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| **World Radiocommunication Conference (WRC-19) Sharm el-Sheikh, Egypt, 28 October – 22 November 2019** |  |
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| PLENARY MEETING | **Addendum 5 to Document 47-E** |
|  | **4 October 2019** |
|  | **Original: English** |
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| Australia | |
| PROPOSALS FOR THE WORK OF THE CONFERENCE | |
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| Agenda item 1.5 | |

1.5 to consider the use of the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion communicating with geostationary space stations in the fixed-satellite service and take appropriate action, in accordance with Resolution **158 (WRC-15)**;

# 1 Introduction

Australia supports the Asia-Pacific Common Proposal (ACP) for WRC-19 agenda item 1.5. The ACP is based on Method B of the CPM Report with a draft new Resolution that sets out arrangements for use of the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz for ESIM subject to protection of, and not imposing undue constraints on, existing in-band services.

The regulatory text provided below is based on the text of the ACP, which in turn was based on the text of the CPM Report.

Australia has proposed different or additional text in this contribution in support of a particular option where the ACP provided more than one, to fill gaps where the ACP did not provide text, and to propose minor editorial drafting improvements to Resolution clauses. Additionally, having considered the issues further, Australia is of the view that further modifications are required to some parts of the ACP. These proposals are included as tracked changes in the proposed regulatory text below with reasons for the proposals that are more than editorial in nature.

# 2 Proposals

Australia proposes regulatory changes for this agenda item, as follows:

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations  
(See No. 2.1)

MOD AUS/47A5/1#49988

15.4-18.4 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 17.7-18.1  FIXED  FIXED-SATELLITE (space-to-Earth) 5.484A ADD 5.A15 (Earth-to-space) 5.516  MOBILE | 17.7-17.8  FIXED  FIXED-SATELLITE (space-to-Earth) 5.517 ADD 5.A15 (Earth-to-space) 5.516  BROADCASTING-SATELLITE  Mobile  5.515 | 17.7-18.1  FIXED  FIXED-SATELLITE (space-to-Earth) 5.484A ADD 5.A15 (Earth-to-space) 5.516  MOBILE |
|  | 17.8-18.1  FIXED  FIXED-SATELLITE (space-to-Earth) 5.484A ADD 5.A15 (Earth-to-space) 5.516  MOBILE  5.519 |  |
| 18.1-18.4 FIXED  FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B ADD 5.A15  (Earth-to-space) 5.520  MOBILE  5.519 5.521 | | |

**Reasons:** Add a footnote to the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz to reference draft new Resolution **[AUS/A15] (WRC-19)**.

MOD AUS/47A5/2#49989

18.4-22 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 18.4-18.6 FIXED  FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B ADD 5.A15  MOBILE | | |
| 18.6-18.8  EARTH EXPLORATION-SATELLITE (passive)  FIXED  FIXED-SATELLITE (space-to-Earth) 5.522B ADD 5.A15  MOBILE except aeronautical mobile  Space research (passive) | 18.6-18.8  EARTH EXPLORATION- SATELLITE (passive)  FIXED  FIXED-SATELLITE (space-to-Earth) 5.516B 5.522B ADD 5.A15  MOBILE except aeronautical mobile  SPACE RESEARCH (passive) | 18.6-18.8  EARTH EXPLORATION-SATELLITE (passive)  FIXED  FIXED-SATELLITE (space-to-Earth) 5.522B ADD 5.A15  MOBILE except aeronautical mobile  Space research (passive) |
| 5.522A 5.522C | 5.522A | 5.522A |
| 18.8-19.3 FIXED  FIXED-SATELLITE (space-to-Earth) 5.516B 5.523A ADD 5.A15  MOBILE | | |
| 19.3-19.7 FIXED  FIXED-SATELLITE (space-to-Earth) (Earth-to-space) 5.523B 5.523C 5.523D 5.523E ADD 5.A15  MOBILE | | |

**Reasons:** Add a footnote to the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz to reference draft new Resolution **[AUS/A15] (WRC-19)**.

MOD AUS/47A5/3#49990

24.75-29.9 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 27.5-28.5 FIXED 5.537A  FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 ADD 5.A15  MOBILE  5.538 5.540 | | |
| 28.5-29.1 FIXED  FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.523A 5.539 ADD 5.A15  MOBILE  Earth exploration-satellite (Earth-to-space) 5.541  5.540 | | |
| 29.1-29.5 FIXED  FIXED-SATELLITE (Earth-to-space) 5.516B 5.523C 5.523E 5.535A 5.539 5.541A ADD 5.A15  MOBILE  Earth exploration-satellite (Earth-to-space) 5.541  5.540 | | |

**Reasons:** Add a footnote to the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz to reference draft new Resolution **[AUS/A15] (WRC-19)**.

ADD AUS/47A5/4#49991

5.A15The operation of earth stations in motion communicating with geostationary FSS space stations in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz shall be subject to draft new Resolution **[AUS/A15] (WRC‑19)**.(WRC‑19)

**Reasons:** Add a footnote to the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz to reference draft new Resolution **[AUS/A15] (WRC-19)**.

ADD AUS/47A5/5#49993

draft new RESOLUTION [AUS/A15] (WRC-19)

Use of the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz by earth stations in motion (ESIM) communicating with geostationary space stations  
in the fixed-satellite service

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

considering

*a)* that there is a need for global broadband mobile-satellite communications, and that some of this need could be met by allowing earth stations in motion (ESIM) to communicate with space stations of geostationary-satellite orbit (GSO) fixed-satellite service (FSS) operating in the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space);

*b)* that appropriate regulatory and interference management mechanisms are necessary for the operation of ESIM;

*c)* that the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) are also allocated to terrestrial and space services used by a variety of different systems and these existing services and their future development need to be protected from the operation of ESIM,

recognizing

*a)* that the administration authorizing ESIM on territory under its jurisdiction has the right to require that ESIM 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 Article **11**, including Nos. **11.31**, **11.32** or **11.32A**, where applicable;

*b)* that for cases of incomplete coordination under No. **9.7** of the GSO FSS network with assignments to be used by ESIM, the operation of ESIM using those assignments in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz needs to be in accordance with the provisions of No. **11.42** with respect to any recorded frequency assignment which was the basis of the unfavourable finding under No. **11.38**;

*c)* 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 ESIM communicate or on the coordination requirements of that satellite network;

*d)* that compliance with this Resolution does not oblige any administration to authorize any ESIM to operate within territory under its jurisdiction unless such operation fully complies with its national jurisdiction;

*e)* that the operation of any type of ESIM (land, maritime and aeronautical) within territory, territorial waters and airspace under the jurisdiction of an administration, shall be carried out only if authorized by that administration,

resolves

1 that for any ESIM communicating with a GSO FSS space station in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz, or portions thereof, the following conditions shall apply:

1.1 with respect to protection of space services in the 17.7-19.7 GHz and 27.5-29.5 GHz frequency bands, ESIM shall comply with the following conditions:

1.1.1 with respect to satellite networks or systems of other administrations, the notifying administration of the GSO FSS satellite network with which ESIM communicate shall ensure that ESIM characteristics remain within the notified characteristics (for networks already recorded in the MIFR) or coordination envelope (for networks yet to complete coordination which may subsequently be recorded in the MIFR) of that GSO FSS satellite network;

1.1.2 that the notifying administration of the GSO FSS satellite network, with which ESIM communicate, shall ensure that ESIM operation complies with coordination agreements for the frequency assignments of that GSO FSS network under the relevant provisions of the Radio Regulations;

1.1*.*3 for the implementation of *resolves*1.1.1 above, the notifying administration of the GSO FSS network with which ESIM communicate shall send to the Bureau under this Resolutionthe relevant Appendix **4** information related to the characteristics of the ESIM intended to communicate with the space station of that GSO FSS satellite network, together with the commitment that the ESIM operation shall be in conformity with the Radio Regulations and this Resolution;

1.1.3.1 for a GSO FSS satellite network recorded in the MIFR: upon receipt of the information provided in accordance with *resolves*1.1.3 above, the Bureau shall examine it in relation to the requirements referred to in *resolves*1.1.1 based on the information recorded in the MIFR and any other reliable information available to it. If, following this examination, the Bureau concludes that the ESIM characteristics are within the envelope of the satellite network, the Bureau shall publish the results for information in the BR IFIC, otherwise the information shall be returned to the notifying administration;

1.1.3.2 for a GSO FSS satellite network yet to complete coordination which may subsequently be recorded in the MIFR: upon receipt of the information provided in accordance with *resolves*1.1.3 above, the Bureau shall examine it in relation to the requirements referred to in *resolves*1.1.1 based on the complete information submitted. If, following this examination, the Bureau concludes that the ESIM characteristics are within the envelope of the satellite network yet to complete coordination, the Bureau shall publish the results for information in the BR IFIC indicating the provisional nature of the coordination process with a remark that once the coordination is successfully completed and the satellite network recorded in the MIFR the finding would be reviewed and, if necessary, revised, otherwise the information shall be returned to the notifying administration;

1.1.4 for the protection of non-GSO FSS systems operating in the frequency band 27.5-28.6 GHz, ESIM communicating with GSO FSS networks shall comply with the provisions contained in Annex 1 to this Resolution;

1.1.5 ESIM shall not claim protection from non-GSO FSS systems operating in the frequency band 17.8-18.6 GHz in accordance with the Radio Regulations, including No. **22.5C**;

1.1.6 ESIM shall not claim protection from BSS feeder link earth stations operating in the frequency band 17.7-18.4 GHz in accordance with the Radio Regulations and shall not affect their future development;

1.2 with respect to protection of terrestrial services in the 17.7-19.7 GHz and 27.5-29.5 GHz frequency bands ESIM shall comply with the following conditions:

1.2.1 the receiving ESIM in the 17.7-19.7 GHz frequency band shall not claim protection from terrestrial services in the above-mentioned frequency band operating in accordance with the Radio Regulations and shall not affect the future development of these services;

*Note from Australia: In order to ensure efficient use and utilization of spectrum, Australia is of the view that “and shall not affect the future development of these services” is not necessary and should be deleted, given requirements in other parts of the Resolution (content to be discussed and agreed to at WRC-19).*

1.2.2 the transmitting aeronautical and maritime ESIM in the 27.5-29.5 GHz frequency band shall not cause unacceptable interference to terrestrial services in the above-mentioned frequency band operating in accordance with the Radio Regulations and shall comply with the provisions of Annex 2;

1.2.3 for the implementation of *resolves* 1.2.2 above, the notifying administration of the GSO FSS network with which aeronautical ESIM communicate shall send the Bureau the relevant Appendix **4** information related to the characteristics of the aeronautical ESIM. The Bureau shall examine the information with respect to its conformity with the pfd limits specified in Part 2 of Annex 2 on the Earth’s surface. Should the result of examination be unfavourable the BR shall return submission to the notifying administration of ESIM;

*Note from Australia: Australia considers the note below to be a good starting point for discussions at WRC-19. Australia considers that views of the BR should be sought on which characteristics need to be provided, noting the BR applies Rules of Procedure No.* ***21.16****. Depending on the characteristics required, they could be listed in Appendix* ***4*** *or in an Annex to this Resolution.*

*Note: Revision of Appendix* ***4*** *of the Radio Regulations is required accordingly for submission of aeronautical ESIM characteristics including maximum input power density to antenna, antenna radiation pattern, antenna mounted type (fuselage or tail), fuselage attenuation characteristics (Report ITU-R M.2221 or other attenuation characteristics), operating minimum altitude (if 0 m, no altitude limitation) and any other technical characteristics which are required to calculate pfd value at the Earth’s surface as well as techniques to comply with the required pfd value.*

1.2.4 the transmitting land ESIM in the 27.5-29.5 GHz frequency band shall not cause unacceptable interference to terrestrial services in the above-mentioned frequency band operating in accordance with the Radio Regulations and shall not affect the future development of these services;

1.2.5 for the implementation of *resolves* 1.2.2 and 1.2.4 above, the notifying administration responsible for the GSO FSS satellite network with which ESIM communicate shall send to the Bureau relevant Appendix **4** information together with a commitment that ESIM operation shall be in conformity with the Radio Regulations and this Resolution and that, upon receipt of a report of unacceptable interference, the notifying administration will take necessary action to immediately eliminate this interference or reduce interference to an acceptable level;

*Note from Australia: Australia is of the view that, once the content of Annex 2 to this Resolution is discussed and agreed at WRC-19,* resolves *1.2.6 below provides a base level of protection for terrestrial services. Additional protection can be imposed by administrations through authorization of ESIM within territory under their jurisdiction.*

1.2.6 any transmitting aeronautical or maritime ESIM that conforms to the requirements in Annex 2 to this Resolution are considered not to cause unacceptable interference to terrestrial stations under *resolves* 1.2.2 above;

2 that ESIM shall not be used or relied upon for safety-of-life applications;

*Note from Australia*: *Australia considers that* resolves *2.1 below is not necessary and should be deleted as its intended results are already achieved by* resolves *2 above. There is no definition of ‘civil application’ so a long list of the nature of service types would be required to capture what services are acceptable or prohibited.*

3 that the notifying administration for the satellite network with which ESIM communicate , in collaboration with the administration authorizing operation of ESIM in its territory, shall ensure that the ESIM have the capability to limit operation to territory of administrations having authorized those earth stations in order to comply with Article **18**;

4 that the administration responsible for the GSO FSS satellite network with which the ESIM communicate shall ensure that:

4.1 techniques to maintain pointing accuracy with the associated GSO FSS satellite without inadvertently tracking adjacent GSO satellites are employed for the operation of ESIM;

*Note from Australia****:*** *Australia proposes to delete the sentence “Such network control capability/facilities relating to operation of ESIM need to be made available to the administrations authorizing ESIM in their territories” as it is not necessary. An administration authorising ESIM can require a point of contact under* resolves *4.4 below prior to granting authorisation for ESIM to operate within its territory. This point of contact would become the means by which the authorising administration implements* resolves *5.*

4.2 all necessary measures are to be taken so that ESIM are subject to permanent monitoring and control by a Network Control and Monitoring Centre (NCMC) or equivalent facility and are capable of receiving and acting upon at least “enable transmission” and “disable transmission” commands from the NCMC or equivalent facility;

4.3 measures are taken to limit the operation of ESIM to territory under the jurisdiction of the administrations authorizing ESIM;

4.4 a point of contact shall be provided for the purpose of tracing any suspected cases of unacceptable interference from ESIM;

5 that in case of unacceptable interference caused by any type of ESIM:

5.1 the administration of the country in which the ESIM is authorized shall cooperate with an investigation into the matter and provide, where possible, any required information on the operation of ESIM and a point of contact to provide such information;

5.2 the administration of the country in which the ESIM is authorized and the notifying administration of the satellite network with which the ESIM communicate shall, upon receipt of a report of unacceptable interference, identify the suspected ESIM with the information of this identification/the location of the ESIM and take required action jointly or individually, as the case may be, to eliminate or reduce interference to an acceptable level;

6 that the application of this Resolution does not provide regulatory status to ESIM different from that derived from the GSO FSS satellite network with which they communicate taking into account the provisions referred to in this Resolution,

instructs the Director of the Radiocommunication Bureau

1 to take any necessary actions for the implementation of this Resolution;

2 to take any necessary actions to facilitate the implementation of this Resolution, including assisting in resolving interference, if any;

3 to report to future WRCs any difficulties or inconsistencies encountered in the implementation of this Resolution,

invites administrations

1 to collaborate, to the maximum extent practicable, for the implementation of this Resolution, in particular for resolving interference, if any;

instructs the Secretary-General

to bring this Resolution to the attention of the Secretary-General of the International Maritime Organization (IMO) and of the Secretary General of the International Civil Aviation Organization (ICAO).

Annex 1 to draft new Resolution [AUS/A15] (WRC-19)

Provisions for ESIM to protect non-GSO FSS systems in the frequency band 27.5‑28.6 GHz

1 In order to protect those non-GSO FSS systems referred to in *resolves*1.1.4 of this Resolution, ESIM shall comply with the following provisions:

*a)* the level of equivalent isotropically radiated power (e.i.r.p.) density emitted by an ESIM in a geostationary-satellite network in the 27.5-28.6 GHz frequency band shall not exceed the following values for any off-axis angle ϕ which is 3° or more off the main-lobe axis of an ESIM antenna and outside 3° of the GSO:

|  |  |  |
| --- | --- | --- |
| *Off-axis angle* |  | *Maximum e.i.r.p. density* |
| 3    7 |  | 28 − 25 log dB(W/40 kHz) |
| 7    9.2 |  | 7 dB(W/40 kHz) |
| 9.2    48 |  | 31 − 25 log dB(W/40 kHz) |
| 48    180 |  | −1 dB(W/40 kHz) |

*b)* for any ESIM that does not meet the condition *a)* above, outside of 3° of the GSO arc, the maximum ESIM on-axis e.i.r.p. shall not exceed 55 dBW for emission bandwidths of 100 MHz. For emission bandwidths smaller or larger than 100 MHz, the maximum ESIM on-axis e.i.r.p. may be decreased or increased proportionately, as appropriate.

Annex 2 to draft new Resolution [A15] (WRC-19)

Provisions for maritime and aeronautical ESIM to protect terrestrial services in the frequency band 27.5-29.5 GHz

Part 1: MARITIME ESIM

1 The notifying administration of the GSO FSS satellite network with which a maritime ESIM communicates shall ensure compliance of the maritime ESIM with the following conditions:

1.1 the minimum distance from the low-water mark as officially recognized by the coastal State beyond which maritime ESIM can operate without the prior agreement of any administration is 70 km in the 27.5‑29.5 GHz frequency band. Any transmissions from maritime ESIM within the minimum distance shall be subject to the prior agreement of the concerned coastal State;

1.2 the maximum maritime ESIM e.i.r.p. spectral density towards the horizon shall not exceed 12.98 dB(W/1 MHz). Transmissions from maritime 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 concerned coastal State together with the mechanism by which this level is to be maintained.

Part 2: AERONAUTICAL ESIM

2 The notifying administration of the GSO FSS satellite network with which an aeronautical ESIM communicates shall ensure compliance of the aeronautical ESIM with the following conditions:

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(δ) = −124.7 (dB(W/m2 ⋅ 14 MHz)) for 0° ≤ δ ≤ 0.01°

pfd(δ) = −120.9+1.9∙log10(δ) (dB(W/m2 ⋅ 14 MHz)) for 0.01° ≤ δ ≤ 0.3°

pfd(δ) = −116.2+11∙log10(δ) (dB(W/m2 ⋅ 14 MHz)) for 0.3° < δ ≤ 1°

pfd(δ) = −116.2+18∙log10(δ) (dB(W/m2 ⋅ 14 MHz)) for 1° < δ ≤ 2°

pfd(δ) = −117.9+23.7∙log10(δ) (dB(W/m2 ⋅ 14 MHz)) for 2° < δ ≤ 8°

pfd(δ) = −96.5 (dB(W/m2 ⋅ 14 MHz)) for 8° < δ ≤ 90.0°

where δ is the angle of arrival of the radio-frequency wave (degrees above the horizon).

*Note from Australia: An international altitude limit is not required since compliance with the pfd mask in 2.1 above is sufficient to protect terrestrial services.*

2.2 higher pfd levels than those provided in 2.1 above produced by aeronautical ESIM on the surface of the Earth within territory under the jurisdiction of an administration shall be subject to the prior agreement of that administration;

2.3 within territory under the jurisdiction of an administration where the ESIM operate, aeronautical ESIM shall comply with bilateral or multilateral agreements of the concerned administrations.

*Note from Australia: It appears to Australia that requirements for ESIM operations set out in Annex 3 are already covered in previous parts of this Resolution. Therefore, Australia proposes that there be no Annex 3.*

SUP AUS/47A5/6#49987

RESOLUTION 158 (WRC‑15)

Use of the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion communicating with  
geostationary space stations in the fixed-satellite service

**Reasons:** No longer required after WRC-19.

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