
PLENARY MEETING

**Addendum 5 to
Document 6311-E
4 September 2019
Original: English**

Member States of the Inter-American Telecommunication Commission (CITEL)

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)**;

Background

Earth stations in motion (ESIM) currently serve a wide range of applications, both on board aircraft and ships and on land and, considering that users expect to be able to connect wherever they are, the broadband service satellite is a key component in meeting that demand.

The 2015 World Radiocommunication Conference (WRC-15) adopted Radio Regulations (RR) No. 5.527A, through which the operation of ESIMs that communicate with geostationary satellite (GSO) networks of the Fixed Satellite Service (FSS) in the frequency bands 29.5-30.0 GHz (Earth-to-space) and 19.7-20.2 GHz (space-to-Earth) under Resolution 156.

However, recognizing the growing demand for mobile services and the global availability of satellite broadband, WRC-2015 adopted WRC-19 Agenda Item 1.5 to consider ESIM operation in the frequency bands 27.5-29.5 GHz (Earth-to-space) and 17.7-19.7 GHz (space-to-Earth) of the FSS, thereby using more spectrum to meet the ESIM demand.

Results of the ITU Radiocommunication Sector (ITU-R)

The bands 17.7-19.7 GHz and 27.5-29.5 GHz are currently allocated to the FSS, among other services, and used by GSO Satellite FSS networks. These bands are shared with other services, including (in some sub-bands) non-geostationary orbital (non-GSO) satellite FSS systems, feeder links for non-GSO systems for the mobile-satellite service (MSS) and terrestrial systems.

To protect other services assigned in these bands, different use conditions must be applied to the different types of ESIM, since scenarios of interference from other services will be different for maritime, aeronautical and terrestrial ESIM.

The results of the sharing studies on the ESIM and the existing services in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz are described below:

Results of sharing studies with the Fixed and Mobile Services (FS and MS)

The ITU-R reviewed the sharing conditions for ESIM with terrestrial services in the band 17.7-19.7 GHz and concluded that terrestrial service transmitters could potentially interfere with ESIM receivers. Therefore, ESIM should operate under the condition of not claiming protection from terrestrial services operating in accordance with the RR.

In the case of the frequency band 27.5-29.5 GHz, the ITU-R reviewed the sharing conditions for ESIM with terrestrial services in the band 27.5-29.5 GHz and concluded that ESIM transmitters could interfere with terrestrial service receivers. Therefore, aeronautical and maritime ESIM must operate under specific technical, operational and regulatory conditions to avoid causing unacceptable interference to receiving stations of terrestrial services and, likewise, land ESIM need to operate under the condition of not causing unacceptable interference to receiving stations of terrestrial services operating in accordance with the RR.

Results of sharing studies with the Earth Exploration Satellite Service (EESS) (passive)

The ITU-R examined sharing conditions for ESIM with the EESS (passive) in the 18.6-18.8 GHz band used by the EESS (passive) in remote sensing for Earth exploration, in which the EESS (passive) earth station and the ESIM are receiving. Therefore, ESIM receivers can cause no interference with the SETS receiver (passive).

The ITU-R noted that the use of ESIM in the band 27.5-29.5 GHz would not change the current interference environment with respect to the secondary service EESS in the range 28.5-29.5 GHz.

Results of sharing studies with the meteorological satellite service

The ITU-R examined sharing conditions for ESIM receivers and the meteorological-satellite service in the 18 GHz range. The satellite meteorological earth station and the ESIM are receiving in this band. Therefore, ESIM receivers cannot cause interference with the receiving station of the meteorological satellite.

Results of sharing studies with the GSO FSS

The ITU-R reviewed the sharing conditions between the ESIM and the GSO FSS satellite systems in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz. As a result, it found that ESIM operations need to be maintained within the envelope of the satellite network with which they communicate, and concluded that to prevent interference between ESIMs and the GSO networks of the FSS of other administrations, the provisions of the proposed Resolution must be followed.

Results of sharing studies with the non-GSO FSS

In the bands 17.7-18.6 GHz and 18.8-19.3 GHz, interference from ESIMs with earth stations communicating with non-GSO FSS systems is not anticipated, since both are in the receiving direction (space-to-Earth).

Regarding interferences that ESIM could receive, in the 17.7-18.6 GHz band ESIMs will not claim protection from non-GSO systems, but will accept the levels of protection from non-GSO FSS systems that comply with those established within the pfd limits of Article 22 and, for the band 18.8-19.3 GHz, will operate under the technical and operating parameters contained in the respective coordination agreement in application of RR Nos. 9.12A and 9.13, so ESIM would not require any additional protection.

For the frequency segments 27.5-28.6 GHz and 28.6-29.1 GHz, it was found that the ESIM transmission link could potentially interfere with non-GSO system receivers, and it is proposed that the ESIM protect non-GSO systems as set out in the proposed resolution.

For the frequency segments 27.5-28.6 GHz and 28.6-29.1 GHz, it was found that the ESIM transmission link could potentially interfere with non-GSO system receivers, and it is proposed that the ESIM protect non-GSO systems as set out in the proposed resolution.

Results of sharing studies with the non-GSO MSS feeder links

For the frequency band 19.3-19.7 GHz, since ESIM and non-GSO MSS feederlink systems earth stations are in the receiving direction (space-to-Earth), the interference environment for non-GSO MSS feeder links is expected to remain unchanged with the introduction of ESIM in this frequency band.

For the case of the frequency band 29.1-29.5 GHz, the ITU-R examined possible sharing and compatibility between ESIM and non-GSO MSS feeder links through several analyses. The ITU-R examination reveals that under certain operating conditions there is an expectation that ESIM may be successfully coordinated with non-GSO MSS feeder link systems in the 29.1-29.5 GHz band under RR No. **9.11A**. For ESIM operating beyond those defined parameters, such ESIM must operate under specific operational and regulatory conditions to avoid causing unacceptable interference to non-GSO MSS feeder links.

For cases where coordination is possible, to ensure protection of the operations of non-GSO MSS feeder links based on long term and short term *I/N* values and their corresponding percentages of times, boundaries need to be defined through bilateral coordination discussions. Such boundaries would consist of geographical points at which a hypothetical interfering ESIM just meets the single-entry protection criteria of the non-GSO MSS feeder link system.

For cases where coordination is not feasible due to the characteristics of contemplated ESIM deployments and operations, the ITU-R examination provides a basis to derive regulatory and operational constraints on ESIM operations to ensure that non-GSO MSS feeder links are protected.

For all of the cases above, it will be necessary for the ESIM operator to have the capability to control the ESIM characteristics based on its location (e.g., transmit power, frequency) to ensure that constraints agreed to in coordination, or otherwise required, are met and that non-GSO MSS feeder links are protected.

Results of sharing studies with the BSS

ESIM are receiving and BSS feeder link earth stations transmitting in the 17.7-18.1 and 18.1-18.4 GHz bands. Therefore, ESIM should not claim protection or impose restrictions on the development of BSS earth stations.

With respect to the band 27.5-29.5 GHz, ESIMs must remain within the envelope of the satellite network with which they communicate, and it is necessary to indicate this in the proposal.

ARTICLE 5

Frequency allocations

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

MOD IAP/6311A5/1

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 <u>5.A15</u> (Earth-to-space) 5.516 MOBILE | 17.7-17.8 FIXED FIXED-SATELLITE (space-to-Earth) 5.517 ADD <u>5.A15</u> (Earth-to-space) 5.516 BROADCASTING-SATELLITE Mobile 5.515 <hr/> 17.8-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A ADD <u>5.A15</u> (Earth-to-space) 5.516 MOBILE 5.519 | 17.7-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A ADD <u>5.A15</u> (Earth-to-space) 5.516 MOBILE |
| 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 new footnote No. **5.A15** in RR Article **5** providing the conditions for the operation of ESIM.

MOD IAP/6311A5/2

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) 5.522A 5.522C | 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) 5.522A | 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 |
| 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 new footnote No. **5.A15** in RR Article 5 providing the conditions for the operation of ESIM.

MOD IAP/6311A5/3

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 new footnote No. **5.A15** in RR Article 5 providing the conditions for the operation of ESIM.

ADD IAP/6311A5/4

5.A15 The operation of earth stations in motion communicating with geostationary FSS space stations in the bands 17.7-19.7 GHz and 27.5-29.5 GHz, or portions of these frequency bands, shall be subject to draft new Resolution [IAP/A15] (WRC-19). (WRC-19)

Reasons: The objective of this footnote is to make draft new Resolution [IAP/A15] (WRC-19) mandatory.

ADD IAP/6311A5/5

DRAFT NEW RESOLUTION [IAP/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 the operation of any type 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, or portions thereof, 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 with respect to satellite networks or systems of other administrations, the ESIM characteristics shall remain within the envelope of the satellite network with which these ESIM communicate;

1.1.2 that the notifying administration of the GSO FSS network, with which ESIM communicate, shall ensure that ESIM operation complies with coordination agreements for the frequency assignments of this 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 Resolution the relevant Appendix 4 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;

1.1.4 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, the Bureau shall publish the results for information in the BR IFIC, otherwise the information shall be returned to the notifying administration;

1.1.5 should the Bureau find, prior to entering the characteristics for a network into the MIFR, that the information submitted under *resolves* 1.1.3 is not in compliance with the requirements of *resolves* 1.1.1, the corresponding information previously published by the Bureau under *resolves* 1.1.4 shall be suppressed;

1.1.6 for the protection of non-GSO FSS systems operating in the frequency band 27.5-29.1 GHz, ESIM communicating with GSO FSS networks shall comply with the provisions contained in Annex 1 to this Resolution;

1.1.7 for the protection of non-GSO MSS feeder links operating in the frequency band 29.1-29.5 GHz from ESIM communicating with GSO FSS networks, Annex 1*bis* to this Resolution applies:

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 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;

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 Annex 2 shall apply;

1.2.3 the 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;

1.2.4 for the implementation of *resolves* 1.2.2 and 1.2.3 above, the notifying administration responsible for the GSO FSS satellite network with which ESIM communicate shall submit to the Bureau together with the Appendix 4 data referred to in *resolves* 1.1.3 a commitment undertaking that in case of unacceptable interference, upon receipt of a report of interference, take necessary action to immediately eliminate this interference or reduce interference to an acceptable level

2 that ESIM shall not be 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 techniques to maintain pointing accuracy with the associated GSO FSS satellite, without inadvertently tracking adjacent GSO satellites, are employed for the operation of ESIM;

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

3.3 measures, when required, are taken to limit the operation of ESIM to the territory or territories under the jurisdiction of the administrations authorizing ESIM;

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 of the country in which the ESIM is authorized shall cooperate with an investigation into the matter to provide any available information on the operation of ESIM and a point of contact to provide such information;

4.2 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, jointly or individually, as the case may be, upon receipt of a report of interference, take required action to eliminate or reduce interference to an acceptable level;

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

instructs the Director of the Radiocommunication Bureau

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

invites administrations

1 when assigning frequencies for ESIM, to consider the provisions in Annex 2 of this resolution as guidance, where practicable, to assist administration in facilitating the protection of terrestrial services, where applicable;

2 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 [IAP/A15] (WRC-19)

Provisions for ESIM to protect space services in the frequency band 27.5-29.5 GHz

1 In order to protect those non-GSO FSS systems referred to in *resolves* 1.1.6 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 27.5-29.1 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:

| <i>Off-axis angle</i> | <i>Maximum e.i.r.p. density</i> |
|----------------------------------|----------------------------------|
| $3^\circ \leq \phi \leq 7^\circ$ | $28 - 25 \log \phi$ dB(W/40 kHz) |
| $7^\circ < \phi \leq 9.2^\circ$ | 7 dB(W/40 kHz) |
| $9.2^\circ < \phi \leq 48^\circ$ | $31 - 25 \log \phi$ dB(W/40 kHz) |
| $48^\circ < \phi \leq 180^\circ$ | -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 1BIS TO DRAFT NEW RESOLUTION [IAP/A15] (WRC-19)

Provisions for protection of non-GSO MSS feeder links in the frequency band 29.1-29.5 GHz from ESIM

With regard to non-GSO MSS feeder links referred to in *resolves* 1.1.7 of this Resolution, the provisions in Part A, Part B, or Part C, below, as appropriate, shall apply:

A. If an ESIM communicating with a GSO FSS network complies with each of the parameters or operating conditions listed in Table 1 below, coordination is used to ensure compatibility between the affected non-GSO MSS feeder link systems in the 29.1-29.5 GHz band and the GSO FSS network with which the ESIM is associated.

TABLE 1

ESIM operational characteristics and parameter

| | |
|--|--|
| E.i.r.p density per carrier (single per ESIM) | ≤ 35.5 dBW/MHz |
| Off-axis e.i.r.p density | per RR No. 22.32 |
| Average carrier burst duty cycle | $\leq 10\%$ (averaged over 30 seconds) |
| Number of transmitting ESIM in a single satellite beam in a 15 MHz channel | ≤ 6 |

B. If an ESIM communicating with a GSO FSS network does not comply with each of the parameters or operating conditions listed in Table 1 above, but complies with each of the parameters of operating conditions listed in Table 2 below, coordination is used to ensure compatibility between the affected non-GSO MSS feeder link systems in the 29.1-29.5 GHz band and the GSO FSS network with which the ESIM is associated. However, depending on the values of these parameters and characteristics in combination, there needs to be an exclusion zone or other constraint(s) on ESIM developed by the parties and included in the agreement. Until such time as an agreement on coordination is reached, ESIM shall not operate within 500 km of a non-GSO MSS feeder link earth station in any portion of the 29.1-29.5 GHz band used by non-GSO MSS feeder links earth station, and ESIM shall not cause harmful interference.

Table 2

ESIM operational characteristics and parameter

| | |
|--|------------------------------|
| E.i.r.p density per carrier (single per ESIM) | ≤ 50 dBW/MHz |
| Off-axis e.i.r.p density | per RR No. 22.32 |
| Average carrier burst duty cycle | 100% (averaged over 4 hours) |
| Number of transmitting ESIM in a single satellite beam in a 15 MHz channel | ≤ 12 |

C. If an ESIM communicating with a GSO FSS network does not comply with each of the parameters or operating conditions listed in Table 1 or Table 2 above, the ESIM shall not operate within 725 km of the non-GSO MSS feeder link earth station in any portion of the 29.1-29.5 GHz band used by non-GSO MSS feeder link earth stations, and any ESIM operations between 725 and 1,450 km of the non-GSO MSS feeder link earth station in any portion of the 29.1-29.5 GHz band used by non-GSO MSS feeder link earth stations shall not cause harmful interference.

ANNEX 2 TO DRAFT NEW RESOLUTION [IAP/A15] (WRC-19)

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

The parts below contain provisions to ensure that maritime and aeronautical ESIM do not cause unacceptable interference to the terrestrial services operating in accordance with the Radio Regulations within line-of-sight, on a co-frequency basis, in adjacent neighboring countries, 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 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;

1.2 the maximum maritime ESIM e.i.r.p. spectral density towards the horizon shall be limited to 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 That an aeronautical ESIM operating within the territory of an administration that has authorized fixed service and/or mobile service operation in the same frequency bands shall not transmit in these bands without prior agreement of that administration;

2.2 that for the purpose of protecting fixed and mobile service stations in other administrations from interference, from a single aeronautical ESIM shall not exceed the following maximum power flux-density values at the Earth's surface at an administration's border, without prior agreement of the affected administration:

$$\begin{array}{llll} \text{pfd}(\delta) = -136.2 & (\text{dB(W/m}^2 \cdot 1 \text{ MHz)}) & \text{for} & 0^\circ \leq \delta \leq 0.01^\circ \\ \text{pfd}(\delta) = -132.4 + 1.9 \cdot \log_{10}(\delta) & (\text{dB(W/m}^2 \cdot 1 \text{ MHz)}) & \text{for} & 0.01^\circ \leq \delta \leq 0.3^\circ \\ \text{pfd}(\delta) = -127.7 + 11 \cdot \log_{10}(\delta) & (\text{dB(W/m}^2 \cdot 1 \text{ MHz)}) & \text{for} & 0.3^\circ < \delta \leq 1^\circ \\ \text{pfd}(\delta) = -127.7 + 18 \cdot \log_{10}(\delta) & (\text{dB(W/m}^2 \cdot 1 \text{ MHz)}) & \text{for} & 1^\circ < \delta \leq 12.4^\circ \\ \text{pfd}(\delta) = -108 & (\text{dB(W/m}^2 \cdot 1 \text{ MHz)}) & \text{for} & 12.4^\circ < \delta \leq 90^\circ \end{array}$$

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

2.3 The maximum power in the out of band domain (i.e. up to 250% of the ESIM channel bandwidth) should be attenuated below the maximum output power of the aeronautical ESIM transmitter as described in Recommendation ITU-R SM.1541.

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

Reasons: New WRC Resolution providing the conditions for the operation of ESIM and protection of the services to which the frequency bands are allocated.

APPENDIX 4 (REV.WRC-15)

**Consolidated list and tables of characteristics for use in the
application of the procedures of Chapter III**

ANNEX 2

**Characteristics of satellite networks, earth stations
or radio astronomy stations² (Rev.WRC-12)**

² The Radiocommunication Bureau shall develop and keep up-to-date forms of notice to meet fully the statutory provisions of this Appendix and related decisions of future conferences. Additional information on the items listed in this Annex together with an explanation of the symbols is to be found in the Preface to the BR IFIC (Space Services). (WRC-12)

Footnotes to Tables A, B, C and D

MOD IAP/6311A5/6

TABLE A
GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK,
EARTH STATION OR RADIO ASTRONOMY STATION (Rev.WRC-15)

| Items in Appendix | A - GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK, EARTH STATION OR RADIO ASTRONOMY STATION | Advance publication of a geostationary-satellite network | Advance publication of a non-geostationary-satellite network subject to coordination under Section II of Article 9 | Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article 9 | Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2.A of Appendices 30 or 30A) | Notification or coordination of a non-geostationary-satellite network | Notification or coordination of an earth station (including notification under Appendices 30A or 30B) | Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5) | Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5) | Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8) | Notice for ESIM station under Resolution IAP/A1.5 (WRC-19) | Items in Appendix | Radio astronomy |
|-------------------|--|--|--|--|---|---|---|---|--|---|--|-------------------|-----------------|
| A.1 | IDENTITY OF THE SATELLITE NETWORK, EARTH STATION OR RADIOASTRONOMY STATION | | | | | | | | | | | A.1 | |
| A.1.a | the identity of the satellite network | X | X | X | X | X | | X | X | X | | A.1.a | |
| A.1.b | the beam identification In the case of Appendix 30 or 30A, required for modification, suppression or notification of Plan assignments In the case of Appendix 30B, required for a network derived from the Allotment Plan | | | | | | | + | + | + | | A.1.b | |
| A.1.e | Identity of the earth station or radio astronomy station or ESIM stations under Resolution IAP/A1.5 (WRC-19): | | | | | | | | | | | A.1.e | |
| A.1.e.1 | the type of earth station (specific or typical) | | | | | | X | | | | | A.1.e.1 | |
| A.1.e.2 | the name of the station | | | | | | X | | | | | A.1.e.2 | X |
| A.1.e.3 | For a specific earth station or radio astronomy station or ESIM stations under Resolution IAP/A1.5 (WRC-19): | | | | | | | | | | | A.1.e.3 | |
| A.1.e.3.a | the country or geographical area in which the station is located, using the symbols from the Preface | | | | | | X | | | | X | A.1.e.3.a | X |
| A.1.e.3.b | the geographical coordinates of each transmitting or receiving antenna site constituting the station latitude and longitude in degrees and minutes) For a specific earth station, seconds are to be provided if the coordination area of the earth station overlaps the territory of another administration | | | | | | X | | | | | A.1.e.3.b | X |
| A.1.f | Administration and intergovernmental organization symbol: | | | | | | | | | | | A.1.f | |
| A.1.f.1 | the symbol of the notifying administration (see the Preface) | X | X | X | X | X | X | X | X | X | X | A.1.f.1 | X |
| A.1.f.2 | if the notice is submitted on behalf of a group of administrations, the symbols of each of the administrations in the group, submitting the information on the satellite network (see the Preface) | + | + | + | + | + | | + | + | + | + | A.1.f.2 | |
| A.1.f.3 | if the notice is submitted on behalf of an intergovernmental satellite organization, the symbol of that organization (see the Preface) | + | + | + | + | + | | + | + | + | + | A.1.f.3 | |
| A.1.g | Not used | | | | | | | | | | | A.1.g | |
| A.1.g.1 | Not used | | | | | | | | | | | A.1.g.1 | |
| A.1.g.2 | Not used | | | | | | | | | | | A.1.g.2 | |
| A.3 | OPERATING ADMINISTRATION OR AGENCY | | | | | | | | | | | A.3 | |
| A.3.a | the symbol for the operating administration or agency (see the Preface) that is in operational control of the space station, earth station or radio astronomy station In the case of Appendix 30B, required only for notification under Article 8 | | | X | X | X | X | X | X | + | X | A.3.a | X |
| A.3.b | the symbol for the address of the administration (see the Preface) to which communication should be sent on urgent matters regarding interference, quality of emissions and questions referring to the technical operation of the network or station (see Article 15) In the case of Appendix 30B, required only for notification under Article 8 | | | X | X | X | X | X | X | + | X | A.3.b | X |
| A.4 | ORBITAL INFORMATION | | | | | | | | | | | A.4 | |
| ... | | | | | | | | | | | | | |

| Items in Appendix | A - GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK, EARTH STATION OR RADIO ASTRONOMY STATION | Advance publication of a geostationary-satellite network | Advance publication of a non-geostationary-satellite network subject to coordination under Section II of Article 9 | Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article 9 | Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A) | Notification or coordination of a non-geostationary-satellite network | Notification or coordination of an earth station (including notification under Appendices 30A or 30B) | Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5) | Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5) | Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8) | Notice for ESIM station under Resolution [IAP/A1.5] (WRC-19) | Items in Appendix | Radio astronomy |
|-------------------|--|--|--|--|--|---|---|---|--|---|--|-------------------|-----------------|
| A.4.c | For an earth station: | | | | | | | | | | | A.4.c | |
| A.4.c.1 | the identity of the associated space station(s) with which communication is to be established | | | | | | X | | | | X | A.4.c.1 | |
| A.4.c.2 | if communication is to be established with a geostationary space station, its orbital position <u>Mandatory for notice for ESIM station submitted in accordance with Resolution [IAP/A1.5] (WRC-19)</u> | | | | | | + | | | | X | A.4.c.2 | |
| ... | | | | | | | | | | | | | |
| A.19 | COMPLIANCE WITH § 6.26 OF ARTICLE 6 OF APPENDIX 30B | | | | | | | | | | | A.19 | |
| A.19.a | a commitment that the use of the assignment shall not cause unacceptable interference to, nor claim protection from, those assignments for which agreement still needs to be obtained Required if the notice is submitted under § 6.25 of Article 6 of Appendix 30B | | | | | | | | | + | | A.19.a | |
| A.20 | COMPLIANCE WITH resolves 1.1.232 and resolves 1.2.4 OF DRAFT RESOLUTION [IAP/A1.5] (WRC-19) | | | | | | | | | | | A.20 | |
| A.20.a | a commitment that the ESIM operation would be in conformity with the Radio Regulations and draft new Resolution [IAP/A1.5] (WRC-19) (including its Annexes) | | | | | | + | | | | X | A.20.a | |

MOD IAP/6311A5/7

TABLE B
CHARACTERISTICS TO BE PROVIDED FOR EACH SATELLITE ANTENNA BEAM OR EACH EARTH STATION OR RADIO ASTRONOMY ANTENNA (Rev.WRC-15)

| Items in Appendix | B - CHARACTERISTICS TO BE PROVIDED FOR EACH SATELLITE ANTENNA BEAM OR EACH EARTH STATION OR RADIO ASTRONOMY ANTENNA | Advance publication of a geostationary-satellite network subject to coordination under Section II of Article 9 | Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article 9 | Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A) | Notification or coordination of a non-geostationary-satellite network | Notification or coordination of an earth station (including notification under Appendices 30A or 30B) | Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5) | Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5) | Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8) | Notice for ESIM station under Resolution [IAP/A1.5] (WRC-19) | Items in Appendix | Radio astronomy |
|-------------------|--|--|--|--|---|---|---|--|---|--|-------------------|-----------------|
| B.1 | IDENTIFICATION AND DIRECTION OF THE SATELLITE ANTENNA BEAM | | | | | | | | | | B.1 | |
| B.1.a | the designation of the satellite antenna beam For an earth station, the designation of the satellite antenna beam of the associated space station | | X | X | X | X | X | X | X | X | B.1.a | |
| B.1.b | an indicator showing whether the antenna beam, under B.1.a, is fixed or whether it is steerable and / or reconfigurable | | X | X | X | | X | X | X | | B.1.b | |
| B.2 | TRANSMISSION / RECEPTION INDICATOR FOR THE BEAM OF THE SPACE STATION OR THE ASSOCIATED SPACE STATION | | X | X | X | +1 | | X | X | X | B.2 | |
| ... | | | | | | | | | | | | |

| Items in Appendix | B - CHARACTERISTICS TO BE PROVIDED FOR EACH SATELLITE ANTENNA BEAM OR EACH EARTH STATION OR RADIO ASTRONOMY ANTENNA | Advance publication of a geostationary-satellite network subject to coordination under Section II of Article 9 | Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article 9 | Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A) | Notification or coordination of a non-geostationary-satellite network | Notification or coordination of an earth station (including notification under Appendices 30A or 30B) | Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5) | Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5) | Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8) | Notice for ESIM station under Resolution IAP/A15(WRC-19) | Items in Appendix | Radio astronomy |
|-------------------|--|--|--|--|---|---|---|--|---|--|-------------------|-----------------|
| B.5 | EARTH STATION ANTENNA CHARACTERISTICS | | | | | | | | | | B.5 | |
| B.5.a | the isotropic gain, in dBi, of the antenna in the direction of maximum radiation (see No. 1.160) | | | | | X | | | | X | B.5.a | |
| B.5.b | the half-power beamwidth, in degrees | | | | | + ¹ | | | | X | B.5.b | |
| B.5.c | either the measured radiation pattern of the antenna or the reference radiation pattern to be used for coordination, <u>as appropriate</u> . For coordination under No. 9.7A, the reference radiation pattern is to be provided | | | | | X | | | | X | B.5.c | |
| B.5.d | antenna dimension aligned with the geostationary arc (D_{GS0}), in metres (see the most recent version of Recommendation ITU-R S.1855) except in the case of Appendix 30 or 30A | | | | | O | | | | O | B.5.d | |
| ... | | | | | | | | | | | | |

Reasons:

MOD IAP/6311A5/8

TABLE C
CHARACTERISTICS TO BE PROVIDED FOR EACH GROUP OF FREQUENCY ASSIGNMENTS
FOR A SATELLITE ANTENNA BEAM OR AN EARTH STATION OR
RADIO ASTRONOMY ANTENNA (Rev.WRC-195)

| Items in Appendix | C - CHARACTERISTICS TO BE PROVIDED FOR EACH GROUP OF FREQUENCY ASSIGNMENTS FOR A SATELLITE ANTENNA BEAM OR AN EARTH STATION OR RADIO ASTRONOMY ANTENNA | Advance publication of a geostationary-satellite network | Advance publication of a non-geostationary-satellite network subject to coordination under Section II of Article 9 | Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article 9 | Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A) | Notification or coordination of a non-geostationary-satellite network | Notification or coordination of an earth station (including notification under Appendices 30A or 30B) | Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5) | Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5) | Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8) | Notice for ESIM station under Resolution IAP/A15(WRC-19) | Items in Appendix | Radio astronomy |
|-------------------|--|--|--|--|--|---|---|---|--|---|--|-------------------|-----------------|
| ... | | | | | | | | | | | | | |
| C.2 | ASSIGNED FREQUENCY (FREQUENCIES) | | | | | | | | | | | C.2 | |
| C.2.a.1 | the assigned frequency (frequencies), as defined in No. 1.148 – in kHz up to 28 000 kHz inclusive – in MHz above 28 000 kHz to 10 500 MHz inclusive – in GHz above 10 500 MHz If the basic characteristics are identical, with the exception of the assigned frequency, a list of frequency assignments may be provided In the case of advance publication, required only for active sensors In the case of geostationary and non geo-stationary satellite networks, required for all space applications except passive sensors In the case of Appendix 30B, required only for notification under Article 8 | | | + | + | + | X | X | X | + | X | C.2.a.1 | |

| Items in Appendix | C- CHARACTERISTICS TO BE PROVIDED FOR EACH GROUP OF FREQUENCY ASSIGNMENTS FOR A SATELLITE ANTENNA BEAM OR AN EARTH STATION OR RADIO ASTRONOMY ANTENNA | Advance publication of a geostationary-satellite network | Advance publication of a non-geostationary-satellite network subject to coordination under Section II of Article 9 | Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article 9 | Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2.A of Appendices 30 or 30A) | Notification or coordination of a non-geostationary-satellite network | Notification or coordination of an earth station (including notification under Appendices 30A or 30B) | Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5) | Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5) | Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8) | Notice for ESIM station under Resolution IAP/AIS/(WRC-19) | Items in Appendix | Radio astronomy |
|-------------------|---|--|--|--|---|---|---|---|--|---|---|-------------------|-----------------|
| C.2.a.2 | the channel number | | | | | | | X | X | | | C.2.a.2 | |
| C.2.b | the centre of the frequency band observed – in kHz up to 28 000 kHz inclusive – in MHz above 28 000 kHz to 10 500 MHz inclusive – in GHz above 10 500 MHz In the case of satellite networks, required only for passive sensors | | | + | + | + | | | | | | C.2.b | X |
| C.2.c | if the frequency assignment is to be filed under No. 4.4, an indication to that effect | | | + | + | + | + | | | | | C.2.c | + |
| C.3 | ASSIGNED FREQUENCY BAND | | | | | | | | | | | C.3 | |
| C.3.a | the bandwidth of the assigned frequency band, in kHz (see No. 1.147) In the case of advance publication, required only for active sensors In the case of geostationary and non geo-stationary satellite networks, required for all space applications except passive sensors In the case of Appendix 30B, required only for notification under Article 8 | | | + | + | + | X | X | X | + | X | C.3.a | |
| C.3.b | the bandwidth of the frequency band, in kHz, observed by the station In the case of satellite networks, required only for passive sensors | | | + | + | + | | | | | | C.3.b | X |
| C.4 | CLASS OF STATION AND NATURE OF SERVICE | | | | | | | | | | | C.4 | |
| C.4.a | the class of station, using the symbols from the Preface | | | X | X | X | X | X | X | X | X | C.4.a | X |
| C.4.b | the nature of service performed, using the symbols from the Preface | | | X | X | X | X | | | | X | C.4.b | X |
| ... | | | | | | | | | | | | | |
| C.6 | POLARIZATION | | | | | | | | | | | C.6 | |
| C.6.a | the type of polarization (see the Preface) In the case of circular polarization, this includes the sense of polarization (see Nos. 1.154 and 1.155) In the case of a space station submitted in accordance with Appendix 30 or 30A, see § 3.2 of Annex 5 to Appendix 30 | | | X | X | X | + ¹ | X | X | | X | C.6.a | |
| C.6.b | if linear polarization is used, the angle, in degrees, measured counter-clockwise in a plane normal to the beam axis from the equatorial plane to the electric vector of the waves as seen from the satellite In the case of a space station submitted in accordance with Appendix 30 or 30A, see § 3.2 of Annex 5 to Appendix 30 | | | + | + | + | + ¹ | + | + | | ± | C.6.b | |
| C.7 | NECESSARY BANDWIDTH AND CLASS OF EMISSION <i>(in accordance with Article 2 and Appendix 1)</i> For advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article 9, changes to this information within the limits specified under C.1 shall not affect consideration of notification under Article 11 Not required for active or passive sensors | | | | | | | | | | | C.7 | |
| C.7.a | the necessary bandwidth and the class of emission: for each carrier In the case of Appendix 30B, required only for notification under Article 8 | | | X | X | X | X | X | X | + | X | C.7.a | |
| C.7.b | the carrier frequency or frequencies of the emission(s) | | | X | C | C | C | | | | X | C.7.b | |
| C.8 | POWER CHARACTERISTICS OF THE TRANSMISSION <i>Not required for passive sensors</i> | | | | | | | | | | | C.8 | |
| C.8.a | For the case where individual carriers can be identified: | | | | | | | | | | | C.8.a | |
| C.8.a.1 | the maximum value of the peak envelope power, in dBW, supplied to the input of the antenna for each carrier type Required if neither C.8.b.1 nor C.8.b.3.a is provided | | | + | + | + | C | | | | ± | C.8.a.1 | |

| Items in Appendix | <i>C- CHARACTERISTICS TO BE PROVIDED FOR EACH GROUP OF FREQUENCY ASSIGNMENTS FOR A SATELLITE ANTENNA BEAM OR AN EARTH STATION OR RADIO ASTRONOMY ANTENNA</i> | Advance publication of a geostationary-satellite network | Advance publication of a non-geostationary-satellite network subject to coordination under Section II of Article 9 | Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article 9 | Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2.A of Appendices 30 or 30A) | Notification or coordination of a non-geostationary-satellite network | Notification or coordination of an earth station (including notification under Appendices 30A or 30B) | Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5) | Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5) | Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8) | Notice for ESIM station under Resolution IAP/AIS/(WRC-19) | Items in Appendix | Radio astronomy |
|-------------------|--|--|--|--|---|---|---|---|--|---|---|-------------------|-----------------|
| C.8.a.2 | the maximum power density, in dB(W/Hz), supplied to the input of the antenna for each carrier type ² In the case of Appendix 30B, required only for notification under Article 8 Required if neither C.8.b.2 nor C.8.b.3.b is provided | | | + | + | + | O | | | + | O | C.8.a.2 | |
| C.8.b | For the case where it is not appropriate to identify individual carriers: | | | | | | | | | | | C.8.b | |
| C.8.b.1 | the total peak envelope power, in dBW, supplied to the input of the antenna For coordination or notification of an Appendix 30A earth station the values shall include the maximum range of power control Required if neither C.8.a.1 nor C.8.b.3.a is provided | | | + | + | + | + ¹ | X | X | | I+ | C.8.b.1 | |
| C.8.b.2 | the maximum power density, in dB(W/Hz), supplied to the input of the antenna ² For coordination or notification of an Appendix 30A earth station the values shall include the maximum range of power control In the case of Appendix 30B, required only for submission under Article 6 Required if neither C.8.a.2 nor C.8.b.3.b is provided | | | + | + | + | + ¹ | X | X | + | I+ | C.8.b.2 | |
| ... | | | | | | | | | | | | | |
| C.8.c | For all space applications, except active or passive sensors: | | | | | | | | | | | C.8.c | |
| C.8.c.1 | the minimum value of the peak envelope power, in dBW, supplied to the input of the antenna for each carrier type If not provided, the reason for absence under C.8.c.2 | | | + | + | + | + ¹ | | | | I+ | C.8.c.1 | |
| C.8.c.2 | if C.8.c.1 is not provided, the reason for absence of the minimum value of the peak envelope power | | | + | + | + | + ¹ | | | | I+ | C.8.c.2 | |
| C.8.c.3 | the minimum power density, in dB(W/Hz), supplied to the input of the antenna for each carrier type ² If not provided, the reason for absence under C.8.c.4 | | | + | + | + | + ¹ | | | | I+ | C.8.c.3 | |
| C.8.c.4 | if C.8.c.3 is not provided, the reason for absence of the minimum power density | | | + | + | + | + ¹ | | | | I+ | C.8.c.4 | |
| C.8.d.1 | the maximum total peak envelope power, in dBW, supplied to the input of the antenna for each contiguous satellite bandwidth For a satellite transponder, this corresponds to the maximum saturated peak envelope power Required only for a space-to-Earth or space-to-space link | | | O | + | + | | | | | | C.8.d.1 | |
| C.8.d.2 | each contiguous satellite bandwidth For the maximum saturated peak envelope power of the satellite transponder, this corresponds to the bandwidth of each transponder Required only for a space-to-Earth or space-to-space link, if different from item C.3.a | | | O | + | + | | | | | | C.8.d.2 | |
| C.8.e.1 | for space-to-Earth, Earth-to-space or space-to-space links. for each carrier type, the greater of either the carrier-to-noise ratio, in dB, required to meet the performance of the link under clear-sky conditions or the carrier-to-noise ratio, in dB, required to meet the short-time objectives of the link inclusive of necessary margins If not provided, the reason for absence under C.8.e.2 | | | + | + | + | + ¹ | | | | I+ | C.8.e.1 | |
| C.8.e.2 | if C.8.e.1 is not provided, the reason for absence of the carrier-to-noise ratio | | | + | + | + | + ¹ | | | | I+ | C.8.e.2 | |
| C.8.f.1 | the space station's nominal equivalent isotropically radiated power(s) (e.i.r.p.) on the beam axis Required only for a space-to-space link | | | + | | | | | | | | C.8.f.1 | |
| C.8.f.2 | the associated space station's nominal equivalent isotropically radiated power(s) (e.i.r.p.) on the beam axis Required only for a space-to-space link | | | + | | | | | | | | C.8.f.2 | |
| C.8.g.1 | the maximum aggregate power, in dBW, of all carriers (per transponder, if applicable) supplied to the input of the transmitting antenna of the earth station or the associated earth station Not required for coordination of a specific earth station under Nos. 9.15, 9.17 or 9.17A | | | | C | C | C | | | | X | C.8.g.1 | |

| Items in Appendix | <p align="center">C - CHARACTERISTICS TO BE PROVIDED FOR EACH GROUP OF FREQUENCY ASSIGNMENTS FOR A SATELLITE ANTENNA BEAM OR AN EARTH STATION OR RADIO ASTRONOMY ANTENNA</p> | Advance publication of a geostationary-satellite network | Advance publication of a non-geostationary-satellite network subject to coordination under Section II of Article 9 | Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article 9 | Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2.A of Appendices 30 or 30A) | Notification or coordination of a non-geostationary-satellite network | Notification or coordination of an earth station (including notification under Appendices 30A or 30B) | Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5) | Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5) | Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8) | <p align="center">Notice for ESIM station under Resolution IAP/A15(WRC-19)</p> | Items in Appendix | Radio astronomy |
|-------------------|--|--|--|--|---|---|---|---|--|---|--|-------------------|-----------------|
| C.8.g.2 | the aggregate bandwidth of all carriers (per transponder, if applicable) supplied to the input of the transmitting antenna of the earth station or the associated earth station Not required for coordination of a specific earth station under Nos. 9.15, 9.17 or 9.17A | | | | C | C | C | | | | X | C.8.g.2 | |
| C.8.g.3 | an indicator showing whether the bandwidth of the transponder corresponds to the aggregate bandwidth of all carriers (per transponder, if applicable) supplied to the input of the transmitting antenna of the earth station or the associated earth station Not required for coordination of a specific earth station under Nos. 9.15, 9.17 or 9.17A | | | | C | C | C | | | | X | C.8.g.3 | |
| ... | | | | | | | | | | | | | |
| C.10 | TYPE AND IDENTITY OF THE ASSOCIATED STATION(S) <i>(the associated station may be another space station, a typical earth station of the network or a specific earth station)</i> <i>For all space applications except active or passive sensors</i> | | | | | | | | | | | C.10 | |
| ... | | | | | | | | | | | | | |
| C.10.b | For an associated earth station: | | | | | | | | | | | C.10.b | |
| C.10.b.1 | the name of the station | | | X | X | X | | | X | | | C.10.b.1 | |
| C.10.b.2 | the type of station (specific or typical) | | | X | X | X | | | | | | C.10.b.2 | |
| <u>C.10.b.3</u> | <u>Indicator if an assignment for the 27.5-29.5 GHz and/or 17.7-19.7 GHz band(s) in the satellite network will be used by ESIM</u> | | | | + | | | | | | | <u>C.10.b.3</u> | |
| ... | | | | | | | | | | | | | |

SUP IAP/6311A5/9

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: Due to the implementation of the New WRC Resolution by the WRC-19 on ESIM, Resolution 158 can be suppressed.