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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 12-E** |
|  | **2 October 2019** |
|  | **Original: Russian** |
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| Regional Commonwealth in the field of Communications Common Proposals | |
| Proposals for the work of the conference | |
|  | |
| 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)**;

Introduction

WRC-19 agenda item 1.5 continues the work of WRC-15, which adopted Resolution **156 (WRC‑15)** permitting the use of earth stations in motion (ESIM) in the frequency bands 19.7-20.2 GHz (space-to-Earth) and 29.5-30.0 GHz (Earth-to-space). To that end, ITU-R Working Party 4A, in accordance with Resolution **158 (WRC-15)**, carried out studies on sharing between ESIM and space and terrestrial radiocommunication services in the bands 17.7-19.7 GHz and 27.5-29.5 GHz. The results of those studies are set out in the CPM Report, Document CPM19‑2/237(Rev.1), Report ITU-R S.2464-0 “Operation of earth stations in motion communicating with geostationary space stations in the fixed-satellite service allocations at 17.7-19.7 GHz and 27.5-29.5 GHz”, approved by ITU-R SG 4 (07-2019), and in preliminary draft new ITU-R Reports developed by WP 4A (see Document 4A/912-A(02-05)).

These common proposals by the Administrations of the Regional Commonwealth in the field of Communications (RCC Administrations) are based on Method B in the CPM Report:

1 The RCC Administrations support adoption of new Resolution **[RCC/A15] (WRC-19)**, containing regulatory provisions and technical limitations for the operation of ESIM communicating with GSO FSS space stations in the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space), in order to protect radiocommunication services having allocations in these and adjacent frequency bands. The operation of ESIM in GSO FSS networks in the said frequency bands is permissible subject to compliance by ESIM with the provisions laid down in the regulatory text and in new Resolution **[RCC/A15] (WRC-19)** (see the annex to this document).

2 The RCC Administrations consider that, with regard to satellite networks or systems in space radiocommunication services of other administrations in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz, ESIM shall fulfil the following conditions:

– the ESIM characteristics shall remain within the bounds of the typical earth stations associated with the GSO FSS network with which the ESIM communicate, and the GSO FSS network, when using ESIM, shall not cause more interference and shall not claim more protection than when using typical earth stations in this satellite network;

– ESIM operation shall comply with frequency assignment coordination agreements for the typical earth stations of this GSO FSS network under the relevant provisions of the Radio Regulations;

– in cases of incomplete coordination under RR No. **9.7** of a frequency assignment to a typical earth station, the operation of ESIM with that assignment shall be in accordance with the provisions of RR No. **11.42** with respect to any recorded frequency assignment which was the basis of the unfavourable finding under RR No. **11.38**.

3 The RCC Administrations consider that with regard to terrestrial services in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz, ESIM shall comply with the following conditions:

– transmitting ESIM in the frequency band 27.5-29.5 GHz shall not cause unacceptable interference to stations of terrestrial services in this band, operating in accordance with the Radio Regulations, or impose constraints on future development of these services. Aeronautical and maritime ESIM shall be subject to the technical limitations laid down in new Resolution **[RCC/A15] (WRC-19)**, which will ensure their compatibility with terrestrial services operating in accordance with the Radio Regulations, including in the case of ESIM operating in international waters or international airspace;

– receiving ESIM in the frequency band 17.7-19.7 GHz shall not claim protection from interference caused by terrestrial service stations in this band, operating in accordance with the Radio Regulations, or impose constraints on future development of these services;

4 The RCC Administrations consider that new Resolution **[RCC/A15] (WRC-19)** should also contain provisions requiring an administration notifying a GSO FSS network with which ESIM communicate to:

– exclude unauthorized use of the ESIM on the territory of States that have not granted relevant authorizations (licences);

– immediately cease, or reduce to the acceptable level, interference from the ESIM upon receipt of a report of such interference;

– provide the Bureau with advance information on the characteristics of the ESIM that will be communicating with the GSO FSS in question, to enable the Bureau to check them for compliance with the Radio Regulations and new Resolution **[RCC/A15] (WRC-19)**.

Proposals

The RCC Administrations propose adoption of the modifications to the Radio Regulations set out in the regulatory text and in new Resolution **[RCC/A15] (WRC-19)**, as shown in the annex to this document, and the suppression of Resolution **158 (WRC-15)**.

ANNEX

ARTICLE 5

Frequency allocations

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

MOD RCC/12A5/1#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:** Modification of the Table of Frequency Allocations through the addition of a new footnote identifying frequency bands for ESIM operation.

MOD RCC/12A5/2#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:** Modification of the Table of Frequency Allocations through the addition of a new footnote identifying frequency bands for ESIM operation.

MOD RCC/12A5/3#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:** Modification of the Table of Frequency Allocations through the addition of a new footnote identifying frequency bands for ESIM operation.

ADD RCC/12A5/4#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 Resolution **[RCC/A15] (WRC‑19)**.(WRC‑19)

**Reasons:** Addition of a new footnote in the Radio Regulations to specify the conditions for ESIM operation in the frequency bands in question.

ADD RCC/12A5/5#49993

draft new RESOLUTION [RCC/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 that these existing services and their future development need to be protected, without the imposition of undue constraints, 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 on 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 will have 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 the operation of ESIM (land, maritime and aeronautical) within the territory(-ies), 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, the following conditions shall apply:

1.1 with respect to 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 the use of ESIM is authorized in GSO FSS networks in which the typical earth station frequency assignments are at the stage of coordination under Article **9**, or recording under Article **11**, of the Radio Regulations, or have been recorded in the MIFR, failing which the use of ESIM is not authorized;

1.1.2 with respect to satellite networks or systems of other administrations, the ESIM characteristics shall remain within the envelope of the GSO FSS network with which these ESIM communicate, and the satellite network, when using ESIM, shall not cause more interference and shall not claim more protection than when using typical earth stations in this GSO FSS network;

1.1.3 ESIM operation shall comply with the coordination agreements for this GSO FSS network relating to the frequency assignments to the typical earth stations, obtained in accordance with the Radio Regulations, and for the ESIM frequency assignments the conditions set out in *recognizing b)* of this Resolution shall be complied with;

1.1*.*4 for the implementation of *resolves*1.1.1, 1.1.2 and 1.1.3 above, the notifying administration of the GSO FSS network with which ESIM communicate shall, in accordance with this Resolution, send to the Bureau the relevant Annex 1 information related to the characteristics of the ESIM intended to communicate with the space station of that GSO FSS network, together with the commitment that the ESIM operation shall be in conformity with the Radio Regulations and this Resolution;

1.1.5 upon receipt of the information provided in accordance with resolves 1.1.4 above, the Bureau shall examine it in accordance with the requirements set out in *resolves* 1.1.1, 1.1.2 and 1.1.3, based on the complete information submitted to the Bureau relating to the GSO FSS satellite network with which the ESIM communicate;

1.1.6 if the results of the examination referred to in *resolves* 1.1.5 lead the Bureau to conclude that the ESIM characteristics comply with the requirements set out in *resolves* 1.1.1, 1.1.2 and 1.1.3, the Bureau shall publish the results for information in the BR IFIC and shall include the ESIM in the corresponding frequency assignment for the typical earth station, maintaining all of the conditions and requirements previously established in respect of that frequency assignment, failing which this information shall be returned to the notifying administration;

1.1.7 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 2 to this Resolution;

1.1.8 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**;

1.1.9 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;

1.2 with respect to 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 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;

1.2.2 transmitting aeronautical and maritime ESIM operating in the 27.5-29.5 GHz frequency band shall comply with the provisions contained in Annex 3 to this Resolution;

1.2.3 transmitting land ESIM in the 27.5-29.5 GHz frequency band shall not cause unacceptable interference to terrestrial services in neighbouring countries in the above-mentioned frequency band operating in accordance with the Radio Regulations;

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

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

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

3.2 all necessary measures are taken so that ESIM are subject to permanent monitoring and control by a Network Control and Monitoring Centre (NCMC) or equivalent facility, to ensure compliance with the requirements of Annex 2 and Annex 3, and are capable of receiving and acting upon at least “enable transmission” and “disable transmission” commands from the NCMC or equivalent facility;

3.3 ESIM are capable of limiting their operation to the territory or territories of the administrations having authorized such earth stations, in accordance with *recognizing* *d)* above, and of complying with Article **18** of the Radio Regulations;

3.4 a point of contact is provided for the purpose of tracing any suspected cases of unacceptable interference from ESIM;

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

4.1 the administration[[1]](#footnote-1) of the country authorizing the ESIM 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;

4.2 the administration1 of the country authorizing the ESIM and the notifying administration of the satellite network with which the ESIM communicate shall, jointly or individually, as the case may be, upon receipt of a report of interference, establish the facts and take appropriate action to eliminate or reduce interference to an acceptable level;

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

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 [RCC/A15] (WRC-19)

Information to be submitted to BR, pursuant to *resolves* 1.1.4, by the notifying administration of a GSO FSS network with which ESIM communicate

Identity of the satellite network

a) identity of the satellite network;

b) symbol of the notifying administration.

Frequency assignments of the satellite network for ESIM operation

c) beam identification;

d) group identification code.

ESIM transmission characteristics

e) necessary bandwidth and class of emission;

f) maximum value of the peak envelope power, in dBW, supplied to the input of the antenna;

g) maximum power density, in dB(W/Hz), supplied to the input of the antenna;

h) isotropic gain, in dBi, of the antenna in the direction of maximum radiation;

i) half-power beamwidth, in degrees;

j) co-polar antenna radiation pattern.

ESIM reception characteristics

k) necessary bandwidth and class of emission;

l) isotropic gain, in dBi, of the antenna in the direction of maximum radiation;

m) half-power beamwidth, in degrees;

n) co-polar antenna radiation pattern;

o) lowest total receiving system noise temperature, in kelvins, referred to the output of the receiving antenna of the earth station under clear-sky conditions.

NOTE – The contents of Annex 1 reflect the ESIM transmission and reception characteristics in accordance with *resolves* 1.1.2 and 1.1.4 of this Resolution.

Annex 2 to draft new Resolution [RCC/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*1.1.7 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 up to and including 100 MHz. For emission bandwidths larger than 100 MHz, the maximum ESIM on‑axis e.i.r.p. may be increased proportionately.

Annex 3 to draft new Resolution [RCC/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 two conditions:

1.1 the minimum distances 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;

and

1.2 the maximum maritime ESIM e.i.r.p. spectral density towards the horizon shall be limited to 24.44 dB(W/14 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 θ is the angle of arrival of the radio-frequency wave (degrees above the horizon).

2.2 higher pfd levels than those provided in § 2, produced by aeronautical ESIM on the surface of the Earth for an administration shall be subject to the prior agreement of that administration.

**Reasons:** Addition of this new WRC Resolution to the Radio Regulations in order to define the conditions for ESIM operation in the frequency bands indicated in Resolution **158 (WRC-15)**.

SUP RCC/12A5/6#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:** Consequential suppression of Resolution **158** (WRC-15).

\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. An administration authorizing ESIM is an administration providing a licence for radiocommunication using ESIM to the vehicle on which the ESIM operate. [↑](#footnote-ref-1)