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| A close up of a sign  Description automatically generated | **World Radiocommunication Conference (WRC-23) Dubai, 20 November - 15 December 2023** | |  |
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|  | | **19 August 2023** | |
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|  | | | |
| Asia-Pacific Telecommunity Common Proposals | | | |
| Proposals for the work of the conference | | | |
|  | | | |
| Agenda item 2 | | | |

2 to examine the revised ITU‑R Recommendations incorporated by reference in the Radio Regulations communicated by the Radiocommunication Assembly, in accordance with *further* *resolves* of Resolution **27 (Rev.WRC‑19)**, and to decide whether or not to update the corresponding references in the Radio Regulations, in accordance with the principles contained in *resolves* of that Resolution;

Introduction

In accordance with Resolution **27 (Rev.WRC-19)**, APT Members considered the following issues associated with this agenda item.

**Issue 1: Consideration of the ITU-R Recommendations incorporated by reference (IBR) in the Radio Regulations which have been revised and approved since WRC-19.**

The following Table summarizes the status of IBR Recommendations that have been revised since WRC-19.

Table A1

IBR Recommendations that have been revised since WRC-19

|  |  |  |
| --- | --- | --- |
| Current version in the RR Volume 4 | The most recent version | Relevant RR provisions and footnotes |
| **M.585-8** | **M.585-9** | Nos. **19.99, 19.102, 19.111** |
| **M.633-4** | **M.633-5 (\*)** | No. 34.1 |

(\*) Currently this is under the adoption/approval process.

**Issue 2: Removal of reference to Resolution 27 (Rev.WRC-19) in some provisions in the Radio Regulations.**

APT Members propose to remove the reference to Resolution **27 (Rev. WRC-03)** from RR Nos. **21.2.2** and **21.4.1** as it does not contain any specific information relevant to these provisions.

**Issue 3: Standardizing how to reference ITU-R Recommendations in non-mandatory nature.**

APT Members propose to add the phrase “most recent version of” for some non-mandatory Recommendations in the Radio Regulations, where appropriate.

Details of the related proposals along with explanatory text are given below.

Proposals

**Issue 1: Consideration of the ITU-R Recommendations incorporated by reference in the Radio Regulations which have been revised and approved since WRC-19.**

ARTICLE 19

Identification of stations

Section VI − Identities in the maritime mobile service    (WRC‑12)

19.98 A − General

MOD ACP/xxA20/1

19.99 § 39 When a station6 operating in the maritime mobile service or the maritime mobile-satellite service is required to use maritime mobile service identities, the responsible administration shall assign the identity to the station in accordance with the provisions described in Annex 1 of Recommendation ITU‑R M.585‑9. In accordance with No. **20.16**, administrations shall notify the Radiocommunication Bureau immediately when assigning maritime mobile service identities.    (WRC‑23)

MOD ACP/xxA20/2

19.102 3) The types of maritime mobile service identities shall be as described in Annex 1 of Recommendation ITU‑R M.585‑9.    (WRC‑23)

19.110 C − Maritime mobile service identities    (WRC‑07)

MOD ACP/xxA20/3

19.111 § 43 1) Administrations shall follow Annex 1 of Recommendation ITU‑R M.585‑9 concerning the assignment and use of maritime mobile service identities.    (WRC‑23)

**Reasons:** IBR Recommendation ITU R M.585-9 is in force since May 2022. It is appropriate to update the reference to the latest version of the Recommendation.

ARTICLE 34

Alerting signals in the global maritime distress and safety system (GMDSS)

Section I − Emergency position-indicating radiobeacon (EPIRB) and  
satellite EPIRB signals

MOD ACP/xxA20/4

34.1 § 1 The emergency position-indicating radiobeacon signal in the band 406‑406.1 MHz shall be in accordance with Recommendation ITU‑R M.633‑5.    (WRC‑23)

**Reasons:** It is appropriate to update the reference to a newer version if the revision of Recommendation ITU-R M.633 is approved before WRC-23.

**Issue 2: Removal of reference to Resolution 27 (Rev.WRC-19) in some provisions in the Radio Regulations**

ARTICLE 21

Terrestrial and space services sharing frequency bands above 1 GHz

Section I − Choice of sites and frequencies

MOD ACP/xxA20/5

2 21.2.2 Information on this subject is given in the most recent version of Recommendation ITU‑R SF.765.

Section II − Power limits for terrestrial stations

MOD ACP/xxA20/6

4 21.4.1 Information on this subject is given in the most recent version of Recommendation ITU‑R SF.765.

**Reasons:** Resolution **27 (Rev. WRC-03)** does not contain any specific information relevant to Nos. **21.2.2** and **21.4.1**. This Resolution has been revised by WRC-19. All other non-mandatory references to ITU-R Recommendations in the RR are shown without any reference to Resolution **27(Rev.WRC-19).**

**Issue 3: Standardizing how to reference ITU-R Recommendations in non-mandatory nature**

**Reasons for following proposals:** APT Members propose to use the phrase “most recent version of” for Recommendations referenced in the Radio Regulations in non-mandatory nature, where appropriate.

MOD ACP/xxA20/7

RESOLUTION 165 (rev.WRC‑23)

**Use of the frequency band 21.4-22 GHz by high-altitude platform   
stations in the fixed service in Region 2**

The World Radiocommunication Conference (Dubai, 2023),

*…*

*resolves*

1 that, for the purpose of protecting fixed-service systems in the territory of other administrations in the frequency band 21.4-22 GHz, the power flux-density (pfd) level per HAPS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limits, developed for clear-sky conditions, unless the explicit agreement of the affected administration is provided at the time of notification of HAPS:

0.7 θ − 135 dB(W/(m² · MHz)) for 0° ≤ θ < 10°

2.4 θ − 152 dB(W/(m² · MHz)) for 10° ≤ θ < 20°

0.45 θ − 113 dB(W/(m² · MHz)) for 20° ≤ θ < 60°

−86 dB(W/(m² · MHz)) for 60° ≤ θ ≤ 90°

where θ is the angle of arrival of the incident wave above the horizontal plane, in degrees.

During periods of rain, the equivalent isotropically radiated power (e.i.r.p.) of the beam suffering rain fade may be increased by a level commensurate with the level of rain fade, by up to 20 dB above the e.i.r.p. associated with the above pfd mask at the surface of the Earth;

2 that, for the purpose of protecting the Earth exploration-satellite service (EESS) (passive) in the frequency bands 21.2-21.4 GHz and 22.21-22.5 GHz, the e.i.r.p. density in the frequency bands 21.2-21.4 GHz and 22.21-22.5 GHz per HAPS operating in the frequency band 21.4-22 GHz shall not exceed:

−0.76 θ − 9.5 dB(W/100 MHz) for −4.53° ≤ θ < 35.5°

−36.5 dB(W/100 MHz) for 35.5° ≤ θ ≤ 90°

where θ is the elevation angle in degrees at the platform height;

3 that, in order to ensure the protection of the radio astronomy service (RAS), the pfd level produced by unwanted emissions from HAPS downlink transmissions in the frequency band 21.4‑22 GHz shall not exceed −176 dB(W/(m2 · 290 MHz)) for continuum observations and −192 dB(W/(m2 · 250 kHz)) for spectral line observations in the frequency band 22.21-22.5 GHz at an RAS station location at a height of 50 m; this limit relates to the pfd which would be obtained using a time percentage of 2% in the relevant propagation model.

To verify compliance, the following formula shall be used:



where:

*e.i.r.p.nominal clear sky*: nominal unwanted emission e.i.r.p. density towards the RAS station at which the HAPS operates under clear-sky conditions in dB(W/290 MHz) for continuum observations and in dB(W/250 kHz) for spectral line observations in the frequency band 22.21-22.5 GHz

*Az*: azimuth in degrees from the HAPS towards the RAS station

θ: elevation angle in degrees at the HAPS towards the RAS station

*Att*618*p=*2%: attenuation in dB from the most recent version of Recommendation ITU-R P.618 corresponding to *p* = 2% of the time at the radio astronomy location

*d*: separation distance in metres between the HAPS and the RAS station

*GasAtt*(θ): gaseous attenuation for an elevation angle of θ (see the most recent version of Recommendation ITU‑R SF.1395);

…

MOD ACP/xxA20/8

RESOLUTION 166 (rev.WRC‑23)

**Use of the frequency band 24.25-27.5 GHz by high-altitude platform stations   
in the fixed service in Region 2**

The World Radiocommunication Conference (Dubai, 2023),

*...*

*resolves*

…

10 that, in order to ensure the protection of in-band space research service (SRS)/EESS in the territory of other administrations from the HAPS gateway in the frequency band 25.5-27.0 GHz, the pfd shall not exceed the threshold values given below at the SRS/EESS earth stations at a height of 20 m above the ground level. If the pfd threshold values below are exceeded, then HAPS shall coordinate in accordance with No. **9.18**, taking into account the parameters of the relevant systems. These limits relate to the pfd which would be obtained under assumed propagation conditions predicted by the most recent version of Recommendation ITU‑R P.452 using the following time percentages: 0.001% for SRS, 0.005% for EESS non-GSO and 20% for EESS GSO:

SRS: pfd = −121 dB(W/(m2 · MHz))

EESS non-GSO: pfd = −97 dB(W/(m2 · MHz))

EESS GSO: pfd = −129 dB(W/(m2 · MHz));

11 that, in order to ensure the protection of the radio astronomy service (RAS), the pfd level produced by unwanted emissions from HAPS downlink transmissions in the frequency band 24.25‑25.25 GHz shall not exceed −177 dB(W/(m² · 400 MHz)) for continuum observations and −191 dB(W/(m² · 250 kHz)) for spectral line observations in the frequency band 23.6-24 GHz at an RAS station location at a height of 50 m; this limit relates to the pfd which would be obtained using a time percentage of 2% in the relevant propagation model.

To verify compliance, the following formula shall be used:



where:

*e.i.r.p.nominal clear sky*: nominal unwanted emission e.i.r.p. density towards the RAS station at which the HAPS operates under clear-sky conditions in dB(W/400 MHz) for continuum observations and in dB(W/250 kHz) for spectral line observations in the frequency band 23.6-24 GHz

*Az*: azimuth in degrees from the HAPS towards the RAS station

θ: elevation angle in degrees at the HAPS towards the RAS station

*Att*618*p=*2%: attenuation in dB from the most recent version of Recommendation ITU‑R P.618 corresponding to *p* = 2% of the time at the radio astronomy location

*d*: separation distance in metres between the HAPS and the RAS station

*pfd*:pfd at the Earth’s surface per HAPS in dB(W/(m2 · 400 MHz)) for continuum observations and in dB(W/(m2 · 250 kHz)) for spectral line observations in the frequency band 23.6-24 GHz

*GasAtt*(θ)*:* gaseous attenuation for an elevation angle of θ (see the most recent version of Recommendation ITU‑R SF.1395);

MOD ACP/xxA20/9

RESOLUTION 167 (rev.WRC‑23)

**Use of the frequency band 31-31.3 GHz by high-altitude platform   
stations in the fixed service**

The World Radiocommunication Conference (Dubai, 2023),

…

*resolves*

…

6 that, in order to ensure the protection of the RAS, the pfd level produced by unwanted emissions from HAPS downlink transmissions in the frequency band 31-31.3 GHz shall not exceed −171 dB(W/(m² · 500 MHz)) for continuum observations in the frequency band 31.3‑31.8 GHz at an RAS station location at a height of 50 m; this limit relates to the pfd which would be obtained using a time percentage of 2% in the relevant propagation model;

To verify compliance, the following formula shall be used:



where:

*e.i.r.p.nominal**clear sky*: nominal unwanted emission e.i.r.p. density towards the RAS station at which the HAPS operates under clear-sky conditions in dB(W/500 MHz) in the RAS frequency band

*Az*:azimuth in degrees from the HAPS towards the RAS station

θ: elevation angle in degrees at the HAPS towards the RAS station

*Att*618*p*=2%: attenuation in dB from the most recent version of Recommendation ITU‑R P.618 corresponding to *p* = 2% of the time at the radio astronomy location

*d*: separation distance in metres between the HAPS and the RAS station

*pfd*(θ): pfd at the Earth’s surface per HAPS station in dB(W/(m² · 500 MHz))

*GasAtt*(θ): gaseous attenuation for an elevation angle of θ (see the most recent version of Recommendation ITU‑R SF.1395);

…

MOD ACP/xxA20/10

RESOLUTION 168 (Rev. WRC‑23)

**Use of the frequency band 38-39.5 GHz by high-altitude platform   
stations in the fixed service**

The World Radiocommunication Conference (Dubai, 2023),

*…*

*resolves*

…

5 that, for the purpose of protecting earth stations in the geostationary-satellite (GSO) fixed-satellite service (FSS) (space‑to-Earth) in the territory of other administrations, the pfd in the territory of other neighbouring administrations shall not exceed the following values, unless the explicit agreement of the affected administration is provided at the time of notification of HAPS:

−169.9 + 1954 α² dB(W/(m² · MHz)) for 0° ≤ α < 0.136°

−133.9 dB(W/(m² · MHz)) for 0.136° ≤ α< 1°

−133.9 + 25 log α dB(W/(m² · MHz)) for 1° ≤α< 47.9°

−91.9 dB(W/(m² · MHz)) for 47.9° ≤ α ≤ 180°

where α is the minimum angle between the line to the HAPS (taking into account the HAPS location tolerance) and the lines to the GSO arc, in degrees, at any point on the territory of other administrations.

To calculate the pfd produced by a HAPS platform, the following equation shall be used:



where:

*d*: distance in metres between the HAPS and the GSO FSS earth station

*Attgaz*: attenuation in dB due to atmospheric gases on the HAPS-to-GSO FSS earth station path (the most recent version of Recommendation ITU‑R P.676)

*e.i.r.p.*: maximum HAPS e.i.r.p. spectral density in the direction of the GSO FSS earth station in dB(W/MHz);

…

MOD ACP/xxA20/11

RESOLUTION 169 (rev.WRC-23)

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

The World Radiocommunication Conference (Dubai, 2023),

ANNEX 3 TO RESOLUTION 169 (REV.WRC-23)

**Provisions for maritime and aeronautical earth stations in motion to protect terrestrial services in the frequency band 27.5-29.5 GHz**

…

4 The maximum power in the out-of-band domain should be attenuated below the maximum output power of the aeronautical ESIM transmitter as described in the most recent version of Recommendation ITU‑R SM.1541.

5 Higher pfd levels than those provided in 3.1 and 3.2 above produced by aeronautical ESIMs on the surface of the Earth within an administration shall be subject to the prior agreement of that administration (see also *resolves further* of this Resolution).

MOD ACP/xxA20/12

RESOLUTION 212 (REV.WRC‑23)

**Implementation of International Mobile Telecommunications in the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz**

The World Radiocommunication Conference (Dubai, 2023),

*…*

*resolves*

1 that administrations which implement IMT:

*a)* should make the necessary frequencies available for system development;

*b)* should use those frequencies when IMT is implemented;

*c)* should use the relevant international technical characteristics, as identified by Recommendations of ITU‑R and of the ITU Telecommunication Standardization Sector;

2 that administrations should take the technical and operational measures, such as those found in the Annex to this Resolution, to facilitate coexistence and compatibility between the terrestrial and satellite components of IMT in the frequency bands 1 980-2 010 MHz and 2 170‑2 200 MHz;

3 that, in the event of harmful interference, the concerned administrations should investigate and take technical and operational measures, as appropriate, to reduce interference to an acceptable level,

*invites the ITU Radiocommunication Sector*

to study possible technical and operational measures to improve co-existence and compatibility between the terrestrial and satellite components of IMT in the frequency bands 1 980-2 010 MHz and 2 170‑2 200 MHz where those frequency bands are shared by the mobile service and the mobile-satellite service in different countries, in particular for the deployment of independent satellite and terrestrial components of IMT and to facilitate development of both the satellite and terrestrial components of IMT,

*invites administrations*

1 to give due consideration to the accommodation of other services currently operating in these frequency bands when implementing IMT;

2 to facilitate coexistence of the satellite component of IMT with the terrestrial component of IMT in the frequency band 1 980-2 010 MHz, by the concerned administrations, as appropriate, considering the following:

*a)* to apply an uplink direction from user equipment to IMT base stations as provided in the most recent version of Recommendation ITU‑R M.1036, for the user equipment belonging to the terrestrial component of IMT in the frequency band 1 980-2 010 MHz (see the Annex to this Resolution);

*b)* that, in the event of harmful interference to the satellite component of the IMT space station, the concerned administrations may take additional steps to facilitate the reduction of harmful interference to an acceptable level;

3 to facilitate coexistence of the terrestrial component of IMT stations with the satellite component of IMT in the frequency band 2 170-2 200 MHz, by the concerned administrations, as appropriate, considering the following:

*a)* to apply an appropriate power flux-density value to the IMT space stations in the frequency band 2 170-2 200 MHz (see the Annex to this Resolution);

*b)* that, in the event of harmful interference to the terrestrial component of IMT, the concerned administrations may take additional steps to facilitate the reduction of harmful interference to an acceptable level.

ANNEX TO RESOLUTION 212 (REV.WRC-23)

**Guidance on the implementation of technical and operational measures to facilitate coexistence between terrestrial and satellite components of International Mobile Telecommunications in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz**

…

**Interference scenarios**

| **Scenario** | **From** | **To** |
| --- | --- | --- |
| A1 | Terrestrial IMT base station or mobile station | Satellite IMT space station |
| A2 | Terrestrial IMT base station | Satellite IMT mobile earth station |
| B1 | Satellite IMT mobile earth station | Terrestrial IMT base station or user equipment |
| B2 | Satellite IMT space station | Terrestrial IMT user equipment |

1) Measures for the terrestrial component of IMT:

a) Use base station antennas with improved sidelobe performance as shown in relevant ITU‑R Recommendations and Reports (e.g. improved antenna patterns compared with those contained in the most recent version of Recommendation ITU‑R F.1336).

…

MOD ACP/xxA20/13

RESOLUTION 217 (Rev. WRC-23)

**Implementation of wind profiler radars**

The World Radiocommunication Conference (Dubai, 2023),

…

*resolves*

1 to urge administrations to implement wind profiler radars as radiolocation service systems in the following bands, having due regard to the potential for incompatibility with other services and assignments to stations in these services, thereby taking due account of the principle of geographical separation, in particular with regard to neighbouring countries, and keeping in mind the category of service of each of these services:

46-68 MHz in accordance with No. **5.162A**

440-450 MHz

470-494 MHz in accordance with No. **5.291A**

904-928 MHz in Region 2 only

1 270-1 295 MHz

1 300-1 375 MHz;

2 that, in case compatibility between wind profiler radars and other radio applications operating in the band 440-450 MHz or 470-494 MHz cannot be achieved, the bands 420-435 MHz or 438-440 MHz could be considered for use;

3 to urge administrations to implement wind profiler radars in accordance with the most recent versions of Recommendations ITU-R M.1226, ITU-R M.1085 and ITU‑R M.1227 for the frequency bands around 50 MHz, 400 MHz and 1 000 MHz, respectively;

4 to urge administrations not to implement wind profiler radars in the band 400.15‑406 MHz;

5 to urge administrations currently operating wind profiler radars in the band 400.15‑406 MHz to discontinue them as soon as possible,

*instructs the Secretary-General*

to bring this Resolution to the attention of the International Civil Aviation Organization (ICAO), International Maritime Organization (IMO) and WMO.

MOD ACP/xxA20/14

RESOLUTION 221 (Rev.WRC‑23)

**Use of high altitude platform stations providing IMT in the bands 1 885‑1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3   
and 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2**

The World Radiocommunication Conference (Dubai, 2023),

*considering*

*a)* that the bands 1 885-2 025 MHz and 2 110-2 200 MHz are identified in No. **5.388** as intended for use on a worldwide basis for IMT, including the bands 1 980-2 010 MHz and 2 170‑2 200 MHz for the terrestrial and satellite components of IMT;

*b)* that a high altitude platform station (HAPS) is defined in No. **1.66A** as “a station located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth”;

*c)* that HAPS may offer a new means of providing IMT services with minimal network infrastructure as they are capable of providing service to a large footprint together with a dense coverage;

*d)* that the use of HAPS as base stations within the terrestrial component of IMT is optional for administrations, and that such use should not have any priority over other terrestrial IMT use;

*e)* that, in accordance with No. **5.388** and Resolution **212 (Rev.WRC‑23)**, administrations may use the bands identified for IMT, including the bands referred to in this Resolution, for stations of other primary services to which they are allocated;

…..

ANNEX TO RESOLUTION 221 (Rev.WRC-23)

**Characteristics of a HAPS operating as an IMT base station in  
the frequency bands given in this Resolution**

**A General characteristics to be provided for the station**

**A.1 Identity of the station**

*a)* Identity of the station

*b)* Country

**A.2 Date of bringing into use**

The date (actual or foreseen, as appropriate) of bringing the frequency assignment (new or modified) into use.

**A.3 Administration or operating agency**

Symbols for the administration or operating agency and for the address of the administration to which communication should be sent on urgent matters regarding interference, quality of emissions and questions referring to the technical operation of the station (see Article **15**).

**A.4 Position information of the HAPS**

*a)* The nominal geographical longitude for the HAPS

*b)* The nominal geographical latitude for the HAPS

*c)* The nominal altitude for the HAPS

*d)* The planned longitudinal and latitudinal tolerance for the HAPS

*e)* The planned tolerance of altitude for the HAPS

**A.5 Agreements**

If appropriate, the country symbol of any administration or administration representing a group of administrations with which agreement has been reached, including where the agreement is to exceed the limits prescribed in this Resolution.

**B Characteristics to be provided for each antenna beam**

**B.1 HAPS antenna characteristics**

*a)* The maximum isotropic gain (dBi).

*b)* HAPS antenna gain contours plotted on a map of the Earth’s surface.

**C Characteristics to be provided for each frequency assignment for HAPS antenna beam**

**C.1 Frequency range**

**C.2 Power density characteristics of the transmission**

The maximum value of the maximum power density (dB(W/MHz)), averaged over the worst 1 MHz supplied to the input of the antenna.

**D Calculated pfd limit produced over any country in visibility of HAPS**

The maximum pfd calculated at the Earth’s surface within each administration’s territory over which the HAPS may be visible and over which these calculated pfd levels exceed the limits indicated in *resolves*1.1, 1.3 and 1.4 of this Resolution.

MOD ACP/xxA20/15

RESOLUTION 225 (Rev.WRC‑23)

**Use of additional frequency bands for the satellite component of IMT**

The World Radiocommunication Conference (Dubai, 2023),

*considering*

*a)* that the bands 1 980-2 010 MHz and 2 170-2 200 MHz are identified for use by the satellite component of International Mobile Telecommunications (IMT) through No. **5.388** and Resolution **212 (Rev.WRC‑23)**;

*b)* Resolutions **212 (Rev.WRC‑23)**, **223 (Rev.WRC‑12)**\* and **224 (Rev.WRC‑12)**\* on the implementation of the terrestrial and satellite components of IMT;

*….*

MOD ACP/xxA20/16

RESOLUTION 229 (REV.WRC‑23)

**Use of the frequency bands 5 150-5 250 MHz, 5 250-5 350 MHz and 5 470‑5 725 MHz by the mobile service for the implementation of   
wireless access systems including radio local area networks**

The World Radiocommunication Conference (Dubai,2023),

…

*resolves*

…

4 that administrations may monitor whether the aggregate pfd levels given in the most recent version of Recommendation ITU‑R S.1426[[1]](#footnote-3)2 are exceeded as a consequence of a prolific growth in the number of WAS/RLANs;

5 that, in the frequency band 5 250-5 350 MHz, stations in the mobile service shall be limited to a maximum mean e.i.r.p. of 200 mW and a maximum mean e.i.r.p. density of 10 mW/MHz in any 1 MHz band; administrations are requested to take appropriate measures that will result in the predominant number of stations in the mobile service being operated in an indoor environment; furthermore, stations in the mobile service that are permitted to be used either indoors or outdoors may operate up to a maximum mean e.i.r.p. of 1 W and a maximum mean e.i.r.p. density of 50 mW/MHz in any 1 MHz band, and, when operating above a mean e.i.r.p. of 200 mW, these stations shall comply with the following e.i.r.p. elevation angle mask, where θ is the angle above the local horizontal plane (of the Earth):

−13 dB(W/MHz) for 0° ≤ θ < 8°

−13 − 0.716(θ − 8) dB(W/MHz) for 8° ≤ θ < 40°

−35.9 − 1.22(θ − 40) dB(W/MHz) for 40° ≤ θ ≤ 45°

−42 dB(W/MHz) for 45° < θ;

6 that administrations may exercise some flexibility in adopting other mitigation techniques, provided that they develop national regulations to meet their obligations to achieve an equivalent level of protection to the EESS (active) and the SRS (active) based on their system characteristics and interference criteria as stated in the most recent version of Recommendation ITU‑R RS.1632;

…

MOD ACP/xxA20/17

RESOLUTION 242 (REV. WRC‑23)

Terrestrial component of International Mobile Telecommunications in the frequency band 24.25-27.5 GHz

The World Radiocommunication Conference (Dubai,2023),

…

noting

Recommendation ITU R M.2083-0, which provides the “IMT Vision – Framework and overall objectives of the future development of IMT for 2020 and beyond”,

…

encourages administrations

1 to ensure that provisions for the implementation of IMT allow for the continued use of EESS, SRS and FSS earth stations and their future development;

2 to keep the antenna pattern of IMT base stations within the limits of the approximation envelope according to the most recent version of Recommendation ITU‑R M.2101;

MOD ACP/xxA20/18

RESOLUTION 243 (REV. WRC‑23)

Terrestrial component of International Mobile Telecommunications in the frequency bands 37-43.5 GHz and 47.2-48.2 GHz

The World Radiocommunication Conference (Dubai, 2023),

…

noting

*a)* thatRecommendation ITU‑R M.2083-0, which provides the “IMT Vision – Framework and overall objectives of the future development of IMT for 2020 and beyond”;

…

encourages administrations

1 to ensure that provisions for the implementation of IMT allow for the continued development of EESS, SRS, FSS and broadcasting-satellite service (BSS) earth stations and RAS stations and their future development;

2 to keep the antenna pattern of IMT base stations within the limits of the approximation envelope according to the most recent version of Recommendation ITU‑R M.2101,

MOD ACP/xxA20/19

RESOLUTION 251 (Rev. WRC‑23)

**Removal of the limitation regarding aeronautical mobile in the frequency range 694-960 MHz for the use of International Mobile Telecommunications user equipment by non-safety applications**

The World Radiocommunication Conference (Dubai, 2023),

*….*

*noting*

*a)* that ITU Radiocommunication Sector sharing and compatibility studies supporting the identification of specific frequency bands for IMT did not consider the use cases described in *considering b)* to *e)*;

*b)* that the frequency band 694-960 MHz is allocated on a primary basis to the mobile, except aeronautical mobile, service in Region 1;

*c)* that the frequency bands 890-902 MHz and 928-942 MHz are allocated on a primary basis to the mobile, except aeronautical mobile, service in Region 2 and that the frequency band 902‑928 MHz is allocated on a secondary basis to the mobile, except aeronautical mobile, service in Region 2;

*d)* that Nos. **5.312** and **5.323** allocate the frequency band 645-960 MHz or parts thereof to the aeronautical radionavigation service on a primary basis in several countries of Region 1;

*e)* that the frequency band 694-960 MHz is allocated on a primary basis to the broadcasting service in Region 1;

*f)* that Resolution **224 (Rev.WRC‑19)** addresses frequency bands for the terrestrial component of IMT below 1 GHz;

*g)* that Resolution **749 (Rev.WRC-23)**addresses the use of the frequency band 790‑862 MHz in countries of Region 1 and the Islamic Republic of Iran by mobile applications and by other services;

*h)* that Resolution **760 (Rev.WRC-23)** addresses provisions relating to the use of the frequency band 694-790 MHz in Region 1 by the mobile, except aeronautical mobile, service and by other services,

….

MOD ACP/xxA20/20

RESOLUTION 413 (Rev.WRC‑23)

**Use of the band 108-117.975 MHz by the aeronautical mobile (R) service**

The World Radiocommunication Conference (Dubai, 2023),

…

*invites ITU‑R*

to study any compatibility issues between the broadcasting service and AM(R)S in the band 108‑117.975 MHz that may arise from the introduction of appropriate digital sound broadcasting systems, described in the most recent version of Recommendation ITU‑R BS.1114,and to develop new or revised ITU‑R Recommendations as appropriate,

*instructs the Secretary-General*

to bring this Resolution to the attention of ICAO.

MOD ACP/xxA20/21

RESOLUTION 424 (REV.WRC-23)

**Use of Wireless Avionics Intra-Communications in the   
frequency band 4 200-4 400 MHz**

The World Radiocommunication Conference (Dubai, 2023),

…

*instructs the Secretary-General*

to bring this Resolution to the attention of ICAO,

*invites the International Civil Aviation Organization*

to take into account the most recent version of Recommendation ITU‑R M.2085 in the course of development of SARPs for WAIC systems.

MOD ACP/xxA20/22

RESOLUTION 716 (Rev.WRC‑23)

**Use of the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz in   
all three Regions and 2 010-2 025 MHz and 2 160-2 170 MHz in   
Region 2 by the fixed and mobile-satellite services   
and associated transition arrangements**

The World Radiocommunication Conference (Dubai, 2023),

…

*resolves*

…

4 that to facilitate the introduction and future use of the 2 GHz bands by the MSS:

4.1 administrations are urged to ensure that frequency assignments to new fixed service systems, to be brought into operation after 1 January 2000, do not overlap with the 1 980-2 010 MHz and 2 170-2 200 MHz in all three Regions and 2 010-2 025 MHz and 2 160-2 170 MHz in Region 2 MSS allocations, for example by using the channel plans of the most recent version of Recommendation ITU‑R F.1098;

…

MOD ACP/xxA20/23

RESOLUTION 744 (Rev.WRC-23)

**Sharing between the mobile-satellite service (Earth-to-space) and the fixed and mobile services in the band 1 668.4-1 675 MHz**

The World Radiocommunication Conference (Dubai, 2023),

…

*resolves*

1 that the use of the band 1 668.4-1 675 MHz by systems in the mobile service is limited to transportable radio-relay systems;

2 that administrations operating transportable radio-relay systems should take into account the most recent version of Recommendation ITU‑R M.1799, which states that, to adequately protect MSS networks, the e.i.r.p. of transportable radio-relay stations should not exceed −27 dB(W/4 kHz) in the band 1 668.4‑1 675 MHz in the direction of the geostationary orbit;

3 that from 1 January 2015 administrations operating such systems in the mobile service shall limit the e.i.r.p. spectral density radiated in the direction of the geostationary orbit by these systems to −27 dB(W/4 kHz) in the band 1 668.4-1 675 MHz;

4 that, in the band 1 670-1 675 MHz, stations in the MSS shall not claim protection from stations in the fixed and mobile services operating in Canada and the United States of America;

5 that *resolves*1, 2 and 3 do not apply to stations in the fixed and mobile services operating in Canada and the United States of America.

MOD ACP/xxA20/24

RESOLUTION 749 (REV.WRC‑23)

**Use of the frequency band 790-862 MHz in countries of Region 1 and the Islamic Republic of Iran by mobile applications and by other services**

The World Radiocommunication Conference (Dubai, 2023),

…

*resolves*

1 that, in Region 1:

in accordance with No. **5.316B**, and based on the criteria contained in the Annex to this Resolution, administrations implementing the mobile service in Region 1 shall seek agreement under No. **9.21** with respect to the ARNS in the countries mentioned in No. **5.312**;

2 that for Region 1 and the Islamic Republic of Iran:

2.1 when coordination between administrations is being effected, the protection ratios applicable to the generic case NB contained in the GE06 Agreement for the protection of the broadcasting service shall be used only for mobile systems with a bandwidth of 25 kHz; if another bandwidth is used, the relevant protection ratios are to be found in the most recent versions of Recommendations ITU‑R BT.1368 and ITU‑R BT.2033;

2.2 administrations are invited to take into account, *inter alia*, the results of the sharing studies conducted by ITU‑R in response to Resolution **749** (**WRC‑07**)\*;

3 that, with respect to adjacent channel interference within the frequency band 790‑862 MHz:

3.1 adjacent channel interference within a given country is a national matter and needs to be dealt with by each administration as a national matter;

3.2 adjacent channel interference should be treated among administrations concerned, using mutually agreed criteria or those contained in relevant ITU‑R Recommendations (see also the most recent versions of Recommendations ITU‑R BT.1368, ITU‑R BT.1895 and ITU‑R BT.2033 when sharing with the broadcasting service is concerned), as appropriate,

…

MOD ACP/xxA20/25

RESOLUTION 760 (REV.WRC‑23)

**Provisions relating to the use of the frequency band 694-790 MHz in Region 1 by the mobile, except aeronautical mobile, service and by other services**

The World Radiocommunication Conference (Dubai, 2023),

…

*resolves*

1 that use of the frequency band 694-790 MHz in Region 1 by the mobile, except aeronautical mobile, serviceissubject to agreement obtained under No. **9.21** with respect to ARNS in countries listed in No. **5.312**, in which regard the criteria for identifying affected administrations under No. **9.21** for the mobile service with respect to the ARNS in the frequency band 694-790 MHz are set out in the Annex to this Resolution;

2 that, for Region 1 and the Islamic Republic of Iran:

2.1 when coordination between administrations is being effected, the protection ratios applicable to the generic case NB contained in the GE06 Regional Agreement for the protection of the broadcasting service shall be used only for mobile systems with a bandwidth of 25 kHz; if another bandwidth is used, the relevant protection ratios are to be found in the most recent versions of Recommendations ITU‑R BT.1368 and ITU R BT.2033;

2.2 administrations are invited to take into account, *inter alia*, the results of the sharing studies conducted by ITU‑R in response to Resolution **232 (WRC‑12)**[[2]](#footnote-4)\*;

3 that, with respect to adjacent-channel interference between the mobile service in the frequency band 694-790 MHz and the broadcasting service in the frequency band 470-694 MHz:

3.1 adjacent-channel interference within a given country is a national matter and needs to be dealt with by each administration as a national matter;

3.2 adjacent-channel interference should be treated among administrations concerned, using mutually agreed criteria or those contained in relevant ITU‑R Recommendations (see also the most recent versions of Recommendations ITU‑R BT.1368, ITU‑R BT.1895 and ITU-R BT.2033, as well as ITU‑R M.2090 when sharing with the broadcasting service is concerned), as appropriate,

….

MOD ACP/xxA20/26

RESOLUTION 902 (Rev. WRC-23)

**Provisions relating to earth stations located on board vessels which operate   
in fixed-satellite service networks in the uplink bands   
5 925-6 425 MHz and 14-14.5 GHz**

The World Radiocommunication Conference (Dubai, 2023),

…

*encourages concerned administrations*

to cooperate with administrations which license ESVs while seeking agreement under the above-mentioned provisions, taking into consideration the provisions of Recommendation **37 (Rev. WRC‑23)**,

…

ANNEX 1 TO RESOLUTION 902 (Rev. WRC-23)

**Regulatory and operational provisions for ESVs transmitting in the 5 925‑6 425 MHz and 14-14.5 GHz bands**

….

ANNEX 2 TO RESOLUTION 902 (Rev. WRC‑23)

**Technical limitations applicable to ESVs transmitting in the bands 5 925‑6 425 MHz and 14-14.5 GHz**

|  |  |  |
| --- | --- | --- |
|  | **5 925-6 425 MHz** | **14-14.5 GHz** |
| Minimum diameter of ESV antenna | 2.4 m | 1.2 m1 |
| Tracking accuracy of ESV antenna | ±0.2° (peak) | ±0.2° (peak) |
| Maximum ESV e.i.r.p. spectral density toward the horizon | 17 dB(W/MHz) | 12.5 dB(W/MHz) |
| Maximum ESV e.i.r.p. towards the horizon | 20.8 dBW | 16.3 dBW |
| Maximum off-axis e.i.r.p. density2 | See below | See below |
| 1 While operations within the minimum distances are subject to specific agreement with concerned administrations, licensing administrations may authorize the deployment of smaller antenna sizes down to 0.6 m at 14 GHz provided that the interference to the terrestrial services is no greater than that which would be caused with an antenna size of 1.2 m, taking into account the most recent version of Recommendation ITU‑R SF.1650. In any case, the use of smaller antenna size shall be in compliance with the tracking accuracy of ESV antenna, maximum ESV e.i.r.p. spectral density toward the horizon, maximum ESV e.i.r.p. towards the horizon and maximum off-axis e.i.r.p. density limits in the Table above and the protection requirements of the FSS intersystem coordination agreements.  2 In any case, the e.i.r.p. off-axis limits shall be compliant with the FSS intersystem coordination agreements that may agree to more stringent off-axis e.i.r.p. levels. | | |

…

ARTICLE 5

**Frequency allocations**

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

MOD ACP/xxA20/27

**5.162A** *Additional allocation:* in Germany, Austria, Belgium, Bosnia and Herzegovina, China, Vatican, Denmark, Spain, Estonia, the Russian Federation, Finland, France, Ireland, Iceland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, North Macedonia, Monaco, Montenegro, Norway, the Netherlands, Poland, Portugal, the Czech Rep., the United Kingdom, Serbia, Slovenia, Sweden and Switzerland the frequency band 46-68 MHz is also allocated to the radiolocation service on a secondary basis. This use is limited to the operation of wind profiler radars in accordance with Resolution **217 (Rev. WRC‑23)**.    (WRC‑23)

MOD ACP/xxA20/28

**5.197A** *Additional allocation:*  the band 108-117.975 MHz is also allocated on a primary basis to the aeronautical mobile (R) service, limited to systems operating in accordance with recognized international aeronautical standards. Such use shall be in accordance with Resolution **413 (Rev.WRC‑23)**. The use of the band 108-112 MHz by the aeronautical mobile (R) service shall be limited to systems composed of ground-based transmitters and associated receivers that provide navigational information in support of air navigation functions in accordance with recognized international aeronautical standards.     (WRC-23)

MOD ACP/xxA20/29

**5.291A** *Additional allocation:*in Germany, Austria, Denmark, Estonia, Liechtenstein, the Czech Rep., Serbia and Switzerland, the frequency band 470-494 MHz is also allocated to the radiolocation service on a secondary basis. This use is limited to the operation of wind profiler radars in accordance with Resolution **217** **(Rev. WRC‑23)**.     (WRC-23)

MOD ACP/xxA20/30

**5.312A** In Region 1, the use of the frequency band 694-790 MHz by the mobile, except aeronautical mobile, service is subject to the provisions of Resolution **760 (Rev.WRC‑23)**. See also Resolution **224 (Rev.WRC‑19)**.     (WRC‑23)

MOD ACP/xxA20/31

**5.316B** In Region 1, the allocation to the mobile, except aeronautical mobile, service in the frequency band 790‑862 MHz is subject to agreement obtained under No. **9.21** with respect to the aeronautical radionavigation service in countries mentioned in No. **5.312**. For countries party to the GE06 Agreement, the use of stations of the mobile service is also subject to the successful application of the procedures of that Agreement. Resolutions **224 (Rev.WRC‑19)** and **749 (Rev.WRC‑23)** shall apply, as appropriate.    (WRC‑23)

MOD ACP/xxA20/32

**5.317A** The parts of the frequency band 698-960 MHz in Region 2 and the frequency bands 694-790 MHz in Region 1 and 790-960 MHz in Regions 1 and 3 which are allocated to the mobile service on a primary basis are identified for use by administrations wishing to implement International Mobile Telecommunications (IMT) – see Resolutions **224 (Rev.WRC‑19)**, **760 (Rev.WRC‑23)** and **749 (Rev.WRC‑23)**, where applicable. This identification does not preclude the use of these frequency bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations.     (WRC-23)

MOD ACP/xxA20/33

**5.351A** For the use of the bands 1 518-1 544 MHz, 1 545-1 559 MHz, 1 610-1 645.5 MHz, 1 646.5-1 660.5 MHz, 1 668-1 675 MHz, 1 980-2 010 MHz, 2 170-2 200 MHz, 2 483.5-2 520 MHz and 2 670-2 690 MHz by the mobile-satellite service, see Resolutions **212 (Rev.WRC‑23)** and **225 (Rev.WRC‑07)[[3]](#footnote-7)\*\***.     (WRC‑23)

MOD ACP/xxA20/34

**5.379D** For sharing of the band 1 668.4-1 675 MHz between the mobile-satellite service and the fixed and mobile services, Resolution **744 (Rev.WRC‑23)** shall apply.     (WRC-23)

MOD ACP/xxA20/35

**5.388** The frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz are intended for use, on a worldwide basis, by administrations wishing to implement International Mobile Telecommunications (IMT). Such use does  not preclude the use of these frequency bands by other services to which they are allocated. The frequency bands should be made  available for IMT in accordance with Resolution **212 (Rev.WRC‑23)** (see also Resolution **223 (Rev.WRC‑15)**\*).     (WRC‑23)

MOD ACP/xxA20/36

**5.388A** In Regions 1 and 3, the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz and, in Region 2, the bands 1 885-1 980 MHz and 2 110-2 160 MHz may be used by high altitude platform stations as base stations to provide International Mobile Telecommunications (IMT), in accordance with Resolution **221 (Rev.WRC‑23)**. Their use by IMT applications using high altitude platform stations as base stations does not preclude the use of these bands by any station in the services to which they are allocated and does not establish priority in the Radio Regulations.     (WRC-23)

MOD ACP/xxA20/37

**5.436** Use of the frequency band 4 200-4 400 MHz by stations in the aeronautical mobile (R) service is reserved exclusively for wireless avionics intra-communication systems that operate in accordance with recognized international aeronautical standards. Such use shall be in accordance with Resolution **424 (Rev. WRC‑23)**.      (WRC‑23)

MOD ACP/xxA20/38

**5.457A** In the frequency bands 5 925-6 425 MHz and 14-14.5 GHz, earth stations located on board vessels may communicate with space stations of the fixed-satellite service. Such use shall be in accordance with Resolution **902** **(Rev. WRC‑23)**. In the frequency band 5 925-6 425 MHz, earth stations located on board vessels and communicating with space stations of the fixed-satellite service may employ transmit antennas with minimum diameter of 1.2 m and operate without prior agreement of any administration if located at least 330 km away from the low-water mark as officially recognized by the coastal State. All other provisions of Resolution **902 (Rev. WRC-23)** shall apply.     (WRC-23)

MOD ACP/xxA20/39

**5.457B** In the frequency bands 5 925-6 425 MHz and 14-14.5 GHz, earth stations located on board vessels may operate with the characteristics and under the conditions contained in Resolution **902** **(Rev. WRC‑23)** in Algeria, Saudi Arabia, Bahrain, Comoros, Djibouti, Egypt, United Arab Emirates, Jordan, Kuwait, Libya, Morocco, Mauritania, Oman, Qatar, the Syrian Arab Republic, Sudan, Tunisia and Yemen, in the maritime mobile-satellite service on a secondary basis. Such use shall be in accordance with Resolution **902 (Rev. WRC‑23)**.     (WRC‑23)

MOD ACP/xxA20/40

**5.506A** In the band 14-14.5 GHz, ship earth stations with an e.i.r.p. greater than 21 dBW shall operate under the same conditions as earth stations located on board vessels, as provided in Resolution **902 (Rev. WRC‑23)**. This footnote shall not apply to ship earth stations for which the complete Appendix **4** information has been received by the Bureau prior to 5 July 2003.      (WRC-23)

MOD ACP/xxA20/41

**5.506B** Earth stations located on board vessels communicating with space stations in the fixed-satellite service may operate in the frequency band 14-14.5 GHz without the need for prior agreement from Cyprus and Malta, within the minimum distance given in Resolution **902 (Rev. WRC‑23)** from these countries.     (WRC-23)

MOD ACP/xxA20/42

**5.517A** The operation of earth stations in motion communicating with geostationary fixed-satellite service space stations within the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) shall be subject to the application of Resolution **169 (Rev. WRC‑23)**.(WRC‑23)

MOD ACP/xxA20/43

**5.530E** The allocation to the fixed service in the frequency band 21.4-22 GHz is identified for use in Region 2 by high-altitude platform stations (HAPS). This identification does not preclude the use of this frequency band by other fixed-service applications or by other services to which it is allocated on a co-primary basis, and does not establish priority in the Radio Regulations. Such use of the fixed-service allocation by HAPS is limited to the HAPS-to-ground direction, and shall be in accordance with the provisions of Resolution **165 (Rev. WRC‑23)**.     (WRC‑23)

MOD ACP/xxA20/44

**5.532AA** The allocation to the fixed service in the frequency band 24.25-25.25 GHz is identified for use in Region 2 by high-altitude platform stations (HAPS). This identification does not preclude the use of this frequency band by other fixed-service applications or by other services to which this frequency band is allocated on a co-primary basis, and does not establish priority in the Radio Regulations. Such use of the fixed-service allocation by HAPS is limited to the HAPS-to-ground direction and shall be in accordance with the provisions of Resolution **166 (Rev. WRC‑23)**.     (WRC‑23)

MOD ACP/xxA20/45

**5.534A** The allocation to the fixed service in the frequency band 25.25-27.5 GHz is identified in Region 2 for use by high-altitude platform stations (HAPS) in accordance with the provisions of Resolution **166 (Rev. WRC‑23)**. Such use of the fixed-service allocation by HAPS shall be limited to the ground-to-HAPS direction in the frequency band 25.25-27.0 GHz and to the HAPS-to-ground direction in the frequency band 27.0-27.5 GHz. Furthermore, the use of the frequency band 25.5-27.0 GHz by HAPS shall be limited to gateway links. This identification does not preclude the use of this frequency band by other fixed-service applications or by other services to which this band is allocated on a co-primary basis, and does not establish priority in the Radio Regulations.     (WRC‑23)

MOD ACP/xxA20/46

**5.543B** The allocation to the fixed service in the frequency band 31-31.3 GHz is identified for worldwide use by high-altitude platform stations (HAPS). This identification does not preclude the use of this frequency band by other fixed-service applications or by other services to which this frequency band is allocated on a co-primary basis, and does not establish priority in the Radio Regulations. Such use of the fixed-service allocation by HAPS shall be in accordance with the provisions of Resolution **167 (Rev. WRC‑23)**.     (WRC‑23)

MOD ACP/xxA20/47

**5.550D** The allocation to the fixed service in the frequency band 38-39.5 GHz is identified for worldwide use by administrations wishing to implement high-altitude platform stations (HAPS). In the HAPS-to-ground direction, the HAPS ground station shall not claim protection from stations in the fixed, mobile and fixed-satellite services; and No. 5.43A does not apply. This identification does not preclude the use of this frequency band by other fixed-service applications or by other services to which this frequency band is allocated on a co-primary basis and does not establish priority in the Radio Regulations. Furthermore, the development of the fixed-satellite, fixed and mobile services shall not be unduly constrained by HAPS. Such use of the fixed-service allocation by HAPS shall be in accordance with the provisions of Resolution **168 (Rev. WRC‑23)**.     (WRC‑23)

APPENDIX 4 (REV.WRC‑19)

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

ANNEX 1

**Characteristics of stations in the terrestrial services**[[4]](#footnote-8)1

**Footnotes to Tables 1 and 2**

MOD ACP/xxA20/48

TABLE 2   (Rev.WRC-23)

**Characteristics for high altitude platform stations (HAPS) frequency assignments  
in the terrestrial services**

| **Item identifier** | ***1 \_ GENERAL CHARACTERISTICS OF THE HAPS*** | **Transmitting station in the bands listed in No. 5.388A for the application of No. 11.2** | **Receiving station in the bands listed in No. 5.388A for the application of No. 11.9** | **Transmitting station in the bands listed in Nos. 5.457, 5.537A****, 5.530E, 5.532AA, 5.534A, 5.543B, 5.550D and 5.552A for the application of No. 11.2** | **Receiving station in the bands listed in Nos.  5.457, 5.534A, 5.543B, 5.550D and 5.552A for the application of No. 11.9** | **Item identifier** |
| --- | --- | --- | --- | --- | --- | --- |
|  | **COMPLIANCE WITH TECHNICAL OR OPERATIONAL LIMITS** |  | | | | |
| 1.14.b | a commitment that the HAPS does not exceed an out-of-band pfd of −165 dB(W/(m2 · 4 kHz)) at the Earth’s surface in the bands 2 160-2 200 MHz in Region 2 and 2 170‑2 200 MHz in Regions 1 and 3 (see Resolution **221** **(Rev.WRC‑23)**) | **X** |  |  |  | 1.14.b |
| 1.14.c | a commitment that the HAPS does not exceed the out-of-band pfd limits of −165 dB(W/(m2 · MHz)) for angles of arrival (θ) less than 5° above the horizontal plane, −165 + 1.75 (θ − 5) dB(W/(m2 · MHz)) for angles of arrival between 5° and 25° and −130 dB(W/(m2 · MHz)) for angles of arrival between 25° and 90° (see Resolution **221 (Rev.WRC‑23** | **X** |  |  |  | 1.14.c |
| 1.14.d | a commitment that the antenna pattern complies with the reference antenna pattern defined in *resolves* 1 of Resolution **150 (WRC‑12)**  Required in the band 6 560-6 640 MHz |  |  |  | **+** | 1.14.d |
| 1.14.e | a commitment that the aggregate power flux-density (pfd) of HAPS uplinks is limited to a maximum of −183.9 dB(W/(m2 · 4 kHz)) at any point in the geostationary arc. To meet this aggregate power flux-density (pfd) criterion, the maximum e.i.r.p. density value of a single HAPS gateway link towards the geostationary arc shall not exceed −59.9 dB(W/4 kHz) in any direction within ±5 degrees of the geostationary arc (see Resolution **150 (WRC-12)**)  Required in the band 6 560-6 640 MHz |  |  |  | **+** | 1.14.e |
| 1.14.f | a commitment that the e.i.r.p. density per HAPS in the bands 21.2-21.4 GHz and 22.21-22.5 GHz does not exceed −0.76 θ – 9.5 dB(W/100 MHz) for angles of arrival between −4.53° and 35.5° and −36.5 dB(W/100MHz) for angles of arrival between 35.5° and 90° (see Resolution **165 (Rev. WRC‑23)**)  Required in the band 21.4-22 GHz |  |  | **+** |  | 1.14.f |
| 1.14.g | a commitment that the unwanted emission power flux-density produced by the HAPS does not exceed −176 dB(W/(m² · 290 MHz)) for continuum observations, and −192 dB(W/(m² ⋅ 250 kHz)) for spectral line observations in the band 22.21-22.5 GHz at an RAS station location at a height of 50 m (see Resolution **165 (Rev. WRC‑23)**)  Required in the band 21.4-22 GHz |  |  | **+** |  | 1.14.g |
| 1.14.h | a commitment that, for the purpose of protecting the aeronautical mobile service operating in the band 21.2-21.5 GHz, the e.i.r.p. density per HAPS in the bands 21.4-21.5 GHz does not exceed 17.5 dB(W/100 MHz) (see Resolution **165** **(Rev. WRC‑23)**)  Required in the band 21.4-22 GHz |  |  | **+** |  | 1.14.h |
| 1.14.i | a commitment that the e.i.r.p. density per HAPS in the band 23.6-24GHz does not exceed −0.7714 θ −16.5 dB(W/200 MHz) for angles of arrival between −4.53° and 35° and −43.5 dB(W/200 MHz) for angles of arrival between 35° and 90° (see Resolution **166 (Rev. WRC‑23)**)  Required in the band 24.25-25.25 GHz |  |  | **+** |  | 1.14.i |
| 1.14.j | a commitment that the power flux-density produced by unwanted emissions from the HAPS does not exceed −177 dB(W/(m² · 400 MHz) for continuum observations and −191 dB(W/(m² · 250 kHz) for spectral line observations in the band 23.6-24 GHz at an RAS station location at the height of 50 m (see Resolution **166 (Rev. WRC‑23)**)  Required in the band 24.25-25.25 GHz |  |  | **+** |  | 1.14.j |
| 1.14.k | a commitment that the level of unwanted power density into the HAPS ground station antenna in the band 31.3-31.8 GHz does not exceed −83 dB(W/200 MHz) under clear-sky conditions and may be increased under rainy conditions to mitigate fading due to rain, provided that the effective impact on the passive satellite does not exceed the impact under clear-sky conditions (see Resolution **167 (Rev. WRC‑23)**)  Required in the band 31-31.3 GHz |  |  | **+** |  | 1.14.k |
| 1.14.l | a commitment that the e.i.r.p. density per HAPS in the band 31.3-31.8 GHz does not exceed −θ − 13.1 dB(W/200 MHz) for angles of arrival between −4.53° and 22° and −35.1 dB(W/200 MHz) for angles of arrival between 22° and 90° (see Resolution **167 (Rev. WRC‑23)**)  Required in the band 31-31.3 GHz |  |  | **+** |  | 1.14.l |
| 1.14.m | a commitment that the power flux-density produced by unwanted emissions from the HAPS ground station does not exceed −141 dB(W/(m² · 500 MHz) in the band 31.3-31.8 GHz at an RAS station location at the height of 50 m (see Resolution **167 (Rev. WRC‑23)**)  Required in the band 31-31.3 GHz |  |  |  | **+** | 1.14.m |
| 1.14.n | a commitment that the power flux-density produced by unwanted emissions from the HAPS does not exceed −171 dB(W/(m² · 500 MHz) in the band 31.3-31.8 GHz at an RAS station location at the height of 50 m. (see Resolution **167 (Rev. WRC‑23)**)  Required in the band 31-31.3 GHz |  |  | **+** |  | 1.14.n |
| 1.14.o | a commitment that the space research service (space-to-Earth) protection level of −217 dB(W/Hz) at the input of SRS receiver in the 37.0-38.0 GHz band with 0.001% exceedance due to atmospheric and precipitation effects, as referred to in the relevant ITU‑R Recommendations, is not exceeded. (see Resolution **168 (Rev. WRC‑23)**)  Required in the band 38-39.5 GHz |  |  | **+** | **+** | 1.14.o |
| 1.14.p | A commitment that the HAPS operation shall be in conformity with the Radio Regulations, including this Resolution. (see Resolution **168 (Rev. WRC‑23)**)  Required in the band 38-39.5 GHz |  |  | **+** | **+** | 1.14.p |
| 1.14.q | a commitment that, upon receiving an unacceptable interference report with relevant justification on the exceedance of the limits set in this Resolution, the notifying administration for the HAPS system shall take the required action to eliminate the interference or reduce it an acceptable level. (see Resolution **168 (Rev. WRC‑23)**)  Required in the band 38-39.5 GHz |  |  | **+** | **+** | 1.14.q |
| 1.14.r | a commitment that the separation distance between the nadir of the HAPS and a radio astronomy station operating in the band 48.94-49.04 GHz within the territory of another administration shall exceed 50 km (see Resolution **122** **(Rev.WRC‑19)**)  Required in the bands 47.2-47.5 GHz and 47.9-48.2 GHz |  |  | **+** |  | 1.14.r |

APPENDIX 4 (REV.WRC‑19)

**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 stations**[[5]](#footnote-9)2    (Rev.WRC‑12)

**Footnotes to Tables A, B, C and D**

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**TABLE A**

**GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM,  
EARTH STATION OR RADIO ASTRONOMY STATION**(Rev.WRC‑23)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Items in Appendix** | ***A \_ GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION*** | **Advance publication of a geostationary- satellite network** | **Advance publication of a non-geostationary-satellite network or system subject to coordination under Section II  of Article 9** | **Advance publication of a non-geostationary-satellite network or system 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 or system** | **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)** | **Items in Appendix** | **Radio astronomy** |
| A.19.b | a commitment in accordance with *resolves*1.5 of Resolution **156** (**WRC‑15**) that the administration responsible for the use of the assignment shall implement *resolves*1.4 of Resolution **156** (**WRC‑15**)  Required only for geostationary-satellite networks operating in the fixed-satellite sebrvice in the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz communicating with transmitting earth stations in motion |  |  |  | **+** |  |  |  |  |  | A.19.b |  |
| **A.20** | **COMPLIANCE WITH *resolves* 1.1.4 OF RESOLUTION 169 (Rev. WRC-23)** |  | | | | | | | | | **A.20** |  |
| A.20.a | a commitment that the ESIM operation would be in conformity with the Radio Regulations and Resolution **169** **(Rev. WRC‑23)**  Required only for the notification of earth stations in motion submitted in accordance with Resolution **169 (Rev. WRC‑23)** |  |  |  | **+** |  |  |  |  |  | A.20.a |  |
| **A.21** | **COMPLIANCE WITH *resolves* 1.2.6 OF RESOLUTION 169** **(Rev. WRC**‑**23)** |  | | | | | | | | | **A.21** |  |
| A.21.a | a commitment that, upon receiving a report of unacceptable interference, the notifying administration for the GSO FSS network with which ESIMs communicate shall follow the procedures in *resolves*4 of Resolution **169 (Rev. WRC‑23)**  Required only for the notification of earth stations in motion submitted in accordance with Resolution **169 (Rev. WRC‑23)** |  |  |  | **+** |  |  |  |  |  | A.21.a |  |
| **A.22** | **COMPLIANCE WITH *resolves* 7 OF RESOLUTION 169** **(23WRC‑23)** |  | | | | | | | | | **A.22** |  |
| A.22.a | a commitment that aeronautical ESIMs would be in conformity with the pfd limits on the Earth’s surface specified in Part II of Annex 3 to Resolution **169 (Rev. WRC‑23)**  Required only for the notification of earth stations in motion submitted in accordance with Resolution **169 (Rev. WRC‑23)** |  |  |  | **+** |  |  |  |  |  | A.22.a |  |
| **A.23** | **COMPLIANCE WITH RESOLUTION 35 (WRC‑19)** |  | | | | | | | | | **A.23** |  |
| A.23.a | a commitment stating that the characteristics as modified will not cause more interference or require more protection than the characteristics provided in the latest notification information published in Part I‑S of the BR IFIC for the frequency assignments to the non-geostationary-satellite system |  |  |  |  | **O** |  |  |  |  | A.23.a |  |
| **A.24** | **COMPLIANCE WITH NOTIFICATION OF A NON-GSO SHORT DURATION MISSION** |  | | | | | | | | | **A.24** |  |
| A.24.a | a commitment by the administration that, in the case that unacceptable interference caused by a non-GSO satellite network or system identified as short-duration mission in accordance with Resolution **32 (WRC‑19)** is not resolved, the administration shall undertake steps to eliminate the interference or reduce it to an acceptable level  Required only for notification |  |  |  |  | **+** |  |  |  |  | A.24a |  |

APPENDIX 30A (REV.WRC‑19)[[6]](#footnote-10)\*

**Provisions and associated Plans and List[[7]](#footnote-11)1 for feeder links for the broadcasting-satellite service (11.7-12.5 GHz in Region 1, 12.2-12.7 GHz  
in Region 2 and 11.7-12.2 GHz in Region 3) in the frequency bands  
14.5-14.8 GHz[[8]](#footnote-12)2 and 17.3-18.1 GHz in Regions 1 and 3,  
and 17.3-17.8 GHz in Region 2**     (WRC‑03)

ANNEX 3

**Technical data used in establishing the provisions and associated  
Plans and Regions 1 and 3 feeder-link List, which should  
be used for their application[[9]](#footnote-13)36**     (Rev.WRC‑03)

**3 Basic technical characteristics for Regions 1 and 3**

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**3.9 Polarization**

In Regions 1 and 3, circular polarization was normally used for the purpose of planning the feeder-links.

For the definitions of the terms “direct and indirect polarization”, see § 3.2.3 of Annex 5 to Appendix **30**.

For the planning of the broadcasting-satellite service, circular polarization is generally used. However, for implementation of assignments in the Regions 1 and 3 Plan, linear polarization may also be used subject to successful application of the modification procedure of Article 4. Linear polarization is defined in the most recent version of Recommendation ITU‑R BO.1212. This Recommendation should be used when analysing linearly polarized signals.

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RECOMMENDATION 37 (Rev. WRC-23)

**Operational procedures for earth stations on board vessels (ESVs) use**

The World Radiocommunication Conference (Dubai, 2023),

*considering*

*a)* that under the provisions of Resolution **902** **(Rev. WRC‑23)** transmissions from ESVs within the distances defined in item 4 of Annex 1 of Resolution **902** **(Rev. WRC‑23)** should be based upon prior agreement of concerned administrations;

*b)* that it is desirable to provide guidance on activities to achieve such prior agreement with concerned administrations;

*c)* that such guidance should include the operational procedures for ESV use,

*recommends*

that operation of ESVs follow the procedures set forth in the Annex.

ANNEX 1 TO RECOMMENDATION 37 (Rev. WRC-23)

**Operational procedures for ESV use**

**A Initiation of contact**

The ESV licensing administration or the licence-holder should contact, in advance of ESV operations within the minimum distances, the concerned administration(s) to obtain agreements that will establish the technical bases for avoiding unacceptable interference to the terrestrial facilities of the concerned administration or administrations.

The minimum distances and concerned administrations are defined in items 4 and 5 of Annex 1 of Resolution **902** **(Rev. WRC‑23)**, respectively.

**B Recommended actions of licensing administrations, licence-holders and concerned administrations**

– The licensing administration or the licence-holder should provide the technical and operational parameters required by the concerned administration, among them, if required, information on the movement of the ship(s) equipped with ESVs within the minimum distances.

– Concerned administrations that wish to permit the operation of ESVs should determine if they have terrestrial stations that could be affected by ESV operations with a view to identifying possible frequencies for ESV use that would avoid potential interference.

**C Frequency use arrangements**

National practices, as well as applicable Recommendations of ITU‑R (such as ITU‑R S.1587, ITU‑R SF.1585, ITU‑R SF.1648, ITU‑R SF.1649, ITU‑R SF.1650), may be used in reaching frequency usage arrangements.

**D Avoidance of unacceptable interference**

According to Annex 1 of Resolution **902** **(Rev. WRC‑23)** the ESV licensing administration shall ensure that such stations do not cause unacceptable interference to the services of other concerned administrations. In the event that unacceptable interference occurs, the licence-holder must eliminate the source of any interference from its station immediately upon being advised of such interference. Additionally, the licence-holder shall immediately terminate transmissions at the request of either the concerned administration or the ESV licensing administration if either administration determines that the ESV is causing unacceptable interference or is otherwise not being operated in compliance with the operating agreement.

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RECOMMENDATION 206 (REV.WRC‑23)

**Studies on the possible use of integrated mobile-satellite service and ground component systems in the frequency bands 1 525-1 544 MHz,   
1 545-1 559 MHz, 1 626.5-1 645.5 MHz and 1 646.5-1 660.5 MHz**

The World Radiocommunication Conference (Dubai, 2023),

…..

*noting*

*a)* that the combined wide-area and urban coverage capabilities of integrated MSS systems may contribute to meeting the particular needs of developing countries such as is noted in Resolution**212 (Rev.WRC‑23)**;

*b)* that some administrations that are planning to implement or are implementing integrated systems within their national territories have imposed limitations, in rules and authorization actions, on the e.i.r.p. density that the ground component of such systems may produce into bands allocated to the radionavigation-satellite service;

*c)* that there are a limited number of frequency bands allocated to the MSS, that these bands are already congested, and that the introduction of integrated ground components may in some instances make spectrum access for other MSS systems more difficult;

*d)* that administrations implementing integrated MSS systems may provide, in bilateral consultations of administrations, information on system characteristics of the ground component,

**…**

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

1. 2 −124 − 20 log (*hSAT*/1 414) dB(W/(m2 · 1 MHz)), or equivalently, −140 − 20 log (*hSAT*/1 414) dB(W/(m2 · 25 kHz)), at the FSS satellite orbit, where *hSAT* is the altitude of the satellite (km). [↑](#footnote-ref-3)
2. \* *Note by the Secretariat:* This Resolution was abrogated by WRC-15. [↑](#footnote-ref-4)
3. \*\* *Note by the Secretariat:*  This Resolution was revised by WRC-12. [↑](#footnote-ref-7)
4. 1 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 (Terrestrial Services). [↑](#footnote-ref-8)
5. 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) [↑](#footnote-ref-9)
6. \* The expression “frequency assignment to a space station”, wherever it appears in this Appendix, shall be understood to refer to a frequency assignment associated with a given orbital position.     (WRC‑03) [↑](#footnote-ref-10)
7. 1 The Regions 1 and 3 feeder-link List of additional uses is annexed to the Master International Frequency Register (see Resolution **542** (WRC‑2000)\*\*).     (WRC‑03)

   \*\* *Note by the Secretariat*: This Resolution was abrogated by WRC‑03. [↑](#footnote-ref-11)
8. 2 This use of the band 14.5-14.8 GHz is reserved for countries outside Europe.

   *Note by the Secretariat*: Reference to an Article with the number in roman is referring to an Article in this Appendix. [↑](#footnote-ref-12)
9. 36 In revising this Annex at WRC‑97 and at WRC‑2000, no changes were made to the technical data applicable to the Region 2 feeder-link Plan. However, for all three Regions it should be noted that some of the parameters of networks proposed as modifications to the Region 2 feeder-link Plan and the Regions 1 and 3 feeder-link Lists may differ from the technical data presented herein.     (WRC‑2000) [↑](#footnote-ref-13)