long-term protection criteria for a fixed station with a 29 dBi gain antenna. To address this slight exceedance, this study considered that the above mask would need to be 6 dB more stringent for aircraft at altitudes above 10 km and up to 12 km in order to meet the protection criteria. It was agreed that further simulations should be performed to address this case. Another study employed a static methodology to derive an A-ESIM pfd mask to protect the terrestrial station based on an I/N value of  $-10$  dB not to be exceeded from a single A-ESIM. This study considered the parameters of a fixed service station with highest maximum antenna gain provided by the ITU-R expert group, taking into account worst-case scenario. It concluded that the pfd mask not to be exceeded from emission of earth stations on aircraft in the frequency band 12.75-13.25 GHz should be:  $-152.1654 + 52.2324 \cdot \theta$  dB(W/(m<sup>2</sup> · 1 MHz)) for  $0^\circ \leq \theta < 0.5620^\circ$   $-135.6654$  dB(W/(m<sup>2</sup> · 1 MHz)) for  $0.5620^\circ \leq \theta < 0.8017^\circ$   $-133.2654 + 25 \log_{10}(\theta)$  dB(W/(m<sup>2</sup> · 1 MHz)) for  $0.8017^\circ \leq \theta < 48^\circ$   $-91.2654$  dB(W/(m<sup>2</sup> · 1 MHz)) for  $48^\circ \leq \theta \leq 90^\circ$  where  $\theta$  is the angle of arrival of the radio-frequency wave (degrees above the horizon). One study considered the two different pfd masks and verified whether they would ensure that the protection criteria for the FS are met. This statistical study considered the impact of multiple A-ESIM into FS receivers and took into account both the long- and short-term FS protection criteria. This study considered the pfd mask below:  $-152.1654 + 52.2324 \cdot \theta$  dB(W/(m<sup>2</sup> · 1 MHz)) for  $0^\circ \leq \theta < 0.5620^\circ$   $-135.6654$  dB(W/(m<sup>2</sup> · 1 MHz)) for  $0.5620^\circ \leq \theta < 0.8017^\circ$   $-133.2654 + 25 \log_{10}(\theta)$  dB(W/(m<sup>2</sup> · 1 MHz)) for  $0.8017^\circ \leq \theta < 48^\circ$   $-91.2654$  dB(W/(m<sup>2</sup> · 1 MHz)) for  $48^\circ \leq \theta \leq 90^\circ$  This study demonstrated that the above pfd mask does not adequately protect the FS with exceedance of the short-term protection criteria in some cases. The study also showed that the following pfd mask ensures the protection of the FS:  $-123.5$  dB(W/(m<sup>2</sup> · 1 MHz)) for  $\theta \leq 5^\circ$   $-128.5 + \theta$  dB(W/(m<sup>2</sup> · 1 MHz)) for  $5^\circ < \theta \leq 40^\circ$   $-88.5$  dB(W/(m<sup>2</sup> · 1 MHz)) for  $40^\circ < \theta \leq 90^\circ$  where  $\theta$  is the angle of arrival of the radio-frequency wave (degrees above the horizon). These limits take into account only free space attenuation and no polarization mismatch was considered. In considering the above studies it should be recognized that there are no overall results of different studies available, thus these should be carefully considered by administration when deciding on their preferred method as contained in Section 4. 4/1.15/3.5.2 Sharing between M-ESIM and terrestrial services Technical studies addressed how the short- and long-term protection requirements of the terrestrial services can be met by determining a minimum distance from the low-water mark as officially recognized by the coastal State within which the M-ESIM transmission is subject to the prior agreement of that administration. All studies used the same worst-case assumption of a maximum M-ESIM power of 8W within the receive bandwidth of the terrestrial service terminal and, for

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determination of distances required to meet the FS short-term protection criterion, followed the methodology described in Recommendation ITU-R SF.1650-1. One study, based on the propagation model of Recommendation ITU-R P.452, addressed the protection of the FS, and demonstrated that the maximum distance is driven by the short-term protection criterion of the FS station. According

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to this study, the required distance to meet the short-term protection criterion of the FS, for M-ESIM antennas with a discrimination angle of  $10^\circ$ , is 190 km from the low-water mark as officially recognized by the coastal State. In comparison, the same study showed that the distance required to meet the FS long-term protection criterion is 86 km. One study calculated the minimum distance required to meet the short-term protection criterion of the FS but used the propagation model of Recommendation ITU-R P.620 instead. It concluded that the required distances to meet the short-term protection criterion of the FS, for M-ESIM antennas with discrimination angles of  $10^\circ$ ,  $20^\circ$  and  $35^\circ$  are, respectively, 218 km, 211 km and 190 km from the low-water mark as officially recognized by the coastal State. One study, based on the propagation model of Recommendation ITU-R P.452, demonstrated that the minimum distance from the low-water mark as officially recognized by the coastal State required to meet the short-term protection criterion of the FS is 195.21 km for the case of  $10^\circ$  M-ESIM antenna discrimination angle. For  $36^\circ$  antenna discrimination angle, the distance varies from 155.84 km to 150.7 km, noting that Recommendation ITU-R SF.1650-1 indicates that “ $10^\circ$  discrimination only occurs in the improbable case for which the FSR and ESV azimuths are aligned, and the ESV operates at the minimum elevation angle”. This study has been updated. The new study considered the various protection distances from M-ESIM to protect the FS obtained in the different studies performed. These protection distances vary depending on the assumptions taken, namely on the antenna minimum elevation and the number of vessels passes considered in a year. The new study considered both short-term and long-term protection criteria to derive the protection distance. The protection distance ranges between 86 and 190 km. Based on these considerations, this study proposes to use the single value of 133 km as protection distance. One study addressed the protection of the MS using the technical characteristics of the broadcast auxiliary services (BAS) that operate in the mobile service as described in Recommendation ITU-R M.1824-1. It also calculated distances from the low-water mark as officially recognized by the coastal State required to meet short- and long-term protection criteria of the BAS and showed that the largest required distance to meet the BAS protection criteria is 99.8 km, about half the distance required to protect the fixed services on land. Consequently, protecting the FS will automatically protect the MS operating in the same frequency band. One study calculated the separation distance to meet the long-term and short-term protection criteria for FS stations, assuming M-ESIM antennas operating at 20-degree elevation. The separation distances presented in this study range from 65.8 km to 182 km. It is proposed to adopt a minimum distance, based on the above studies, from the low-water mark as officially recognized by the coastal State within which the M-ESIM transmission is subject to the prior agreement of that administration, if such a method to satisfy agenda item 1.15 of WRC-23 is adopted by the Conference. In considering the above studies it should be recognized that there are no overall results of different studies available, thus these should be carefully considered by administration when deciding on their preferred method as contained in Section 4.

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4/1.15/3.6 Sharing with space services 4/1.15/3.6.1 RR Appendix 30B allotment and frequency assignments As mentioned in recognizing j) of Resolution 172 (WRC-19), there are established criteria in Annex 4 to RR Appendix 30B comprising single-entry and aggregate values to protect RR Appendix 30B allotments/assignments, so the A-ESIM and M-ESIM communicating with GSO

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space stations shall ensure protection of, and not impose undue constraints on them and their future development. Examination of the proposed RR Appendix 30B assignment in accordance with Annex 4 of RR Appendix 30B is conducted for the test points submitted by the notifying administration. For further information on this, see the procedure described in Annex 1 to the draft new Resolution [A115] (WRC-23). Technical characteristics of A-ESIM and M-ESIM communicating with a GSO space station in the FSS shall comply with the envelope characteristics of the Appendix 30B notified earth stations associated with the satellite network (with supporting assignment) (see also resolves 2 of the draft new Resolution [A115] (WRC-23)), with which the ESIMs communicate, and with the coordination agreements between administrations, which apply only to the agreed service area, which may include only territories of administrations that have given their explicit agreement to this.

4/1.15/3.6.2 Non-geostationary FSS satellite systems A number of studies addressed the protection of non-GSO FSS satellite systems from A-ESIM and M-ESIM operating in the frequency band 12.75-13.25 GHz. One study focused only on regulatory issues, and the others developed various operational off-axis e.i.r.p. density masks and maximum on-axis e.i.r.p. levels that ESIMs would need to meet. Through consideration of these various proposals, a single mask and level are contained in Annex 3 of the draft new Resolution [A115] (WRC-23).

4/1.15/3.6.3 Earth exploration-satellite service, space research service in frequency band 13.25-13.4 GHz The ITU-R studied the compatibility between A-ESIM and M-ESIM communicating with GSO FSS networks in the frequency band 12.75-13.25 GHz and EESS (active) in the frequency band 13.25- 13.75 GHz. A comparative analysis was performed from the results of in-band studies between GSO FSS (Earth-to-space) and EESS (active) in the frequency band 13.25-13.75 GHz (see Report ITU-R S.2365). It was concluded that even though Recommendation ITU-R RS.2105 contains further typical EESS (active) system characteristics that were not considered by the analyses in Report ITU-R S.2365, there will not be a compatibility issue between EESS (active) in the frequency band 13.25-13.75 GHz from A-ESIM and M-ESIM in the frequency band 12.75-13.25 GHz due to the relatively large amount of signal attenuation from FSS emissions into the EESS (active) band. The frequency band 13.25-13.4 GHz is allocated to the SRS (active) as well. The SRS (active) was not identified as potentially affected, so there is no need to perform any compatibility study with this service.

4/1.15/3.6.4 Aeronautical radionavigation systems in the frequency band 13.25- 13.4 GHz Two studies on the protection of the aeronautical radionavigation service (ARNS) were performed. Both studies considered protection of ARNS radars 3, 4, 6 and 7 in Table 1 of Recommendation ITU-R M.2008-1. One of the studies addressed the aggregate interference from A-ESIM to an air plane equipped with an ARNS radar in Approach 1, Approach 2, Holding and Landing scenarios

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as defined by the contributing group. In this study the polarization mismatch and the radar receiver feeder loss were considered to be 0 dB. The second study analysed the impact of a single A-ESIM using similar assumptions as the first study. Both studies concluded that with the assumptions taken, the I/N protection criteria of the ARNS operating in the frequency band 13.25-13.40 GHz was met for all scenarios. An additional study addressed the potential interference from A-ESIM into ARNS radar installed on the same aircraft and concluded that ARNS protection criteria would always be

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met. These studies are intended to be used to assist administration in providing authorization or in bilateral and multilateral discussion.

4/1.15/4 Methods to satisfy the agenda item 4/1.15/4.1

**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. 4/1.15/4.2 Method B Add a new footnote in RR Article 5 that refers to a new WRC Resolution with complete 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). However, Method B may solely be pursued under the explicit conditions that all shortcomings, deficiencies, and incomplete operational and regulatory obstacles referred to above are totally removed. 4/1.15/5 Regulatory and procedural considerations

4/1.15/5.1 For Method A NOC ARTICLES NOC APPENDICES

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SUP RESOLUTION 172 (WRC-19) 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) 4/1.15/5.2

For Method B ARTICLE 5

Frequency allocations Section IV –

Table of Frequency Allocations (See No. 2.1) MOD 11.7-13.4 GHz Allocation to services Region 1 Region 2 Region 3 12.75-13.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.441 ADD 5.A115 MOBILE Space research (deep space) (space-to-Earth) ADD 5.A115 The operation of earth stations in motion on board 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) shall be subject to the application of Resolution [A115] (WRC-23). (WRC-23) ADD DRAFT NEW RESOLUTION [A115] (WRC-23) **There are several areas on which there are no consensus either on the text or how to proceed with the implementation of this Resolution.** Consequently, the text below is not consistent with resolves 9 of Resolution 172 (WRC-19) as shown below.

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9 to ensure that the results of ITU-R studies are agreed by Member States taking into account the required consensus on this matter; Use of the frequency band 12.75-13.25 GHz by earth stations in motion on aircraft and vessels communicating with geostationary space stations in the fixed-satellite

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service The World Radiocommunication Conference (Dubai, 2023), considering a) that WARC Orb-88 established an Allotment Plan for the use of the frequency bands 4 500-4 800 MHz, 6 725-7 025 MHz, 10.70-10.95 GHz, 11.20-11.45 GHz and 12.75-13.25 GHz; b) that WRC-07 revised the regulatory regime governing the use of the frequency bands referred to in considering a) above; c) that the objective of providing broadband mobile satellite communications may also be met by allowing earth stations in motion (ESIMs), on aircraft (A-ESIMs) and vessels (M-ESIMs), to communicate with the geostationary space stations of a fixed-satellite service network in the frequency bands 12.75-13.25 GHz (Earth-to-space) and the associated downlink frequency bands of that satellite, thus for example the frequency bands 10.70-10.95 GHz and 11.20-11.45 GHz of Appendix 30B may be used; d) that the frequency band 12.75-13.25 GHz is currently allocated on a primary basis to the fixed-satellite service (FSS) (Earth-to-space), fixed and mobile services and on a secondary basis to the space research (deep space) (space-to-Earth) service; e) that the operation of services to which the frequency band 12.75-13.25 GHz is allocated and those in adjacent bands needs to be protected from A-ESIM and M-ESIM; f) that the frequency band 12.75-13.25 GHz (Earth-to-space) is used by the geostationary-satellite orbit (GSO) FSS in accordance with the provisions of Appendix 30B (No. 5.441) and that there are many existing GSO FSS satellite networks operating in this frequency band; g) that the objective of the procedures in Appendix 30B is to guarantee, for all countries, equitable access to the GSO in the frequency bands of the FSS covered by this Appendix; h) that appropriate regulatory and interference-management mechanisms, including necessary mitigation measures and associated techniques, are required for the operation of A-ESIM and M-ESIM in the frequency band 12.75-13.25 GHz (Earth-to-space) to protect other space and terrestrial services in this frequency band as well as services in adjacent frequency bands and without adversely affecting those services and their future development, taking into account the provisions of Appendix 30B (see also resolves further 1 to 5 on responsibilities); i) that, in Appendix 30B, the frequency bands in the space-to-Earth direction corresponding to the frequency band 12.75-13.25 GHz (Earth-to-space) are 10.7-10.95 GHz and 11.2-11.45 GHz, which may be used by A-ESIM and M-ESIM, subject to not claiming protection from other services and applications of the FSS and other radiocommunication services to which the frequency band is allocated; j) that there is no publicly available information on coordination agreements reached among administrations regarding GSO FSS satellite networks except whether coordination has been completed, which is provided to, and published by, the Radiocommunication Bureau (BR);

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k) that the operation of A-ESIM and M-ESIM requires the establishment of one or more gateway earth station facilities in one or several countries that are within the service area of the associated satellite network and that are authorized by the administration of the territory where such earth stations are located, considering further a) that A-ESIMs and M-ESIMs operating within the agreed service area of the satellite network with which they communicate may provide service within the territories under the jurisdiction of multiple administrations; b) that the operation of ESIMs within the territory under the jurisdiction of administrations/countries mentioned in considering further a) above is subject to obtaining authorization from those administrations, recognizing a) that Article 44 of the ITU Constitution contains the basic principles for the use of the radio-frequency spectrum

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and the GSO and other satellite orbits, taking into account the needs of developing countries; b) that administrations intending to authorize A-ESIMs and M-ESIMs, when establishing national licensing rules, may consider adopting other interference management procedures and/or mitigation measures than those contained in this Resolution; c) that, pursuant to the relevant paragraph in Appendix 30B, the operation of ESIM in the frequency band 12.75-13.25 GHz could be only within the service area of the Appendix 30B network for which the explicit agreement of any administration whose territory is partially or wholly included in this service area has been obtained; c bis) that § 6.16 of Article 6 of Appendix 30B provides the opportunity to any administration at any time to request that its territory be excluded from the service area of any assignment governed by Appendix 30B, therefore the service area can change; d) that the operation of an A-ESIM and M-ESIM pertaining to and communicating with a space station of a given satellite network needs that earth station to be within the coordinated and agreed service area of that satellite under the relevant provisions of Appendix 30B; e) that, based on the available information in the Bureau's database in May 2022, there is no contiguous regional or worldwide coordinated and agreed service area for any satellite using the Appendix 30B frequency band 12.75-13.25 GHz recorded in the Master International Frequency Register (MIFR); f) that, in order for A-ESIM and M-ESIM to operate in the frequency band 12.75- 13.25 GHz (Earth-to-space) of Appendix 30B in the most efficient and operationally viable manner, having a contiguous regional or worldwide coordinated and agreed service area is an important issue to be taken into account; g) that the administration authorizing ESIMs on the territory under its jurisdiction has the right to require that the ESIMs referred to above only use those assignments associated with GSO FSS networks which have been successfully coordinated, notified, brought into use and recorded in the MIFR with a favourable finding under § 8.11 of Article 8 of Appendix 30B, except those arising from the application of § 6.25 of Appendix 30B; h) that Resolution 170 (WRC-19) provides the procedure to enhance equitable access to frequency bands under Appendix 30B by developing countries;

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i) that the protection of current usage and future development of Appendix 30B in the frequency band 12.75-13.25 GHz (Earth-to-space) is a fundamental issue without any adverse effect thereto; j) that the availability of the methodology to examine conformity to the power fluxdensity (pfd) limit as contained in Annex 2 to this Resolution is a fundamental and crucial element; k) that there is need to establish regulatory, technical and recording procedures for the usage of these type of ESIMs that may differ from the current FSS Appendix 30B Plan and List recording procedures; l) that successful compliance with this Resolution does not oblige any administration to authorize/license A-ESIM and M-ESIM communicating with geostationary space stations in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space) to operate within the territory under its jurisdiction (see resolves 7); Option 1 m) that affected administrations retain their right to directly contact the aircraft or vessel on which the ESIM operates; n) that any administration experiencing unacceptable interference from an ESIM may request the assistance of the administration authorizing the ESIM on the territory under its jurisdiction; Option 2 Not to add m) and n) o) that, in accordance with Appendix 30B, the examination of the Bureau in the frequency band 12.75-13.25 GHz (Earth-to-space) is limited to the test-points on land, it is necessary to

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perform the examination of A-ESIM and M-ESIM using grid points generated everywhere within the service area of A-ESIM and M-ESIM submitted under Appendix 4 (see Annex 1 to this Resolution), recognizing further a) that, under resolves 1.1.3 of this Resolution, frequency assignments to ESIMs need to be notified to the BR; b) that, for the operation of ESIMs, notification of any frequency assignment under Annex 1 of this Resolution shall only be made by one single administration which is the notifying administration of the GSO FSS network with which ESIMs communicate; c) that an administration authorizing the operation of ESIMs within the territory under its jurisdiction may modify and/or withdraw that authorization at any time; d) that the three elements consisting of interference management mechanism, switching facility for on/off function and the function of NCMC and their relations with each other and sequence of actions together with estimated time for that action/function are needed for the proper and factual operation of the ESIM; Option 1 see resolves 1.17, 1.1.8 and 1.19 for Option 2 e) the operation of A-ESIM and M-ESIM shall comply with provision No. 5.340; f) when the Appendix 30B GSO FSS satellite network with which A-ESIM and M-ESIM communicate transmits in the frequency bands 10.7-10.95 GHz and 11.2-11.45 GHz, it shall operate

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under the levels that were coordinated and included in the List, and these Appendix 30B satellite transmissions will not change to accommodate A-ESIM and M-ESIM; g) the operation of A-ESIM and M-ESIM in the frequency bands 10.7-10.95 GHz and 11.2-11.45 GHz, if any, shall not adversely affect the allotments in the Plan or 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, resolves 1 that, for any A-ESIM and M-ESIM communicating with a GSO FSS space station within the frequency band 12.75-13.25 GHz (Earth-to-space) or parts thereof, the following conditions shall apply: 1.1 with respect to space services in the frequency band 12.75-13.25 GHz and adjacent bands, A-ESIM and M-ESIM shall comply with the following conditions: 1.1.1 the use of the frequency band 12.75-13.25 GHz (Earth-to-space) by A-ESIM and M-ESIM shall not result in any changes or restrictions to the allotment in the Plan, assignments in the List of Appendix 30B, and those recorded in the MIFR, including the assignments arising from the implementation of Resolution 170 (WRC-19); 1.1.2 with respect to satellite networks or systems of other administrations, the characteristics of A-ESIM and M-ESIM shall remain within the envelope of typical characteristics of notified earth stations associated with the satellite networks with which these earth stations communicate, as published by the Bureau and included in relevant International Frequency Information Circular (BR IFIC), and Annex 1 applies;

1.1.2bis the use of A-ESIM and M-ESIM shall not cause any interference to Appendix 30B allotments, assignments received by the Bureau under Article 6 either in process or yet to be processed, assignments in the List, assignments notified under Article 8 of that Appendix, and assignments recorded in the MIFR as well as submission under Appendix 30B beyond that specified in the relevant Annexes to that Appendix;

1.1.3 for the implementation of resolves 1.1.1, 1.1.2 and 1.1.2bis above, the notifying administration for the GSO FSS network with which the above-mentioned A-ESIM and M-ESIM communicate shall follow the procedure in Annex 1 of this Resolution, together with the

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commitment that the operation of ESIM shall be in conformity with the Radio Regulations, including this Resolution; 1.1.4 upon receipt of the notification information referred to in resolves 1.1.3 above, the BR shall process the submission in accordance with Annex 1 of this Resolution; 1.1.5 for the protection of non-GSO FSS systems operating in the frequency band 12.75- 13.25 GHz, the above-mentioned A-ESIM and M-ESIM communicating with GSO FSS networks referred to above shall comply with the provisions contained in Annex 3 of this Resolution;

1.1.6 the notifying administration of the GSO FSS network with which the above-mentioned earth stations communicate shall ensure that the operation of these A-ESIM and M-ESIM complies with the coordination agreements for the frequency assignments of the earth station of this GSO FSS satellite network of Appendix 30B obtained under the relevant provisions of that Appendix; Option 2 (See recognizing further a), b) and c) for Option1)

1.1.7 the operation of A-ESIM and M-ESIM shall comply with provision No. 5.340;

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1.1.8 when the Appendix 30B GSO FSS satellite network with which A-ESIM and M-ESIM communicate transmits in the frequency bands 10.7-10.95 GHz and 11.2-11.45 GHz, it shall operate under the levels that were coordinated and included in the List, and these Appendix 30B satellite transmissions will not change to accommodate A-ESIM and M-ESIM;

1.1.9 the operation of A-ESIM and M-ESIM in the frequency bands 10.7-10.95 GHz and 11.2-11.45 GHz, if any, 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; 1.2 with respect to the protection of terrestrial services to which the frequency band 12.75- 13.25 GHz is allocated and that operate in accordance with the Radio Regulations, A-ESIM and M-ESIM shall comply with the following conditions:

1.2.1 transmitting A-ESIM and M-ESIM in the frequency band 12.75-13.25 GHz (Earth to space) shall not cause unacceptable interference to terrestrial services to which this frequency band is allocated and that operate in accordance with the Radio Regulations, and Annex 2 to this Resolution shall apply;

1.2.2 the receiving part of the above-mentioned ESIM in their associated frequency band shall not claim protection from terrestrial services to which this frequency band is allocated and that operate in accordance with the Radio Regulations;

1.2.3 the requirement to not cause unacceptable interference to terrestrial services to which the frequency band 12.75-13.25 GHz is allocated and that operate in accordance with the Radio Regulations shall be respected, irrespective of compliance with Annex 2 (see resolves 7);

1.2.4 for the application of Part II of Annex 2 as referred to in resolves 1.2.1 above, the BR shall examine the characteristics of A-ESIM with respect to the conformity with the pfd limits on the Earth's surface specified in Part II of Annex 2, and publish the results of such examination in the BR IFIC;

Option 1 1.2.5 however, the compliance with the technical conditions in Annex 2 does not release the notifying administration of the A-ESIM and M-ESIM with respect to discharging its responsibility that such earth station shall not cause unacceptable interference and any interrelated receiving part shall not claim protection from the terrestrial stations;

Option 2 1.2.5 the compliance with the technical conditions in Annex 2 does not release the notifying administration of the A-ESIM and M-ESIM with respect to discharging its responsibility that such earth station shall not cause

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unacceptable interference and any interrelated receiving part shall not claim protection from the terrestrial stations; 1.2.6 if the BR is unable to examine, in accordance with resolves 1.2.4 above, the A-ESIM with respect to conformity with the pfd limits on the Earth's surface specified in Part II of Annex 2, the notifying administration shall send to BR a commitment that the A-ESIM shall comply with those limits; 1.2.7 the BR shall formulate a qualified favourable finding with respect to the limits contained in Part II of Annex 2 if resolves 1.2.6 is applied successfully, otherwise it shall formulate an unfavourable finding;

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1.2.7bis that, after the application of resolves 1.2.6 and 1.2.7 successfully, once the methodology to examine the characteristics of aeronautical GSO ESIMs with respect to conformity with the pfd limits on the Earth's surface specified in Part II of Annex 2 is available, resolves 1.2.4 shall be applied by the Bureau; End of Option 2 1.2.8 if administrations authorizing A-ESIM agree to pfd levels higher than the limits contained in Part II of Annex 2 within the territory under its jurisdiction, such agreement shall in no way affect other countries that are not party to that agreement; 1.2.9 the notifying administration for the GSO FSS network with which the A-ESIM and M-ESIM will communicate, taking into account the resolves further below, shall send to the BR, together with submission of the Appendix 4 information for the above mentioned earth station, a commitment undertaking that, upon receiving a report of unacceptable interference, it shall immediately take all appropriate measures to eliminate that interference or reduce it to an acceptable level and follow the procedures in resolves 9; 1.3 with respect to the aeronautical radionavigation systems operating in the frequency band 13.25-13.4 GHz, A-ESIM and M-ESIM communicating with GSO FSS networks shall not cause unacceptable interference to the aeronautical radionavigation service (ARNS) operating in accordance with the Radio Regulations in the 13.25-13.40 GHz band; Option 1: 2 that, for assignments of Appendix 30B recorded in the List, only frequency assignments entered in the List under § 6.17 can be used as supporting assignments by earth stations on aircraft and vessels communicating with GSO networks in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space), if those assignments are recorded in the MIFR with a favourable finding under § 8.11 of Article 8 of Appendix 30B, except assignments recorded under § 6.25 of Article 6 of the Appendix; Option 2: 2 that only frequency assignments of Appendix 30B recorded in the List can be used as supporting assignments by A-ESIMs and M-ESIMs communicating with GSO networks in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space), if those assignments are recorded in the MIFR with a favourable finding under § 8.11 of Article 8 of Appendix 30B; Option 3: 2 that only frequency assignments of Appendix 30B recorded in the List can be used as supporting assignments by A-ESIMs and M-ESIMs communicating with GSO networks in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space), if those assignments are recorded in the MIFR with a favourable finding under § 8.11 of Article 8 of Appendix 30B provided that assignments recorded under § 6.25 of Article 6 used for A-ESIM and M-ESIM operations shall not cause unacceptable interference or claim protection from those assignments for which agreement was not obtained; 3 that operation of A-ESIM and M-ESIM communicating with GSO space stations in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space) shall be within the coordinated and notified service area of the GSO FSS network with

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which the earth stations communicate; 4 that, for the implementation of resolves 3 above, the notifying administration for the GSO FSS network with which the A-ESIM and M-ESIM communicate shall ensure that necessary arrangements and switching facilities are built into the above-mentioned earth stations to cease

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emissions once approaching the territory under the jurisdiction of those administrations which either are not within the notified and coordinated service area of the subject space station or have not

authorized the operation over their territories; 5 that any course of action taken under this Resolution has no impact on the original date of receipt of the frequency assignments of the GSO FSS satellite network with which A-ESIM and M-ESIM communicate, or on the coordination requirements of that satellite network; 6 that A-ESIM and M-ESIM shall not be used or relied upon for safety-of-life applications; 7 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 according to No. 18.1 of the Radio Regulations/authorization of that administration is obtained; 8 that gateway earth station facilities for A-ESIM and M-ESIM shall be within the service area of the satellite network associated to that gateway; 9 that, in the case unacceptable interference caused by A-ESIM and/or M-ESIM is reported: Option 1: 9.1 only the notifying administration of the GSO FSS network/non-GSO FSS systems with which ESIMs communicate is responsible for resolving the case of unacceptable interference; Option 2: 9.1 the notifying administration of the GSO FSS network/non-GSO FSS systems with which ESIMs communicate is responsible for resolving the case of unacceptable interference; 9.2 the notifying administration of the GSO FSS network with which the ESIMs communicate shall immediately take the required action to eliminate or reduce interference to an acceptable level; 9.3 the affected administration(s) may assist resolving or provide information that would facilitate resolving the case of unacceptable interference; Option 1: 9.4 the administration authorizing the operation of A-ESIM and M-ESIM on territory under its jurisdiction, subject to its explicit agreement, may provide assistance, including information for the resolution of unacceptable interference; Option 2: 9.4 the administration authorizing the operation of A-ESIM and M-ESIM on the territory under its jurisdiction shall, to the extent of its ability, cooperate to assist in the resolution of unacceptable interference, including providing information as necessary; Option 3: 9.4 an administration that the territory of which is situated inside the service area of a satellite and has provided explicit authorization to receive the service/to be served by any type of ESIM has no obligation nor any mandate, whatsoever, to be involved directly or indirectly in detection, identification, reporting, resolution of any interference caused by the operation of the ESIM the operation of which was authorized;

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9.5 the administration responsible for the aircraft or vessel on which the ESIM operates shall provide a point of contact to assist identifying the notifying administration of the satellite with which the ESIM communicates that the notifying administration of the GSO FSS satellite network with which the ESIM communicates shall ensure that:

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10.1 for the operation of A-ESIM and M-ESIM, techniques are employed to maintain adequate 10 pointing accuracy with the associated GSO/non-GSO FSS satellite;

10.2 all necessary measures shall be taken so that A-ESIM and M-ESIM are subject to permanent monitoring and control by a Network Control and Monitoring Centre (NCMC) in order to comply with the provisions in this Resolution, and are capable of receiving and immediately acting upon, inter alia, “enable transmission” and “disable transmission” commands from the NCMC;

10.3 measures are taken so that the A-ESIM and/or M-ESIM do not transmit on the territory, under the jurisdiction of an administration, including its territorial waters and its national airspace, that is neither in the service area of the GSO satellite network and/or has not authorized its use on its territory;

10.4 a permanent point of contact shall be provided, in the Appendix 4 submission under Annex 1 of this Resolution and published in the special section, by the notifying administration of the GSO FSS network for the purpose of tracing any suspected cases of unacceptable interference from earth stations on aircraft and vessels and to immediately respond to such requests; Option 1: 11 the implementation of this Resolution remains in abeyance pending an agreement to be universally reached on the issue of the interference management system, monitoring facilities’ effectiveness and immediate response of MCNC, cessation of transmission over territories which have not explicitly authorized the functioning and operation of any ESIM over their territories providing satisfactory resolution of the problem, as referred to in recognizing further d) above, Option 2: 11 the implementation of this Resolution is conditioned on providing a description to the administrations whose authorization is sought of interference management system(s), monitoring facilities (NCMC), dealing with the cessation of transmission over territories which have not explicitly authorized (see resolves 7) the functioning and operation of any ESIM over their territories in order to provide a satisfactory resolution of the problem as referred to in recognizing further d) above, NOTE: Provided the description mentioned above is properly addressed and concluded, resolves 11 above may be deleted at WRC-23. resolves further 1 that ESIMs shall not cause unacceptable interference to nor claim protection from other services as referred to in resolves 1.2.1 and 1.2.2; 2 that the notifying administration for the ESIMs shall send to the BR, when submitting the relevant Appendix 4 data, a commitment (as stipulated in resolves 1.2.9) that, upon receiving a report of unacceptable interference, the notifying administration for the GSO satellite network with which ESIMs communicate shall remove such interference; 3 that the commitment referred to in resolves further 2 shall be objective, measurable and enforceable;

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4 that, in case of continued unacceptable interference despite of the commitment referred to in resolves further 2, the assignment causing interference shall be submitted to the Radio Regulations Board for review; 5 that compliance with the provisions contained in Annex 2 does not release the notifying administration of the GSO satellite network with which ESIMs communicate of its obligations mentioned in resolves further 1 above (see resolves 1.2.3); 6 that frequency assignments in the frequency band 12.75-13.25 GHz (Earth-to-space) by A-ESIM and M-ESIM communicating with geostationary space stations in the FSS shall be notified by the notifying administration of the

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satellite network with which the ESIM communicates; 7 that the notifying administration of the satellite network shall ensure that ESIMs operate only in the territory under the jurisdiction of an administration from which an authorization has been obtained, taking into account recognizing further c) above; 8 that, for the implementation of resolves further 2 above, the notifying administration of the satellite network with which ESIMs communicate shall ensure that ESIMs are designed and operate so as to cease transmission in the territory of any administration from which authorization has not been obtained; Option 1 8bis that, for the implementation of resolves further 7 and 8 above, the system shall employ the minimum capabilities listed in Annex 5; Option 2 8bis is not required if Annex 5 is not maintained.

9 that, for the implementation of resolves further 6 above, the notifying administration responsible for the operation of A-ESIM and M-ESIM shall also be responsible for observing and complying with all relevant regulatory and administrative provisions applicable to the operation of the above-mentioned ESIMs as included in this Resolution and those contained in the Radio Regulations;

10 that the authorization for an ESIM to operate in the territory under the jurisdiction of an administration shall in no way release the notifying administration of the satellite network with which the ESIM communicates from the obligation to comply with the provisions included in this Resolution and those contained in the Radio Regulations, instructs the Director of the Radiocommunication Bureau 1 to take all necessary actions to facilitate the implementation of this Resolution, together with providing any assistance for the resolution of interference, when required; 2 to report to future world radiocommunication conferences any difficulties or inconsistencies encountered in the implementation of this Resolution, including whether or not the responsibilities relating to the operation of A-ESIMs and M-ESIMs have been properly addressed; 3 to review, if necessary, once the methodology to examine the characteristics of A-ESIMs with respect to conformity with the pfd limits on the Earth's surface specified in Part II of Annex 2 is available; Option 1 4 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,

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Option 2 4 to publish the list of assignments in the Appendix 30B ESIM brought into use, with information about their service area; this information shall be updated regularly, Note: It was agreed that the issue of identifying the notifying administration is still ambiguous and requires further discussions before taking the decision regarding this draft new resolution, in order to develop a means for the affected administration to identify the notifying administration of the satellite network space station with which the ESIM communicates. instructs the Secretary-General 1 to bring this Resolution to the attention of the Council with a view to consider if cost recovery should be applied to ESIM; 2 to bring this Resolution to the attention of the Secretary-General of the International Maritime Organization and of the Secretary General of the International Civil Aviation Organization. ANNEX 1 TO DRAFT NEW RESOLUTION [A115] (WRC-23) PART I Procedure to be followed by the administrations and the Bureau for submission of the earth stations in motion on aircraft and vessels operating in the frequency band 12.75-13.25 GHz (Earth-to-space) and for the protection of allotments in the Plan, assignments in the Appendix 30B List and those submitted

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under Articles 6 and 7 of Appendix 30B as well as under Resolution 170 (WRC-19) Section A – Procedure for entering assignments to earth stations in motion on aircraft and vessels in the Appendix 30B ESIM List<sup>1</sup> 1 When an administration, or one acting on behalf of a group of named administrations, intends to use one or more Appendix 30B assignments already included in the List and MIFR in support of the operation of A-ESIMs and M-ESIMs in the frequency band 12.75-13.25 GHz, it shall send to the Bureau, not earlier than 8 years but preferably not later than 2 years before the operation of A-ESIMs and M-ESIMs, the information specified in Appendix 42. An assignment in the Appendix 30B ESIM List shall lapse if it is not brought into use within 8 years after the date of receipt by the Bureau of the relevant complete information specified above. A proposed assignment not included in the Appendix 30B ESIM List within 8 years after the date of receipt by the Bureau of the relevant complete information shall also lapse. \_\_\_\_\_ 1 The List of assignments for earth station in motion (ESIM) in the frequency band 12.75-13.25 GHz in Appendix 30B. 2 Submissions may include only the frequency band 12.75-13.0 GHz or 13.0-13.25 GHz.

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1bis If the information received by the Bureau under § 1 is found to be incomplete, the Bureau shall immediately seek any clarification required and information not provided from the administration concerned. 2 Upon receipt of a complete notice under § 1, the Bureau shall examine it with respect to its conformity with: a) the Table of Frequency Allocations and the other provisions<sup>3</sup> of the Radio Regulations, except those provisions relating to conformity with the FSS Plan and the coordination procedures; b) Annex 3 to Appendix 30B; c) the on-axis e.i.r.p. density and off-axis e.i.r.p. density of the supporting Appendix 30B assignment(s); d) the service area of the supporting Appendix 30B assignment(s) in respect of explicit agreements of those administrations whose territories are included in the service area<sup>4</sup>; e) the frequency band of the supporting Appendix 30B assignment(s) in the List in the frequency band 12.75-13.25 GHz. 3 When the examination with respect to § 2 leads to an unfavourable finding, the relevant part of the notice shall be returned to the notifying administration with an indication of the appropriate action. 4 When the examination with respect to § 2 leads to a favourable finding, the Bureau shall use the method of Annex 4 to Appendix 30B to determine administrations whose: a) allotments in the Plan; or b) assignments which appear in the List; or c) assignments which the Bureau has previously examined under § 6.5 of Article 6 of Appendix 30B after receiving complete information in accordance with § 6.1 of that Article, are considered as being affected and receiving more interference than that produced by the supporting Appendix 30B assignment(s). 5 The Bureau shall publish, in a Special Section of its BR IFIC, the complete information received under § 1, together with the names of the affected administrations, the corresponding allotments in the Plan, assignments in the List and assignments for which the Bureau has previously received complete information in accordance with § 6.1 of Article 6 of Appendix 30B and which it has examined under § 6.5 of that Article. 5bis The Bureau shall immediately inform the administration proposing the assignment, in the ESIM List drawing its attention to the information contained in the relevant BR IFIC and the requirement to seek and obtain the agreement of those affected administrations. 6 The Bureau shall also inform each administration listed in the Special Section of the BR IFIC published under § 5, drawing its

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attention to the information it contains. 7 An administration that has not notified its comments either to the administration seeking agreement or to the Bureau within a period of four months following the date of the BR IFIC \_\_\_\_\_ 3 The “other provisions” shall be identified and included in the Rules of Procedure. 4 The service area may be reduced by excluding certain countries for which explicit agreement was obtained.

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referred to in § 5 shall be deemed to have not agreed to the proposed assignment in respect of its allotment in the Plan, conversion of an allotment into an assignment without modification or with a modification which is within the envelope characteristics of the initial allotment, Article 7 request transferred to Article 6, submission in accordance with Resolution 170 (WRC-19), according to the case for which absence of reply/comments shall construe their disagreement to the request for coordination. This time-limit shall be extended for an administration that has requested the assistance of the Bureau by up to thirty days following the date on which the Bureau communicated the result of its action. In respect of its frequency assignments under Article 6 of Appendix 30B other than those mentioned above, the same course of action outlined in § 6.10 of that Article shall apply. 8 Unless coordination is no longer required, the administration responsible for the notice published under § 5 shall seek and obtain the explicit agreement of the relevant affected administrations contained in the Special Section published under § 5 in respect of allotment in the Plan, conversion of an allotment into an assignment without modification or with a modification which is within the envelope characteristics of the initial allotment, Article 7 request transferred to Article 6, submission in accordance with Resolution 170 (WRC-19), as appropriate. In this specific case of explicit agreement, any request for the assistance of the Bureau shall not change it to implicit/tacit agreement. 9 If agreements have been reached in accordance with §§ 7 and 8 with administrations published under § 5, the administration responsible for the notice published under § 5 may request the Bureau to have the assignment entered into the Appendix 30B ESIM List, indicating the final characteristics of the notice<sup>5</sup> together with the names of the administrations with which agreement has been reached. 9bis In submitting such information, noting the requirement of § 1 of Section B, the administration may also request the Bureau to examine the submission in respect of notification under Section B. 9ter If the information received by the Bureau under §§ 9 and 9bis is found to be incomplete, the Bureau shall immediately seek any clarification required and information not provided from the administration concerned. The Bureau may also provide additional information in order to assist the notifying administration in complying with requirements under §§ 10, 12 and 13. 10 Upon receipt of a complete notice under § 9, the Bureau shall examine each assignment in the notice with respect to its conformity with: a) the Table of Frequency Allocations and the other provisions<sup>6</sup> of the Radio Regulations, except those provisions relating to conformity with the FSS Plan and the procedures for obtaining coordination; b) Annex 3 to Appendix 30B; c) the service area published under § 5; d) the on-axis e.i.r.p. density and off-axis e.i.r.p. density of the assignments published under § 5, and e) frequency band of the assignments published under § 5. \_\_\_\_\_ 5 Submissions may include only the frequency band 12.75-13.0 GHz or 13.0-13.25 GHz. 6 The “other provisions” shall be identified and included in the Rules of Procedure

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11 When the examination with respect to § 10 of an assignment received under § 9 leads to an unfavourable finding, the notice shall be returned to the notifying administration with an indication that subsequent resubmission under § 9 will be considered with a new date of receipt. 12 When the examination with respect to § 10 of an assignment received under § 9 leads to a favourable finding, the Bureau shall use the method of Annex 4 to examine if there is any administration and the corresponding: a) allotment in the Plan; b) assignment which appears in the List at the date of receipt of the examined notice submitted under § 1; c) assignments which the Bureau has previously examined under § 6.5 of Article 6 of Appendix 30B after receiving complete information in accordance with § 6.1 of that Article at the date of receipt of the examined notice submitted under § 17, considered as being affected and receiving more interference than that produced by the supporting Appendix 30B assignment(s) and whose agreement has not been provided under § 9. 13 The Bureau shall determine if the cumulative interference is caused to an allotment in the Plan or an assignment in the List or an assignment for which the Bureau has received complete information in accordance with Article 6 of Appendix 30B before the date of receipt of the complete notice under § 9. The cumulative interference shall be calculated based on Appendix 1 to Annex 4 of Appendix 30B, taking into account assignments in the Appendix 30B ESIM List together with assignments submitted under § 9. The cumulative interference is considered as being caused when the overall aggregate (C/I) aggregate value is less than that resulting from the supporting Appendix 30B assignment(s) with a tolerance of 0.25 dB (inclusive of the 0.05 dB computational precision), except for an allotment in the Plan, an assignment stemming from the conversion of an allotment into an assignment without modification, or when the modification is within the envelope characteristics of the initial allotment, as well as assignments relating to application of Article 7 of Appendix 30B for which the 0.05 dB computational precision is applicable. 14 In the event of a favourable finding under §§ 12 and 13, the Bureau shall enter the proposed assignment in the Appendix 30B ESIM List and publish in a Special Section of its BR IFIC the characteristics of the assignment received under § 9, together with the names of administrations with which the provisions of this procedure have been successfully applied. 15 When the examination under § 12 or § 13 leads to an unfavourable finding with respect to allotments in the Plan, conversion of an allotment into an assignment without modification or with a modification which is within the envelope characteristics of the initial allotment, Article 7 request transferred to Article 6, or submission in accordance with Resolution 170 (WRC-19), the Bureau shall return the notice to the notifying administration. In this case, the notifying administration undertakes not to bring into use the frequency assignments until the finding with respect to allotments in the Plan, conversion of an allotment into an assignment without modification or with a modification which is within the envelope characteristics of the initial allotment, Article 7 request transferred to Article 6, or submission in accordance with Resolution 170 (WRC-19), is favourable. The Bureau, in returning the notice to the notifying administration, shall indicate that the subsequent resubmission under § 9 will be considered with a new date of receipt. \_\_\_\_\_ 7 Similar course of action as prescribed in footnote 7bis of § 6.21 of Article 6 of Appendix 30B applies.

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15bis When the examination under § 12 or § 13 leads to a favourable finding with respect to allotments in the Plan, conversion of an allotment into an assignment without modification or with a modification which is within the envelope characteristics of the initial allotment, Article 7 request transferred to Article 6, submission in accordance with Resolution 170 (WRC-19), but an unfavourable finding with respect to others, and if the notifying administration insists that the proposed assignment be included in the Appendix 30B ESIM List, the Bureau shall enter the assignment provisionally in the Appendix 30B ESIM List with an indication of those administrations whose assignments were the basis of the unfavourable finding. To this effect, the notifying administration shall include a signed commitment, indicating that use of an assignment provisionally recorded in the Appendix 30B ESIM List shall not cause unacceptable interference to, nor claim protection from, those assignments for which agreement still needs to be obtained. The entry in the Appendix 30B ESIM List shall be changed from provisional to definitive only if the Bureau is informed that all required agreements have been obtained. 15ter Should the assignments that were the basis of the unfavourable finding not be brought into use within the period specified in § 6.1 of Article 6 of Appendix 30B or within the extension period under § 6.31bis Article 6 of Appendix 30B, then the status of the assignment in the Appendix 30B ESIM List shall be reviewed accordingly. 16 Should unacceptable interference be caused by an assignment entered in the Appendix 30B ESIM List under § 15bis to any assignment in the List which was the basis of the disagreement, the notifying administration of the assignment entered in the Appendix 30B ESIM List under § 15bis shall, upon receipt of advice thereof, immediately eliminate this unacceptable interference. 17 For the examinations referred to in Part I and Part II, the Bureau shall generate a set of uplink grid points everywhere within the service area of the relevant assignments to A-ESIMs and M-ESIMs, assuming that A-ESIMs and M-ESIMs are located at these uplink grid points.

Section B – Procedure for notification and recording in the Master Register of assignments to earth stations in motion on aircraft and vessels dealt with under this Resolution

1 Any assignment in the ESIM List for which the relevant procedure of Section A and Part II of this Annex has been successfully applied shall be notified to the Bureau using the relevant characteristics listed in Appendix 4, not earlier than three years before the assignments are brought into use. 2 If the first notice referred to in § 1 has not been received by the Bureau within the required period mentioned in § 1 of Section A, the assignments in the Appendix 30B ESIM List shall be cancelled by the Bureau after having informed the administration at least three months before the expiry of this period. 3 Notices not containing those characteristics specified in Appendix 4 as mandatory or required shall be returned with comments to help the notifying administration to complete and resubmit them, unless the information not provided is immediately forthcoming in response to an inquiry by the Bureau. 4 Complete notices shall be marked by the Bureau with their date of receipt and shall be examined in the date order of their receipt. Following receipt of a complete notice, the Bureau shall, as soon as possible after the date of entry of the corresponding assignment into the Appendix 30B ESIM List or within not more than two months if the corresponding assignment has already been entered into the Appendix 30B ESIM List, publish its contents, with any diagrams and maps and the date of receipt, in the BR IFIC, which shall constitute the acknowledgement to the notifying

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administration of receipt of its notice. When the Bureau is not in a position to comply with the time limit referred to above, it shall periodically so inform the administrations, giving the reasons thereof. 5 The Bureau shall not postpone the formulation of a finding on a complete notice unless it lacks sufficient data to reach a conclusion thereon. 6 Each notice shall be examined: 6.1 with respect to its conformity with the Table of Frequency Allocations and the other provisions<sup>8</sup> of these Regulations, except those provisions relating to conformity with the FSS Plan and the procedures for obtaining coordination, which are the subject of the following subparagraph; 6.2 with respect to its conformity with the FSS Plan, the procedures for obtaining coordination and the associated provisions<sup>9</sup>. 7 When the examination with respect to § 6.1 leads to a favourable finding, the assignment shall be examined further with respect to § 6.2; otherwise, the notice shall be returned with an indication of the appropriate action. 8 When the examination with respect to § 6.2 leads to a favourable finding, the ESIM assignment shall be recorded in the Master Register. When the finding is unfavourable, the notice shall be returned to the notifying administration, with an indication of the appropriate action. 9 In every case when a new ESIM assignment is recorded in the Master Register it shall, in accordance with the provisions of this Resolution, include an indication of the finding reflecting the status of the assignment. This information shall also be published in the BR IFIC. 10 A notice of a change in the characteristics of the ESIM assignment already recorded, as specified in Appendix 4, shall be examined by the Bureau under § 6.1 and § 6.2, as appropriate. Any changes to the characteristics of an assignment that has been recorded and confirmed as having been brought into use shall be brought into use within eight years from the date of the notification of the modification. Any changes to the characteristics of an assignment that has been recorded but not yet brought into use shall be brought into use within the period provided for in § 1 of Section A. 11 In applying the provisions of this Section, any resubmitted notice which is received by the Bureau more than six months after the date on which the original notice was returned by the Bureau shall be considered to be a new notice. \_\_\_\_\_ 8 The “other provisions” shall be identified and included in the Rules of Procedure. 9 When an administration notifies any assignment with characteristics different from those entered in the Appendix 30B ESIM List through successful application of the relevant procedure of Section A and Part II of this Annex, the Bureau shall undertake calculation to determine if the proposed new characteristics increase the interference level caused to other allotments in the Plan, assignments in the List, an assignment for which the Bureau has received complete information in accordance with § 6.1 of Article 6 of Appendix 30B before the date of receipt of this notification, assignments in the Appendix 30B ESIM List and an assignment for which the Bureau has received complete information in accordance with § 1 of Section A before the date of receipt of this notification. The increase of the interference due to characteristics different from those entered in the Appendix 30B ESIM List will be checked by comparing the C/I ratios of these other allotments and assignments, which result from the use of the proposed new characteristics of the subject assignment on the one hand, and those obtained with the characteristics of the subject assignment in the Appendix 30B ESIM List, on the other hand. This C/I calculation is performed under the same technical assumptions and conditions.

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12 All frequency assignments notified in advance of their being brought into use shall be entered provisionally in the Master Register. Any frequency assignment provisionally recorded under this provision shall be brought into use no later than the end of the period provided for in § 1 of Section A. Unless the Bureau has been informed by the notifying administration of the bringing into use of the assignment, it shall, no later than 15 days before the end of the regulatory period established under § 1 of Section A, send a reminder requesting confirmation that the assignment has been brought into use within the regulatory period. If the Bureau does not receive that confirmation within 30 days following the period provided under § 1 of Section A, it shall cancel the entry in the Master Register and the corresponding assignment in the Appendix 30B ESIM List. 13 When the Bureau has received confirmation that the assignment in the Appendix 30B ESIM List has been brought into use, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC. 14 Wherever the use of a frequency assignment in the Appendix 30B ESIM List is suspended for a period exceeding six months, the notifying administration shall inform the Bureau of the date on which such use was suspended. When that assignment is brought back into use, the notifying administration shall so inform the Bureau, as soon as possible. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC. The date on which the assignment is brought back into use shall be no later than three years from the date on which the use of the frequency assignment was suspended, provided that the notifying administration informs the Bureau of the suspension within six months from the date on which the use was suspended. If the notifying administration informs the Bureau of the suspension more than six months after the date on which the use of the frequency assignment was suspended, this three-year time period shall be reduced. In this case, the amount by which the three-year period shall be reduced shall be equal to the amount of time that has elapsed between the end of the six-month period and the date that the Bureau is informed of the suspension. If the notifying administration informs the Bureau of the suspension more than 21 months after the date on which the use of the frequency assignment was suspended, the frequency assignment shall be cancelled from the Master Register and the Appendix 30B ESIM List. 15 If the supporting Appendix 30B assignment(s) is cancelled from the List, the corresponding ESIM assignment shall also be cancelled from the Appendix 30B ESIM List and the Master Register, as appropriate. PART II Procedure to be followed by the administrations and the Bureau for examination and protection of one ESIM with respect to the other ESIMs 1 In the publication of the Special Section referred to in § 5 of Section A, the Bureau shall also include the names of the affected administrations, the corresponding assignments in the Appendix 30B ESIM List and assignments for which the Bureau has previously received complete information in accordance with § 1 of Section A and which it has examined under § 4 of Section A, as appropriate. 2 In determining administrations whose assignments in the Appendix 30B ESIM List or assignments for which the Bureau has previously received complete information in accordance with

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§ 1 of Section A and which it has examined under § 4 of Section A are considered as being affected, the Bureau shall apply the principle of Annex 4 to Appendix 30B and the following criteria: a) orbital spacing as specified in paragraph 1.2 of Annex 4; b) Earth-to-space single-entry carrier-to-interference as specified in paragraph 2.1 of Annex 4 or Earth-to-space single-entry carrier-to-interference (C/I) derived from the supporting Appendix 30B assignment(s), whichever is the lowest; c) the Earth-to-space pfd as specified in paragraph 2.2 of Annex 4. 3 An administration that has not notified its comments either to the administration seeking agreement or to the Bureau within a period of four months following the date of the BR IFIC referred to in § 5 of Section A shall be deemed to have agreed to the proposed assignment. This time-limit shall be extended for an administration that has requested the assistance of the Bureau by up to thirty days following the date on which the Bureau communicated the result of its action. 4 Unless coordination is no longer required, taking into account the final characteristics of the notice in § 9 of Section A, should harmful interference be caused by an assignment included in Appendix 30B ESIM List to any assignment in Appendix 30B ESIM List identified in § 1 for which agreement has not been obtained, the notifying administration shall, upon receipt of advice thereof, immediately eliminate this harmful interference. ANNEX 2 TO DRAFT NEW RESOLUTION [A115] (WRC-23) Provisions for earth stations on aircraft and vessels to protect terrestrial services in the frequency band 12.75-13.25 GHz 1 The parts below contain provisions to ensure that A-ESIM and M-ESIM do not cause unacceptable interference in neighbouring countries to terrestrial service operations when A-ESIM and M-ESIM operate in frequency bands overlapping with those used at any time by terrestrial services to which the frequency band 12.75-13.25 GHz is allocated and operating in accordance with the Radio Regulations (see also resolves 1.2 of this Resolution). PART I Earth stations on vessels 2 The notifying administration of the GSO FSS network with which an M-ESIM communicates shall ensure compliance of the M-ESIM operating within the frequency band 12.75-13.25 GHz, or parts thereof, with both of the following conditions for the protection of terrestrial services to which the frequency band is allocated within a coastal State: 2.1 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 133/150 km in the frequency band 12.75-13.25 GHz. Any transmissions from an M-ESIM within the minimum distance shall be subject to the prior agreement of the coastal State concerned. 2.2 The maximum earth station on vessel e.i.r.p. spectral density towards the horizon shall be limited to 12.5 dB(W/MHz). Transmissions from an M-ESIM with higher e.i.r.p. spectral density levels towards the territory of any coastal State shall be subject to the prior agreement of the coastal State concerned.

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PART II Earth stations on aircraft 3 The notifying administration of the GSO FSS satellite network with which an A-ESIM communicates shall ensure compliance of the A-ESIM operating within the frequency band 12.75- 13.25 GHz, or parts thereof, with all of the following conditions for the protection of terrestrial services to which the frequency band is allocated: PFD MASK Option 1 1 When within line-of-sight of the territory of an administration, and above an altitude of 3 km, the maximum pfd produced at the surface of the Earth on the territory of an administration by emissions from a single A-ESIM shall not exceed:  $\text{pfd}(\theta) = -112 \text{ (dB(W/(m}^2 \cdot 14 \text{ MHz)))}$  for  $\theta \leq 5^\circ$   $\text{pfd}(\theta) =$

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$-117 + \theta$  (dB(W/(m<sup>2</sup> · 14 MHz))) for  $5^\circ < \theta \leq 40^\circ$  pfd( $\theta$ ) =  $-77$  (dB(W/(m<sup>2</sup> · 14 MHz))) for  $40^\circ < \theta \leq 90^\circ$  where  $\theta$  is the angle of arrival of the radio-frequency wave (degrees above the horizon). 2 When within line-of-sight of the territory of an administration, maximum pfd produced at the surface of the Earth on the territory of an administration by emissions from a single aeronautical ESIM shall not exceed: pfd( $\theta$ ) =  $-123.5$  dB(W/(m<sup>2</sup> · MHz)) for  $\theta \leq 5^\circ$  pfd( $\theta$ ) =  $-128.5 + \theta$  dB(W/(m<sup>2</sup> · MHz)) for  $5^\circ < \theta \leq 40^\circ$  pfd( $\theta$ ) =  $-88.5$  dB(W/(m<sup>2</sup> · MHz)) for  $40^\circ < \theta \leq 90^\circ$  where  $\theta$  is the angle of arrival of the radio-frequency wave (degrees above the horizon). Option 2 1 When within line-of-sight of the territory of an administration, the maximum pfd produced at the surface of the Earth on the territory of an administration by emissions from a single aeronautical ESIM shall not exceed: pfd( $\theta$ ) =  $-123.5$  dB(W/(m<sup>2</sup> · MHz)) for  $\theta \leq 5^\circ$  pfd( $\theta$ ) =  $-128.5 + \theta$  dB(W/(m<sup>2</sup> · MHz)) for  $5^\circ < \theta \leq 40^\circ$  pfd( $\theta$ ) =  $-88.5$  dB(W/(m<sup>2</sup> · MHz)) for  $40^\circ < \theta \leq 90^\circ$  where  $\theta$  is the angle of arrival of the radio-frequency wave (degrees above the horizon). 2 The maximum power in the out-of-band domain should be attenuated below the maximum output power of the aeronautical ESIM transmitter as described in Recommendation ITU-R SM.1541.

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ANNEX 3 TO DRAFT NEW RESOLUTION [A115] (WRC-23) Provisions for earth stations in motion on aircraft and vessels to protect non-GSO FSS in the frequency band 12.75-13.25 GHz 1 In order to protect the non-GSO FSS systems referred to in resolves 1.1.5 of this Resolution in the frequency band 12.75-13.25 GHz, ESIMs shall not exceed the following operational limits: a) on-axis e.i.r.p. density of 49 dB(W/1 MHz) for an ESIM with an antenna maximum gain lower than 38.5 dBi; b) on-axis e.i.r.p. density of 54 dB(W/1 MHz) for an ESIM with an antenna maximum gain equal to or greater than 38.5 dBi but lower than 45 dBi; c) on-axis e.i.r.p. density of 57.5 dB(W/1 MHz) for an ESIM with an antenna maximum gain equal to or greater than 45 dBi; d) e.i.r.p. density for any off-axis angle  $\theta$  which is  $3^\circ$  or more off the main-lobe axis of an ESIM antenna and outside  $3^\circ$  of the GSO arc: Off-axis angle Maximum e.i.r.p. density  $3\theta \leq 31.6 - 37 - 25 \log \theta$  dB(W/40 kHz)  $31.6 - 180 - 0.5 \theta$  dB(W/40 kHz) 2 the Radiocommunication Bureau shall not make any examination or finding with respect to compliance with this Annex under either Article 9 or 11. ANNEX 4 TO DRAFT NEW RESOLUTION [A115] (WRC-23) NOTE: This methodology has been developed based on the discussions in Working Party 4A regarding the draft new Recommendation ITU-R S.[RES.169\_METH] which contains a methodology for assessing compliance of A-ESIM communicating with GSO FSS satellites to meet the obligations to protect terrestrial services in Resolution 169 (WRC-19). Proposals to WRC-23 on agenda item may need to take into account any further progress/updates to this draft new Recommendation when considering a methodology for assessing compliance with Part 2 of Annex 1 of Resolution [A115] (WRC-23) for A-ESIM communicating with GSO FSS satellites. However, it should be emphasized that the discussion in the CG would lead to a satisfactory conclusion on the matter and there is no certainty that the work of the CG will be agreed at WP 4A and SG4. Consequently, actions referred to in CPM should not be based on other actions that may not be conclusive. Methodology with respect to the examination of compliance of A-ESIM with pfd limits in Part II of Annex 2 1 Overview of the methodology This methodology determines the off-axis e.i.r.p. spectral density (“EIRPC”) towards the ground for an A-ESIM transmitter communicating

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with a GSO FSS satellite that would ensure compliance with a set of pre-established pfd limits defined on the Earth's surface. This methodology may also

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be used for guidance by administrations when considering authorizing the operation of ESIMs in their territories. The methodology then compares the computed EIRPC with a metric introduced here and named Reference off-axis e.i.r.p. towards the ground ("EIRPR") of the A-ESIM. For the emission in each group of a GSO satellite network, EIRPR will be calculated by using the Appendix 4 data for that network as well as other input parameters that shall be provided by the notifying administration for that network. Specifically, for an emission of the GSO FSS satellite network associated with an A-ESIM class of station, the EIRPR is the algebraic summation (in logarithmic terms) of the maximum input power to the antenna flange (item C.8.a.1 of Appendix 4), the peak gain of the A-ESIM antenna (item C.10.d.3 of Appendix 4), the maximum achievable off-axis gain isolation towards the ground of the A-ESIM antenna in the service area of the GSO network under examination and a parameter that would compensate for any difference between the emission bandwidth and the reference bandwidth of the pre-established set of pfd limits. The operations of A-ESIM shall be evaluated over multiple predefined altitude ranges in order to establish as many EIRPC levels for comparison with EIRPR. This comparison is at the basis of the methodology and examination that are described more in detail in the following section. 2 Parameters and geometry Figure A4-1 provides a description of the geometry considered under this methodology. The figure shows an A-ESIM flying at two different altitudes and also some of the parameters used for the calculation. The model is agnostic to GSO ESIM geographical locations on Earth and assumes a spherical Earth model with a fixed radius for the calculation.

FIGURE A4-1 Geometry for the examination of compliance for two different ESIM altitudes All the parameters required by the Bureau to carry out the examination process are listed and briefly described in Table A4-1. Additional considerations are further elaborated in section 3.

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TABLE A4-1 Relevant parameters for pfd compliance examination

Parameter	Symbol	Type of parameter
Observation Aeronautical GSO ESIM altitude	H	Established by the methodology as
Hmin= [0.02] km, Hmax= [15] km, Hstep= [1] km		The altitudes at which the examination is carried out range from Hmin to Hmax at Hstep intervals
Angle of arrival of the incident wave on the Earth's surface	$\delta$	Specified by the pre established set(s) of pfd limits, variable from 0° to 90°
Pre-established set(s) of pfd should cover incident angles from 0° to 90°		Angle below the horizontal plane of the ESIM corresponding to the angle of arrival $\delta$ under examination
$\gamma$		Calculated from the geometry This angle is calculated considering the GSO ESIM altitude $H_j$ examined and angle of arrival $\delta$ under examination (see Fig. A.4-1)
Distance between the ESIM and the point on the ground under examination	D	Calculated from the geometry This distance is a function of the A-ESIM altitude and the angles $\delta$ and $\gamma$
Frequency	f	Established by the methodology To evaluate the propagation loss either at the central frequency or at the upper and lower limits of the frequency range
Atmospheric loss	Latm	Calculated and established by the methodology Based on Recommendation ITU-R P.676
Polarization loss	LPol	Fixed value 0 dB proposed as a conservative approach for the polarization loss between the polarization of A-ESIM antenna and the one used by



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to each of the angles  $\gamma_{j,n}$  computed in b) above. e) Compute the atmospheric loss  $L_{atm\_j,n}$  (dB) applicable to each of the distances  $D_{j,n}$  computed in c) above. f) Compute the  $EIRPC_{j,n}$  (dB(W/BW<sub>Ref</sub>)), that is the maximum e.i.r.p. that can be radiated in the pfd mask's reference bandwidth by the A-ESIM towards each of the N points to be compliant with the set(s) of pre-established pfd limits, as per the following equation:  $EIRPC_{j,n} = EIRP_{ref} - 10 \log_{10} \left( \frac{D_{j,n}^2}{L_{atm\_j,n} \cdot L_{pol} \cdot L_{fj} \cdot L_{fn}} \right)$  (4) g) Compute the minimum  $EIRPC_j$  across all values calculated at the previous step,  $EIRPC_j = \text{Min}(EIRPC_{j,n}(\delta_n, \gamma_n))$ . The output of this last step is the maximum EIRPC that can be radiated by the A-ESIM to ensure it complies with the set(s) of pre-established pfd limits with respect to all angles  $\delta_n$  at the altitude  $H_j$ . There will be one  $EIRPC_j$  for each of the  $H_j$  altitudes considered. iv) For the emissions, check whether there is at least one j for which  $EIRPC_j > EIRPR$ . If the emission of the Group under examination passes the test above, the result of the Bureau's examination for that Group is favourable, otherwise it is unfavourable. v) The Bureau publishes: The finding (favourable or unfavourable) for each Group of emissions of the GSO network examined. 4 Example application of the methodology Table A4-2 below describes the emissions included in one Group of a fictitious satellite network that are associated to the class of A-ESIM transmitting in the frequency band 12.75-13.25 GHz.

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TABLE A4-2 Example A-ESIM emissions in the Group examined  
 Emission No. C7a Designation of emission C8a2/C8b2 Maximum power density dB(W/Hz) C8c3 Minimum power density (not used in methodology) dB(W/Hz) C8e1 C/N objective (total – clear sky) (not used in methodology) dB  
 1 6MD7W-- -70 -80 -5.0  
 Table A4-3 below includes additional assumptions needed for the application of the methodology described in section 3.  
 TABLE A4-3 Additional assumptions  
 Parameter Notation Value Unit  
 Test frequency F 13.25 GHz  
 GSO orbital longitude GSO\_lon 13.0 deg  
 GSO service area latitude bounds – from 23.55 to 63.55 deg  
 GSO service area longitude bounds – from -9.72 to 30.28 deg  
 A-ESIM antenna peak gain  $G_{max}$  32.7 dBi  
 Antenna gain pattern – APEREC015V01 \Polarization loss  $L_{Pol}$  0.0 dB  
 Fuselage attenuation model  $L_f$  See Table A4-4  
 Atmospheric loss  $L_{atm}$  Recommendation ITU-R P.676  
 Minimum examination altitude range  $H_{min}$  0.02 km  
 Maximum examination altitude range  $H_{max}$  15.0 km  
 Examination altitude range spacing  $H_{step}$  1.0 km  
 TABLE A4-4 Fuselage attenuation model from Report ITU-R M.2221  
 $L_{fuse}(\gamma) = 3.5 + 0.25 \cdot \gamma$  dB for  $0^\circ \leq \gamma \leq 10^\circ$   
 $L_{fuse}(\gamma) = -2 + 0.79 \cdot \gamma$  dB for  $10^\circ < \gamma \leq 34^\circ$   
 $L_{fuse}(\gamma) = 3.75 + 0. \cdot \gamma$  dB for  $34^\circ < \gamma \leq 50^\circ$   
 $L_{fuse}(\gamma) = 35$  dB for  $50^\circ < \gamma \leq 90^\circ$

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TABLE A4-5 Tested pfd limits on the ground  
 The maximum pfd produced at the surface of the Earth on the territory of an administration by emissions from a single earth station on aircraft shall not exceed:  
 $-123.5$  dB(W/( $m^2 \cdot MHz$ )) for  $\theta \leq 5^\circ$   
 $-128.5 + \theta$  dB(W/( $m^2 \cdot MHz$ )) for  $5^\circ < \theta \leq 40^\circ$   
 $-88.5$  dB(W/( $m^2 \cdot MHz$ )) for  $40^\circ < \theta \leq 90^\circ$  where  $\theta$  is the angle of arrival of the radio-frequency wave (degrees above the horizon).  
 The paragraphs below represent the step-by-step application of the calculation methodology described in section 3.  
 START i) For the emission in Table A4-2, the reference e.i.r.p. (EIRPR, dBW) is computed and the relevant results are included in Table A4-6 below:  
 TABLE A4-6 Computed values of EIRPR for the Group under consideration  
 Emission  $G_{Max}$ , dBi  
 $G_{isol}$

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dB P<sub>Max</sub>, dB(W/Hz) BW, MHz EIRPR, dBW 1 32.7 35.2 -70 6.0 - 12.5 -12.5 ii) Generate  $\delta n$  angles compatible with the pfd limits described in Table A4-5:  $\delta n = 0^\circ, 0.01^\circ, 0.02^\circ, \dots, 0.3^\circ, 0.4^\circ, \dots, 12.3^\circ, 12.4^\circ, \dots, 13^\circ, 14^\circ, \dots, 90^\circ$ . iii) For each altitude  $H_j = H_{min}, H_{min} + H_{step}, \dots, H_{max}$ , compute EIRPC<sub>j</sub>. The output of this step is summarized in Table A4-7 below: TABLE A4-7 Computed EIRPC<sub>j</sub> values (see embedded file for full results) j H<sub>j</sub> EIRPC<sub>j,n</sub> ( $\delta n, \gamma n$ ) dB(W/BW<sub>Ref</sub>) EIRPC<sub>j</sub> - (km)  $\delta = 0^\circ \delta = 0.01^\circ \dots \delta = 90^\circ$  dB(W/BW<sub>Ref</sub>) 1 0.02 Table A.2.9\_1.15.xlsx -40.62 2 1.00 -26.84 3 2.00 -20.77 ... ... ... 16 15.00 -3.27 iv) For the emission, check whether there is at least one altitude for which EIRPC<sub>j</sub> > EIRPR. The result of this step is summarized in Table A4-8 below:

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TABLE A4-8 Comparison between EIRPC<sub>j</sub> and EIRPR Emission EIRPR dB(W) Smallest j for which EIRPC<sub>j</sub> > EIRPR EIRPC<sub>j</sub> > EIRPR 1 -12.5 5 Yes v) Since the emission among those included in the Group under examination passes the test detailed in iv) above, the results of the Bureau's examination for this Group are favourable. vi) The Bureau publishes: The finding (here, favourable) for the Group of the GSO network examined. ANNEX 5 TO DRAFT NEW RESOLUTION [A115] (WRC-23) Option 1: Required ESIM software and hardware capabilities In order to enable the ESIM to cease transmission when the conditions described are met, the ESIM network shall be designed with appropriate software or hardware capabilities. The table below describes applicable minimum software and hardware capabilities, with a justification for their requirement. Also it is important to note that the NCMC has a database of allowed power spectral density limits per angles (azimuth, elevation and skew), altitude and attitude that are critical to ensure pfd limits are met. The NCMC draws upon this comprehensive and detailed database of allowed levels and continually monitors feedback from the terminal to ensure emissions are fully compliant with regulatory limits. For each ESIM, the NCMC will have a record of the location, the latitude, longitude and altitude, the transmit frequency, channel bandwidth and satellite system. This data can be made available to an administration or authorized agency for the purposes of detecting and resolving interference events. TABLE A5-1 Minimum ESIM capabilities and justification Capability Justification GNSS (or other geolocation capabilities) Required to assess ESIM's geographic location so ESIM is aware when entering the administration's territory that has not given authorization and feedback to software to cease transmissions accordingly. Monitor loss of frequency lock Required to anticipate an error in transmission frequency, which could potentially lead to interference out of assigned transmission band. Monitor loss of LO signal Required to anticipate an error in transmission frequency, which could potentially lead to interference out of assigned transmission band. Internal power off/on/reset Required for the ESIM to have the ability to self-power down after experiencing a fault condition, then restart or power back on when fault is resolved.

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Capability Justification Disable/enable transmission and level adjustment Required to cease, adjust and re-enable transmissions as necessary to mitigate interference or unauthorized transmissions. Receive and execute commands from NCMC Required to receive commands to enable/disable transmission from NCMC or other commands as necessary to mitigate interference or unauthorized

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transmissions. Furthermore, the ESIM shall have the ability to enter the states described in Table A5-2. These states are required to ensure the ESIM is in the correct radio-interface state after some event (such as an initial boot or resuming operations after a fault) and can test system functionality is correct before radiating in order to avoid any transmission errors. TABLE A5-2 ESIM states and events

ESIM state	Radio-interface state	Corresponding event	Non-valid Emissions
disabled	After power-on, until ESIM can receive commands from NCMC and no fault conditions are present	After any failure/fault	During system checks
Initial phase	Emissions disabled	When waiting for a transmission enable or disable command from NCMC	Transmission enabled
Carrier-off	No carrier transmitted/need for carrier to be transmitted	Receive synchronization is lost	Pointing threshold is exceeded
Carrier-on	During transmission and ESIM is correctly pointed	Transmission disabled	Emissions disabled
When commanded by NCMC or ESIM automatically enters based on a "Cease Transmission" condition	In locations where transmission is not permitted	Option 2: Annex 5 is not needed and these elements can be captured in the ITU-R Reports and/or Recommendations.	

\_\_\_\_\_ 10 Heavily adapted from EN 303 979

## References

1. [https://traf.gov.in/sites/default/files/CP\\_06042023.pdf](https://traf.gov.in/sites/default/files/CP_06042023.pdf)
2. [https://traf.gov.in/sites/default/files/PR\\_No.34of2023.pdf](https://traf.gov.in/sites/default/files/PR_No.34of2023.pdf)
3. [https://traf.gov.in/sites/default/files/PR\\_No.40of2023\\_0.pdf](https://traf.gov.in/sites/default/files/PR_No.40of2023_0.pdf)
4. [https://traf.gov.in/sites/default/files/PR\\_No.43of2023\\_0.pdf](https://traf.gov.in/sites/default/files/PR_No.43of2023_0.pdf)
5. [https://traf.gov.in/sites/default/files/PR\\_No.52of2023.pdf](https://traf.gov.in/sites/default/files/PR_No.52of2023.pdf)
6. supra '1'
7. ibid.
8. Below:
  - 1.0 [https://traf.gov.in/sites/default/files/GSMA\\_02062023.pdf](https://traf.gov.in/sites/default/files/GSMA_02062023.pdf)
  - 2.0 [https://traf.gov.in/sites/default/files/BIF\\_02062023.pdf](https://traf.gov.in/sites/default/files/BIF_02062023.pdf)
  - 3.0 [https://traf.gov.in/sites/default/files/IAFI\\_02062023.pdf](https://traf.gov.in/sites/default/files/IAFI_02062023.pdf)
  - 4.0 [https://traf.gov.in/sites/default/files/ISpA\\_02062023.pdf](https://traf.gov.in/sites/default/files/ISpA_02062023.pdf)
  - 5.0 [https://traf.gov.in/sites/default/files/NGN\\_02062023.pdf](https://traf.gov.in/sites/default/files/NGN_02062023.pdf)
  - 6.0 [https://traf.gov.in/sites/default/files/Nasscom\\_02062023.pdf](https://traf.gov.in/sites/default/files/Nasscom_02062023.pdf)
  - 7.0 [https://traf.gov.in/sites/default/files/Mait\\_02062023.pdf](https://traf.gov.in/sites/default/files/Mait_02062023.pdf)
  - 8.0 [https://traf.gov.in/sites/default/files/USIBC\\_02062023.pdf](https://traf.gov.in/sites/default/files/USIBC_02062023.pdf)
  - 9.0 [https://traf.gov.in/sites/default/files/AVIA\\_02062023.pdf](https://traf.gov.in/sites/default/files/AVIA_02062023.pdf)
  10. [https://traf.gov.in/sites/default/files/ICEA\\_02062023.pdf](https://traf.gov.in/sites/default/files/ICEA_02062023.pdf)
  11. [https://traf.gov.in/sites/default/files/SIA\\_02062023.pdf](https://traf.gov.in/sites/default/files/SIA_02062023.pdf)
  12. [https://traf.gov.in/sites/default/files/IBDF\\_02062023.pdf](https://traf.gov.in/sites/default/files/IBDF_02062023.pdf)
  13. [https://traf.gov.in/sites/default/files/NBDA\\_02062023.pdf](https://traf.gov.in/sites/default/files/NBDA_02062023.pdf)
  14. [https://traf.gov.in/sites/default/files/THE\\_BUZZWORD\\_02062023.pdf](https://traf.gov.in/sites/default/files/THE_BUZZWORD_02062023.pdf)

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## Counter Comments

15. [https://traf.gov.in/sites/default/files/PHDCCI\\_02062023.pdf](https://traf.gov.in/sites/default/files/PHDCCI_02062023.pdf)
16. [https://traf.gov.in/sites/default/files/GSOA\\_05062023.pdf](https://traf.gov.in/sites/default/files/GSOA_05062023.pdf)
17. [https://traf.gov.in/sites/default/files/Intelsat\\_02062023.pdf](https://traf.gov.in/sites/default/files/Intelsat_02062023.pdf)
18. [https://traf.gov.in/sites/default/files/Thaicom\\_02062023.pdf](https://traf.gov.in/sites/default/files/Thaicom_02062023.pdf) pages16-
19. [https://traf.gov.in/sites/default/files/Inmarsat\\_02062023.pdf](https://traf.gov.in/sites/default/files/Inmarsat_02062023.pdf)
20. [https://traf.gov.in/sites/default/files/Koan\\_Advisory\\_02062023.pdf](https://traf.gov.in/sites/default/files/Koan_Advisory_02062023.pdf)
21. [https://traf.gov.in/sites/default/files/Koan\\_Advisory\\_02062023.pdf](https://traf.gov.in/sites/default/files/Koan_Advisory_02062023.pdf)
22. [https://traf.gov.in/sites/default/files/The\\_Dialogue\\_02062023.pdf](https://traf.gov.in/sites/default/files/The_Dialogue_02062023.pdf)
23. [https://traf.gov.in/sites/default/files/Asianet\\_02062023.pdf](https://traf.gov.in/sites/default/files/Asianet_02062023.pdf)
24. [https://traf.gov.in/sites/default/files/Viasat\\_02062023.pdf](https://traf.gov.in/sites/default/files/Viasat_02062023.pdf)
25. [https://traf.gov.in/sites/default/files/Myriota\\_02062023.pdf](https://traf.gov.in/sites/default/files/Myriota_02062023.pdf)
26. [https://traf.gov.in/sites/default/files/Dhruva\\_Space\\_02062023.pdf](https://traf.gov.in/sites/default/files/Dhruva_Space_02062023.pdf)
27. [https://traf.gov.in/sites/default/files/Globalstar\\_02062023.pdf](https://traf.gov.in/sites/default/files/Globalstar_02062023.pdf) pages12-
28. [https://traf.gov.in/sites/default/files/SpaceX\\_02062023.pdf](https://traf.gov.in/sites/default/files/SpaceX_02062023.pdf) pages42-
29. [https://traf.gov.in/sites/default/files/Telesat\\_02062023.pdf](https://traf.gov.in/sites/default/files/Telesat_02062023.pdf) pages22-
30. [https://traf.gov.in/sites/default/files/Civis\\_02062023.pdf](https://traf.gov.in/sites/default/files/Civis_02062023.pdf) page4-
31. [https://traf.gov.in/sites/default/files/Esya\\_Centre\\_02062023.pdf](https://traf.gov.in/sites/default/files/Esya_Centre_02062023.pdf) pages28-
32. [https://traf.gov.in/sites/default/files/ABS\\_Global\\_02062023.pdf](https://traf.gov.in/sites/default/files/ABS_Global_02062023.pdf) pages14-
33. [https://traf.gov.in/sites/default/files/Amazon\\_Kuiper\\_02062023.pdf](https://traf.gov.in/sites/default/files/Amazon_Kuiper_02062023.pdf) pages19-
34. [https://traf.gov.in/sites/default/files/Kawa\\_Space\\_02062023.pdf](https://traf.gov.in/sites/default/files/Kawa_Space_02062023.pdf) page1-
35. [https://traf.gov.in/sites/default/files/KRMT\\_02062023.pdf](https://traf.gov.in/sites/default/files/KRMT_02062023.pdf) pages3+
36. [https://traf.gov.in/sites/default/files/LT\\_02062023.pdf](https://traf.gov.in/sites/default/files/LT_02062023.pdf) pages3-
37. [https://traf.gov.in/sites/default/files/Mangata\\_02062023.pdf](https://traf.gov.in/sites/default/files/Mangata_02062023.pdf) pages6-+
38. [https://traf.gov.in/sites/default/files/Redbooks\\_02062023.pdf](https://traf.gov.in/sites/default/files/Redbooks_02062023.pdf) Pages27-
39. [https://traf.gov.in/sites/default/files/Sateliot\\_02062023.pdf](https://traf.gov.in/sites/default/files/Sateliot_02062023.pdf) pages4+-
40. [https://traf.gov.in/sites/default/files/vihaan\\_02062023.pdf](https://traf.gov.in/sites/default/files/vihaan_02062023.pdf) page1-
41. [https://traf.gov.in/sites/default/files/DOORS\\_02062023.pdf](https://traf.gov.in/sites/default/files/DOORS_02062023.pdf) pages3+
42. [https://traf.gov.in/sites/default/files/ICT\\_Robot\\_02062023.pdf](https://traf.gov.in/sites/default/files/ICT_Robot_02062023.pdf) pages25+
43. [https://traf.gov.in/sites/default/files/Augsenselab\\_02062023.pdf](https://traf.gov.in/sites/default/files/Augsenselab_02062023.pdf) pages2-
44. [https://traf.gov.in/sites/default/files/Suhora\\_02062023.pdf](https://traf.gov.in/sites/default/files/Suhora_02062023.pdf) page1+
45. [https://traf.gov.in/sites/default/files/Xovian\\_05062023.pdf](https://traf.gov.in/sites/default/files/Xovian_05062023.pdf) pages23-
46. [https://traf.gov.in/sites/default/files/Manastuspace\\_05062023.pdf](https://traf.gov.in/sites/default/files/Manastuspace_05062023.pdf) pages2-
47. [https://traf.gov.in/sites/default/files/Rajeev\\_Khatter\\_02062023.pdf](https://traf.gov.in/sites/default/files/Rajeev_Khatter_02062023.pdf) pages39-
48. [https://traf.gov.in/sites/default/files/Akash\\_bahure\\_02062023.pdf](https://traf.gov.in/sites/default/files/Akash_bahure_02062023.pdf) page10
49. [https://traf.gov.in/sites/default/files/R\\_Ashok\\_02062023.pdf](https://traf.gov.in/sites/default/files/R_Ashok_02062023.pdf) pages3+
50. [https://traf.gov.in/sites/default/files/Hari\\_Nath\\_02062023.pdf](https://traf.gov.in/sites/default/files/Hari_Nath_02062023.pdf) page10
51. [https://traf.gov.in/sites/default/files/TCL\\_02062023.pdf](https://traf.gov.in/sites/default/files/TCL_02062023.pdf) pages24-
52. [https://traf.gov.in/sites/default/files/Airtel\\_02062023.pdf](https://traf.gov.in/sites/default/files/Airtel_02062023.pdf) pages39
53. [https://traf.gov.in/sites/default/files/Hathway\\_02062023.pdf](https://traf.gov.in/sites/default/files/Hathway_02062023.pdf) pages11+
54. [https://traf.gov.in/sites/default/files/DEN\\_02062023.pdf](https://traf.gov.in/sites/default/files/DEN_02062023.pdf) pages12+
55. [https://traf.gov.in/sites/default/files/Times\\_Network\\_02062023.pdf](https://traf.gov.in/sites/default/files/Times_Network_02062023.pdf) pages20-

## Counter Comments

(DominantMediaEntity)

56. [https://traf.gov.in/sites/default/files/DishD2H\\_02062023.pdf](https://traf.gov.in/sites/default/files/DishD2H_02062023.pdf) pages19-
57. [https://traf.gov.in/sites/default/files/RJIL\\_02062023.pdf](https://traf.gov.in/sites/default/files/RJIL_02062023.pdf) pages68+
58. [https://traf.gov.in/sites/default/files/PMSL\\_02062023.pdf](https://traf.gov.in/sites/default/files/PMSL_02062023.pdf) pages22-
59. [https://traf.gov.in/sites/default/files/HUGHES\\_02062023.pdf](https://traf.gov.in/sites/default/files/HUGHES_02062023.pdf) pages25-
60. [https://traf.gov.in/sites/default/files/vil\\_02062023.pdf](https://traf.gov.in/sites/default/files/vil_02062023.pdf) pages39-
61. [https://traf.gov.in/sites/default/files/OneWeb\\_02062023.pdf](https://traf.gov.in/sites/default/files/OneWeb_02062023.pdf) pages41-
62. [https://traf.gov.in/sites/default/files/NXTD\\_02062023.pdf](https://traf.gov.in/sites/default/files/NXTD_02062023.pdf) pages26-
63. [https://traf.gov.in/sites/default/files/Nelco\\_02062023%20.pdf](https://traf.gov.in/sites/default/files/Nelco_02062023%20.pdf) pages34-
64. [https://traf.gov.in/sites/default/files/TataPlay\\_02062023.pdf](https://traf.gov.in/sites/default/files/TataPlay_02062023.pdf) pages10-

**9.0** *ibid.*

**10.0** *supra* '1'.

**11.0** <https://dot.gov.in/sites/default/files/Administrative%20Assignment%20OM%20dated%2017th%20January%202023.pdf>

**13.** page '35' *supra* 'i'.

**14.** pages 28,29 of *supra* '1'.

**15.** page 4 of *supra* '1'.

**16.** pages 4,33,69 of *supra* '1'.

**17.** page 29 of *supra* '1'.

**18.** para 2.4 page 29 of *supra* '1'.

**19.** pages 30,29,28 of *supra* '1'.

**20.** page 4 of *supra* '1'.

**21.** pages 29 of *supra* '1'.

**22.** pages 4,69,33, of *supra* '1'.

**23.** pages 1,2,15,21,24 of 38 of *supra* **8.60.**

**23.** Pages 1,3 of *supra* **8.54.**

**24.** Pages 2,10 *supra* **8.54.**

**25.** page'5' of *supra* **8.42.**

**26.** pages 3,22,23 of *supra* **8.52.**

**27.** <https://traf.gov.in/about-us/history>

**28.** page 21 of *supra* **8.52.**

**29.** page3/10 of *supra* **8.64.0**

**30.** page 4 of *supra* **6.33.**

## Counter Comments

31. page 4 of supra 6.55.
32. page 1 of supra 8.63.
33. page 1/1 of supra 8.44.
34. supra '1'.
35. page '1' of supra 8.5.0.
36. ibid.
37. page '12' of supra 8.5.0.
38. page '2' of 8.64
39. page '3' of supra 8.55.
40. page '3' of supra 8.31.
41. [https://www.unoosa.org/res/oosadoc/data/documents/2017/stspace/stspace61rev\\_2\\_0\\_html/V1605998-ENGLISH.pdf](https://www.unoosa.org/res/oosadoc/data/documents/2017/stspace/stspace61rev_2_0_html/V1605998-ENGLISH.pdf)
42. pages 5,47,52,88,91 of supra '1'.
43. page '5' of supra 8.55.
44. '42' pages of supra 8.47.
45. [https://www.itu.int/en/ITU-R/space/workshopBangkok2010/03a-Orbit\\_Spectrum%20Allocation%20Procedures\\_MG.pdf](https://www.itu.int/en/ITU-R/space/workshopBangkok2010/03a-Orbit_Spectrum%20Allocation%20Procedures_MG.pdf)
46. <https://www.itu.int/hub/2023/01/satellite-regulation-leo-geo-wrs/>
47. [ICG: ICG: Observers: ITU \(unoosa.org\)](https://www.unoosa.org/icg/observers/)
48. page '18' supra '1'.
49. ITU RR Article 1.16.
50. Page '6 of 1120' of 57. below.
51. pages 109/196 to 112/196 of [https://cabsec.gov.in/writereaddata/allocationbusinessrule/completeaobrules/english/1\\_Upload\\_3540.pdf](https://cabsec.gov.in/writereaddata/allocationbusinessrule/completeaobrules/english/1_Upload_3540.pdf)
52. page 176/196 of [https://cabsec.gov.in/writereaddata/allocationbusinessrule/completeaobrules/english/1\\_Upload\\_3540.pdf](https://cabsec.gov.in/writereaddata/allocationbusinessrule/completeaobrules/english/1_Upload_3540.pdf)
53. supra '11'.
54. [https://tra.gov.in/sites/default/files/CP\\_13012023.pdf](https://tra.gov.in/sites/default/files/CP_13012023.pdf)
55. <https://www.unoosa.org/pdf/pres/lsc2012/symp-01E.pdf>
56. page 35 of supra '1'.

## Counter Comments

- 57. [https://www.itu.int/en/ITU-R/space/workshopBangkok2010/03a-Orbit\\_Spectrum%20Allocation%20Procedures\\_MG.pdf](https://www.itu.int/en/ITU-R/space/workshopBangkok2010/03a-Orbit_Spectrum%20Allocation%20Procedures_MG.pdf)
- 58. [https://www.unoosa.org/documents/pdf/spacelaw/workshops/SLC2022/presentations/H. Glaude - UNOOSA - ITU frequency management 20220511.pdf](https://www.unoosa.org/documents/pdf/spacelaw/workshops/SLC2022/presentations/H._Glaude_-_UNOOSA_-_ITU_frequency_management_20220511.pdf)
- 59. supra '50'.
- 60. [1] [Final CPM Report for WRC-23 \(itu.int\)](#)
- 61. ibid page 13/1120.
- A62. Supra '60'.
- 63. para 1.15 of page 590 of supra **60**.
- 64. page 4/1120 of supra **60**.
- 65. supra '1'.
- 66. ibid.
- 67. WRC-23.
- 68. pages 590 to 627 of supra **60**.

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