ITUPublications

International Telecommunication Union
Radiocommunication Sector

World Radiocommunication Conference 2023 (WRC-23)

Provisional Final Acts



ITUWRC
DUBAI2023
20 November – 15 December 2023
Dubai, United Arab Emirates

Agenda item 9.1

ARTICLE 1

Terms and definitions

Section I – General terms

MOD

1.14 *Coordinated Universal Time (UTC):* Time scale, based on the second (SI), as described in Resolution **655 (Rev.WRC-23)**. (WRC-23)

Agenda item 8

ARTICLE 5

Frequency allocations

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

MOD

5.56 The stations of services to which the frequency bands 14-19.95 kHz and 20.05-70 kHz and in Region 1 also the frequency bands 72-84 kHz and 86-90 kHz are allocated may transmit standard frequency and time signals. Such stations shall be afforded protection from harmful interference. In Armenia, Azerbaijan, Belarus, the Russian Federation, Georgia, Kyrgyzstan, Tajikistan and Turkmenistan, the frequencies 25 kHz and 50 kHz will be used for this purpose under the same conditions. (WRC-23)

MOD

5.58 *Additional allocation:* in Armenia, Azerbaijan, the Russian Federation, Georgia, Kyrgyzstan, Tajikistan and Turkmenistan, the frequency band 67-70 kHz is also allocated to the radionavigation service on a primary basis. (WRC-23)

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MOD

495-1 800 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
495-505	MARITIME MOBILE 5.82C ADD 5.A111	

ADD

5.A111 When establishing coast stations in the NAVDAT system on the frequencies 500 kHz and 4 226 kHz, the conditions for the use of the frequencies 500 kHz and 4 226 kHz are prescribed in Articles **31** and **52**. Administrations are strongly recommended to coordinate the NAVDAT systems operating characteristics in accordance with the procedures of the International Maritime Organization (IMO) (see Resolution **COM4/1 (WRC-23)**). (WRC-23)

MOD

1 800-2 194 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
2 173.5-2 190.5	MOBILE (distress and calling) 5.108 5.109 MOD 5.110 5.111	

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MOD

5.98 *Alternative allocation*: in Armenia, Azerbaijan, Belarus, Belgium, Cameroon, Congo (Rep. of the), Denmark, Eritrea, Spain, Ethiopia, the Russian Federation, Georgia, Greece, Italy, Kazakhstan, Lebanon, Lithuania, the Syrian Arab Republic, Türkiye, Kyrgyzstan, Somalia, Tajikistan, Tunisia and Turkmenistan, the frequency band 1 810-1 830 kHz is allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis. (WRC-23)

MOD

5.99 *Additional allocation:* in Saudi Arabia, Austria, Egypt, Iraq, Libya, Uzbekistan, Romania, Slovakia, Slovenia, Chad, and Togo, the frequency band 1 810-1 830 kHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis. (WRC-23)

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MOD

5.110 The frequencies 2 174.5 kHz, 4 177.5 kHz, 6 268 kHz, 8 376.5 kHz, 12 520 kHz and 16 695 kHz are used for the automatic connection system (ACS), as described in the most recent version of Recommendation ITU-R M.541. (WRC-23)

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MOD

5.117 *Alternative allocation*: in Liberia, Sri Lanka and Togo, the frequency band 3 155-3 200 kHz is allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis. (WRC-23)

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MOD

3 230-5 003 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
4 063-4 438	MARITIME MOBILE 5.79A ADD 5.A111 5.109 MOD 5.110 5.130 5.131 MOD 5.132 5.128	

MOD

5.132 The frequencies 4 210 kHz, 6 314 kHz, 8 416.5 kHz, 12 579 kHz, 16 806.5 kHz, 19 680.5 kHz, 22 376 kHz and 26 100.5 kHz are the international frequencies for the transmission of maritime safety information (MSI) (see Appendices **15** and **17**). (WRC-23)

MOD

5 003-7 000 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
6 200-6 525	MARITIME MOBILE 5.109 MOD 5.110 5.130 MOD 5.132 ADD 5.B111 5.137	

ADD

5.B111 The frequencies 6 337.5 kHz, 8 443 kHz, 12 663.5 kHz, 16 909.5 kHz and 22 450.5 kHz are the regional frequencies for the transmission of MSI by means of the NAVDAT system (see Appendices **15** and **17**). (WRC-23)

MOD

7 450-13 360 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
8 195-8 815	MARITIME MOBILE 5.109 MOD 5.110 MOD 5.132 5.145 ADD 5.B111 5.111	
…		
12 230-13 200	MARITIME MOBILE 5.109 MOD 5.110 MOD 5.132 5.145 ADD 5.B111	

MOD

13 360-18 030 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
16 360-17 410	MARITIME MOBILE 5.109 MOD 5.110 MOD 5.132 5.145 ADD 5.B111	

MOD

18 030-23 350 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
19 680-19 800	MARITIME MOBILE MOD 5.132	
…		
22 000-22 855	MARITIME MOBILE MOD 5.132 ADD 5.B111 5.156	

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MOD

5.155 *Additional allocation:* in Armenia, Azerbaijan, Belarus, the Russian Federation, Georgia, Moldova, Uzbekistan, Kyrgyzstan, Slovakia, Tajikistan, Turkmenistan and Ukraine, the frequency band 21 850-21 870 kHz is also allocated to the aeronautical mobile (R) service on a primary basis. (WRC-23)

MOD

5.155A In Armenia, Azerbaijan, Belarus, the Russian Federation, Georgia, Moldova, Uzbekistan, Kyrgyzstan, Slovakia, Tajikistan, Turkmenistan and Ukraine, the use of the frequency band 21 850-21 870 kHz by the fixed service is limited to provision of services related to aircraft flight safety. (WRC-23)

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MOD

23 350-27 500 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
26 100-26 175	MARITIME MOBILE MOD 5.132	

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MOD

27.5-40.98 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
39.986-40 FIXED MOBILE Space research		**39.986-40** FIXED MOBILE RADIOLOCATION 5.132A Space research
40-40.02 FIXED MOBILE Earth exploration-satellite (active) ADD 5.A112 Space research		**40-40.02** FIXED MOBILE Earth exploration-satellite (active) ADD 5.A112 Space research
40.02-40.98	FIXED MOBILE Earth exploration-satellite (active) ADD 5.A112 5.150	

ADD

5.A112 The use of the frequency band 40-50 MHz by the Earth exploration-satellite service (active) shall be in accordance with the geographical area restrictions and the operational and technical conditions defined in Resolution **COM5/6 (WRC-23)**. The provisions of this footnote in no way diminish the obligation of the Earth exploration-satellite service (active) to operate as a secondary service in accordance with Nos. **5.29** and **5.30**. (WRC-23)

MOD

40.98-47 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
40.98-41.015	FIXED MOBILE Earth exploration-satellite (active) ADD 5.A112 Space research 5.160 5.161	
41.015-42	FIXED MOBILE Earth exploration-satellite (active) ADD 5.A112 5.160 5.161 5.161A	
42-42.5 FIXED MOBILE Earth exploration-satellite (active) ADD 5.A112 Radiolocation 5.132A 5.160 5.161B	**42-42.5** FIXED MOBILE Earth exploration-satellite (active) ADD 5.A112 5.161	
42.5-44	FIXED MOBILE Earth exploration-satellite (active) ADD 5.A112 5.160 5.161 5.161A	
44-47	FIXED MOBILE Earth exploration-satellite (active) ADD 5.A112 5.162 MOD 5.162A	

MOD

5.162A *Additional allocation:* in Germany, Australia, Austria, Belgium, Bosnia and Herzegovina, China, Vatican, Korea (Rep. of), Denmark, Spain, Estonia, the Russian Federation, Finland, France, Indonesia, Ireland, Iceland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, North Macedonia, Monaco, Montenegro, Norway, the Netherlands, Poland, Portugal, the Dem. People's Rep. of Korea, 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

47-75.2 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td>47-50
BROADCASTING
Earth exploration-satellite (active)
ADD 5.A112

MOD 5.162A 5.163 5.164 5.165</td><td>47-50
FIXED
MOBILE
Earth exploration-satellite (active)
ADD 5.A112</td><td>47-50
FIXED
MOBILE
BROADCASTING
Earth exploration-satellite (active)
ADD 5.A112
MOD 5.162A</td></tr>
<tr><td>50-52
BROADCASTING
Amateur 5.166A 5.166B 5.166C 5.166D 5.166E 5.169 5.169A 5.169B
MOD 5.162A 5.164 5.165</td><td colspan="2">50-54
AMATEUR

MOD 5.162A 5.167 5.167A 5.168 5.170</td></tr>
<tr><td rowspan="2">52-68
BROADCASTING

MOD 5.162A 5.163 5.164 5.165 5.169 5.169A 5.169B 5.171</td><td>54-68
BROADCASTING
Fixed
Mobile

5.172</td><td>54-68
FIXED
MOBILE
BROADCASTING

MOD 5.162A</td></tr>
</table>

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MOD

5.175 *Alternative allocation:* in Armenia, Belarus, the Russian Federation, Kazakhstan, Moldova, Uzbekistan, Kyrgyzstan, Tajikistan, Turkmenistan and Ukraine, the frequency bands 68-73 MHz and 76-87.5 MHz are allocated to the broadcasting service on a primary basis. In Latvia and Lithuania, the frequency bands 68-73 MHz and 76-87.5 MHz are allocated to the broadcasting and mobile, except aeronautical mobile, services on a primary basis. In Mongolia, the frequency band 76-87.5 MHz is allocated to the broadcasting service on a primary basis; the stations of the broadcasting service shall not cause harmful interference to, or claim protection from, existing or planned fixed and mobile stations in the neighbouring countries. The services to which these frequency bands are allocated in other countries and the broadcasting service in the countries listed above are subject to agreements with the neighbouring countries concerned. (WRC-23)

MOD

5.177 *Additional allocation:* in Armenia, Belarus, the Russian Federation, Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, Turkmenistan and Ukraine, the frequency band 73-74 MHz is also allocated to the broadcasting service on a primary basis, subject to agreement obtained under No. **9.21**. (WRC-23)

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MOD

75.2-137.175 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
117.975-137	AERONAUTICAL MOBILE (R) AERONAUTICAL MOBILE-SATELLITE (R) ADD 5.A17 ADD 5.B17 5.111 MOD 5.200 5.201 5.202	

ADD

5.A17 The use of the frequency band 117.975-137 MHz by the aeronautical mobile-satellite (R) service is subject to coordination under No. **9.11A**. No. **9.16** does not apply. Such use shall be limited to non-geostationary-satellite systems operated in accordance with international aeronautical standards. Resolution **COM4/2 (WRC-23)** applies. (WRC-23)

ADD

5.B17 The use of the frequency band 117.975-137 MHz by the aeronautical mobile (R) service shall have priority over use by the aeronautical mobile-satellite (R) service. (WRC-23)

Agenda item 8

MOD

5.185 *Different category of service:* in the United States, the French overseas departments and communities in Region 2 and Guyana, the allocation of the frequency band 76-88 MHz to the fixed and mobile services is on a primary basis (see No. **5.33**). (WRC-23)

Agenda item 4

MOD

5.197A *Additional allocation:* the frequency 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 frequency 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)

Agenda item 1.7

MOD

5.200 In the frequency band 117.975-137 MHz, the frequency 121.5 MHz is the aeronautical emergency frequency and, where required, the frequency 123.1 MHz is the aeronautical frequency auxiliary to 121.5 MHz. Mobile stations of the maritime mobile service may communicate on these frequencies under the conditions laid down in Article **31** for distress and safety purposes with stations of the aeronautical mobile service and the aeronautical mobile-satellite service. (WRC-23)

Agenda item 8

MOD

5.201 *Additional allocation:* in Saudi Arabia, Armenia, Azerbaijan, Bahrain, Egypt, Estonia, the Russian Federation, Georgia, Hungary, Iran (Islamic Republic of), Iraq (Republic of), Japan, Kazakhstan, Mali, Mongolia, Mozambique, Uzbekistan, Papua New Guinea, Poland, Qatar, Kyrgyzstan, Romania, Senegal, Somalia, Tajikistan and Turkmenistan, the frequency band 132-136 MHz is also allocated to the aeronautical mobile (OR) service on a primary basis. In assigning frequencies to stations of the aeronautical mobile (OR) service, the administration shall take account of the frequencies assigned to stations in the aeronautical mobile (R) service. (WRC-23)

MOD

5.202 *Additional allocation:* in Saudi Arabia, Armenia, Azerbaijan, Bahrain, the United Arab Emirates, the Russian Federation, Georgia, Iran (Islamic Republic of), Jordan, Mali, Oman, Uzbekistan, Poland, the Syrian Arab Republic, Kyrgyzstan, Romania, Senegal, Tajikistan and Turkmenistan, the frequency band 136-137 MHz is also allocated to the aeronautical mobile (OR) service on a primary basis. In assigning frequencies to stations of the aeronautical mobile (OR) service, the administration shall take account of the frequencies assigned to stations in the aeronautical mobile (R) service. (WRC-23)

MOD

5.210 *Additional allocation:* in Italy and the United Kingdom, the frequency bands 138-143.6 MHz and 143.65-144 MHz are also allocated to the space research service (space-to-Earth) on a secondary basis. (WRC-23)

MOD

5.221 Stations of the mobile-satellite service in the frequency band 148-149.9 MHz shall not cause harmful interference to, or claim protection from, stations of the fixed or mobile services operating in accordance with the Table of Frequency Allocations in the following countries: Albania, Algeria, Germany, Saudi Arabia, Australia, Austria, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Benin, Bosnia and Herzegovina, Botswana, Brunei Darussalam, Bulgaria, Cameroon, China, Cyprus, Congo (Rep. of the), Korea (Rep. of), Côte d'Ivoire, Croatia, Cuba, Denmark, Djibouti, Egypt, the United Arab Emirates, Eritrea, Spain, Estonia, Eswatini, Ethiopia, the Russian Federation, Finland, France, Gabon, Georgia, Ghana, Greece, Guinea, Guinea Bissau, Hungary, India, Iran (Islamic Republic of), Ireland, Iceland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kuwait, Lesotho, Latvia, Lebanon, Libya, Liechtenstein, Lithuania,

Luxembourg, North Macedonia, Malaysia, Mali, Malta, Mauritania, Moldova, Mongolia, Montenegro, Mozambique, Namibia, Norway, New Zealand, Oman, Uganda, Uzbekistan, Pakistan, Panama, Papua New Guinea, Paraguay, the Netherlands, the Philippines, Poland, Portugal, Qatar, the Syrian Arab Republic, Türkiye, Kyrgyzstan, Dem. People's Rep. of Korea, Slovakia, Romania, the United Kingdom, Senegal, Serbia, Sierra Leone, Singapore, Slovenia, Somalia, Sudan, Sri Lanka, South Africa, Sweden, Switzerland, Tanzania, Chad, Togo, Tonga, Trinidad and Tobago, Tunisia, Ukraine, Viet Nam, Yemen, Zambia and Zimbabwe. (WRC-23)

MOD

161.9375-223 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td>161.9375-161.9625
FIXED
MOBILE except aeronautical mobile
Maritime mobile-satellite (Earth-to-space) 5.228AA
5.226</td><td colspan="2">161.9375-161.9625
FIXED
MOBILE
Maritime mobile-satellite (Earth-to-space) 5.228AA
5.226</td></tr>
<tr><td>161.9625-161.9875
FIXED
MOBILE except aeronautical mobile
Mobile-satellite (Earth-to-space) 5.228F
5.226 5.228A 5.228B</td><td>161.9625-161.9875
AERONAUTICAL MOBILE (OR)
MARITIME MOBILE
MOBILE-SATELITE (Earth-to-space)
5.228C 5.228D</td><td>161.9625-161.9875
MARITIME MOBILE
Aeronautical mobile (OR) 5.228E
Mobile-satellite (Earth-to-space) 5.228F
5.226</td></tr>
<tr><td>161.9875-162.0125
FIXED
MOBILE except aeronautical mobile
Maritime mobile-satellite (Earth-to-space) 5.228AA
5.226</td><td colspan="2">161.9875-162.0125
FIXED
MOBILE
Maritime mobile-satellite (Earth-to-space) 5.228AA
5.226</td></tr>
<tr><td>162.0125-162.0375
FIXED
MOBILE except aeronautical mobile
Mobile-satellite (Earth-to-space) 5.228F
5.226 5.228A 5.228B</td><td>162.0125-162.0375
AERONAUTICAL MOBILE (OR)
MARITIME MOBILE
MOBILE-SATELITE (Earth-to-space)
5.228C 5.228D</td><td>162.0125-162.0375
MARITIME MOBILE
Aeronautical mobile (OR) 5.228E
Mobile-satellite (Earth-to-space) 5.228F
5.226</td></tr>
<tr><td>162.0375-174
FIXED
MOBILE except aeronautical mobile
5.226</td><td colspan="2">162.0375-174
FIXED
MOBILE
5.226 5.230 5.231</td></tr>
<tr><td rowspan="2">174-223
BROADCASTING</td><td>174-216
BROADCASTING
Fixed
Mobile</td><td rowspan="2">174-223
FIXED
MOBILE
BROADCASTING</td></tr>
<tr><td>216-220
FIXED
MARITIME MOBILE
Radiolocation 5.241
5.242</td></tr>
</table>

5.235 5.237 5.243		5.233 5.238 5.240 5.245

Agenda item 1.11

MOD

161.9375-223 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
161.9625-161.9875 FIXED MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.228F 5.226 5.228A 5.228B	**161.9625-161.9875** AERONAUTICAL MOBILE (OR) MARITIME MOBILE MOBILE-SATELLITE (Earth-to-space) MOD 5.228C 5.228D	**161.9625-161.9875** MARITIME MOBILE Aeronautical mobile (OR) 5.228E Mobile-satellite (Earth-to-space) 5.228F 5.226
161.9875-162.0125 FIXED MOBILE except aeronautical mobile Maritime mobile-satellite (Earth-to-space) 5.228AA 5.226 5.229	**161.9875-162.0125** FIXED MOBILE Maritime mobile-satellite (Earth-to-space) 5.228AA 5.226	
162.0125-162.0375 FIXED MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.228F 5.226 5.228A 5.228B 5.229	**162.0125-162.0375** AERONAUTICAL MOBILE (OR) MARITIME MOBILE MOBILE-SATELLITE (Earth-to-space) MOD 5.228C 5.228D	**162.0125-162.0375** MARITIME MOBILE Aeronautical mobile (OR) 5.228E Mobile-satellite (Earth-to-space) 5.228F 5.226

MOD

5.228C The use of the frequency bands 161.9625-161.9875 MHz and 162.0125-162.0375 MHz by the maritime mobile service and the mobile-satellite (Earth-to-space) service is limited to the automatic identification system (AIS), including AIS search and rescue transmitters (AIS-SART) and satellite emergency position indicating radio beacons with AIS (EPIRB-AIS). The use of these frequency bands by the aeronautical mobile (OR) service is limited to AIS emissions from search and rescue aircraft operations. The AIS, AIS-SART and EPIRB-AIS operations in these frequency bands shall not constrain the development and use of the fixed and mobile services operating in the adjacent frequency bands. (WRC-23)

Agenda item 8

SUP

5.229

Agenda item 9.2

MOD

5.264B Non-geostationary-satellite systems in the meteorological-satellite service and the Earth exploration-satellite service for which complete notification information has been received by the Radiocommunication Bureau no later than 28 April 2007 are exempt from provisions of No. **5.264A** and may continue to operate in the frequency band 401.898-402.522 MHz on a primary basis without exceeding a maximum e.i.r.p. level of 12 dBW. (WRC-23)

Agenda item 8

MOD

5.269 *Different category of service:* in Australia, Brazil, the United States, India, Japan and the United Kingdom, the allocation of the frequency bands 420-430 MHz and 440-450 MHz to the radiolocation service is on a primary basis (see No. **5.33**). (WRC-23)

Agenda item 1.5

MOD

460-890 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr>
<td rowspan="6">470-694
BROADCASTING
5.149 5.291A MOD 5.294 MOD 5.296 MOD 5.300 5.304 5.306 5.312 ADD 5.15A ADD 5.15B ADD 5.15C</td>
<td>470-512
BROADCASTING
Fixed
Mobile
5.292 5.293 5.295</td>
<td rowspan="2">470-585
FIXED
MOBILE 5.296A
BROADCASTING
5.291 5.298</td>
</tr>
<tr>
<td rowspan="2">512-608
BROADCASTING
5.295 5.297</td>
</tr>
<tr>
<td rowspan="2">585-610
FIXED
MOBILE 5.296A
BROADCASTING
RADIONAVIGATION
5.149 5.305 5.306 5.307</td>
</tr>
<tr>
<td rowspan="2">608-614
RADIO ASTRONOMY
Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)</td>
</tr>
<tr>
<td rowspan="5">610-890
FIXED
MOBILE 5.296A 5.313A MOD 5.317A
BROADCASTING</td>
</tr>
<tr>
<td rowspan="2">614-698
BROADCASTING
Fixed
Mobile
5.293 5.308 5.308A 5.309</td>
</tr>
<tr>
<td rowspan="2">694-790
MOBILE except aeronautical mobile 5.312A MOD 5.317A
BROADCASTING
MOD 5.300 5.312</td>
</tr>
<tr>
<td rowspan="2">698-806
MOBILE MOD 5.317A
BROADCASTING
Fixed
5.293 5.309</td>
</tr>
<tr>
<td>790-862
FIXED</td>
</tr>
</table>

MOBILE except aeronautical mobile 5.316B MOD 5.317A BROADCASTING 5.312 5.319	**806-890** FIXED MOBILE MOD 5.317A BROADCASTING	
862-890 FIXED MOBILE except aeronautical mobile MOD 5.317A BROADCASTING 5.322 5.319 5.323	MOD 5.317 5.318	5.149 5.305 5.306 5.307 5.320

Agenda item 1.4

MOD

460-890 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
460-470	FIXED MOBILE 5.286AA Meteorological-satellite (space-to-Earth) 5.287 5.288 5.289 5.290	
470-694 BROADCASTING 5.149 5.291A 5.294 5.296 5.300 5.304 5.306 5.312	**470-512** BROADCASTING Fixed Mobile 5.292 5.293 5.295	**470-585** FIXED MOBILE 5.296A BROADCASTING 5.291 5.298
	512-608 BROADCASTING 5.295 5.297	**585-610** FIXED MOBILE 5.296A BROADCASTING RADIONAVIGATION 5.149 5.305 5.306 5.307
	608-614 RADIO ASTRONOMY Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)	**610-890** FIXED MOBILE 5.296A 5.313A 5.317A ADD 5.14B BROADCASTING
	614-698 BROADCASTING Fixed Mobile 5.293 5.308 5.308A 5.309	
694-790 MOBILE except aeronautical mobile 5.312A 5.317A ADD 5.14A BROADCASTING 5.300 5.312	**698-806** MOBILE 5.317A ADD 5.14A BROADCASTING Fixed 5.293 5.309	
790-862 FIXED		

MOBILE except aeronautical mobile 5.316B 5.317A ADD 5.14A BROADCASTING 5.312 5.319	**806-890** FIXED MOBILE 5.317A ADD 5.14A BROADCASTING	
862-890 FIXED MOBILE except aeronautical mobile 5.317A ADD 5.14A BROADCASTING 5.322 5.319 5.323	 5.317 5.318	 5.149 5.305 5.306 5.307 5.320

Agenda item 1.5

ADD

5.15A *Additional allocation:* in Albania, Germany, Andorra, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Cyprus, Vatican, Croatia, Denmark, Estonia, Finland, France, Georgia, Greece, Hungary, Ireland, Iceland, Latvia, Liechtenstein, Lithuania, Luxembourg, North Macedonia, Malta, Moldova, Monaco, Montenegro, Norway, Uzbekistan, Kingdom of the Netherlands, Poland, Portugal, Türkiye, Slovakia, the Czech Republic, Romania, the United Kingdom, San Marino, Serbia, Slovenia, Sweden, Switzerland, Ukraine, the frequency band 470-694 MHz is allocated to the mobile, except aeronautical mobile, service on a secondary basis, subject to agreement obtained under No. **9.21**. For the protection of the broadcasting service, stations in the mobile service shall not create a field strength for more than 1% of the time at the highest of the clutter height or 10 m above ground level at the border of the territory of any other administration that exceeds the field strength value as calculated using § 4.1.3.2 of Annex 2 to the GE06 Agreement with regard to allowance for multiple interference, Table AP1.10 and the methodology given in the GE06 Agreement. These limits may be exceeded on the territory of any country whose administration has so agreed. This allocation shall in no way adversely affect the broadcast development or undermine new entries of the broadcast service to the GE06 Plan. (WRC-23)

Agenda item 1.4

ADD

5.14A The frequency band 698-960 MHz, or portions thereof, in Region 2, and the frequency band 694-960 MHz, or portions thereof, in Region 1, are identified for use by high-altitude platform stations as International Mobile Telecommunications (IMT) base stations (HIBS). 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.
Resolution **COM4/3 (WRC-23)** shall apply. HIBS shall not claim protection from existing primary services. No. **5.43A** does not apply, see *resolves* 2 of Resolution **COM4/3 (WRC-23)**. Such use of HIBS in the frequency bands 694-728 MHz, 830-835 MHz and 805.3-806.9 MHz is limited to reception by HIBS. (WRC-23)

Agenda item 1.5

ADD

5.15B *Additional allocation*: in Saudi Arabia, Bahrain, Egypt, the United Arab Emirates, Iraq, Jordan, Kuwait, Oman, Palestine*, Qatar and the Syrian Arab Republic, the frequency band 614-694 MHz is allocated to the mobile, except aeronautical mobile, service on a primary basis and identified for International Mobile Telecommunications (IMT) – see Resolution **224 (Rev.WRC-23)** subject to the agreement obtained under No. **9.21.** Stations in the mobile service shall not create a field strength for more than 1% of the time at the highest of the clutter height or 10 m above ground level at the border of the territory of any other administration that exceeds the field strength value as calculated using § 4.1.3.2 of Annex 2 to the GE06 Agreement with regard to allowance for multiple interference, Table AP1.10 and the methodology given in the GE06 Agreement. Stations in the mobile service of the countries listed in this footnote shall not cause harmful interference to, or claim protection from the existing and future broadcasting stations of the neighbouring countries operating in accordance with the GE06 Plan. 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 and shall in no way adversely affect the development of the existing and future broadcasting service in accordance with the GE06 Agreement. For countries party to the GE06 Agreement, the use of stations in the mobile service is also subject to the successful application of the procedures of that Agreement. This allocation does not establish priority in the Radio Regulations and shall allow the implementation and development of the broadcasting service in accordance with the GE06 Agreement. The countries listed in this footnote and located in the African Broadcasting Area should ensure protection of the radio astronomy service within the frequency band 606-614 MHz, as allocated in No. **5.304**, consistent with the most recent version of Recommendation ITU-R RA.769. The countries listed in this footnote, which are neighbouring to the countries listed in No. **5.312**, should ensure the protection of the aeronautical radionavigation service in the frequency band 645-862 MHz. (WRC-23)

Agenda item 1.4

ADD

5.14B The frequency band 698-960 MHz, or portions thereof, in Australia, Maldives, Micronesia, Papua New Guinea, Tonga and Vanuatu, the frequency bands 703-733 MHz, 758-788 MHz, 890-915 MHz and 935-960 MHz, or portions thereof, in China, India, Indonesia, Japan, Korea (Rep. of), Malaysia, the Philippines and Thailand are identified for use by high-altitude platform stations as International Mobile Telecommunications (IMT) base stations (HIBS). 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. Resolution **COM4/3 (WRC-23)** shall apply. HIBS shall not claim protection from existing primary services. No. **5.43A** does not apply, see *resolves* 2 of Resolution **COM4/3 (WRC-23)**. Such use of HIBS in the frequency bands 698-728 MHz and 830-835 MHz are limited to reception by HIBS. (WRC-23)

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* Pursuant to Resolution 99 (Rev. Dubai, 2018) of the Plenipotentiary Conference, and taking into account the Israeli-Palestinian Interim Agreement of 28 September 1995.

Agenda item 1.5

ADD

5.15C *Additional allocation:* in Gambia, Mauritania, Namibia, Nigeria, Senegal, Somalia, Tanzania and Chad, the frequency band 614-694 MHz is allocated to the mobile service on a secondary basis. For the protection of the broadcasting service, stations in the mobile service shall not create a field strength for more than 1% of the time at the highest of the clutter height or 10 m above ground level at the border of the territory of any other administration that exceeds the field strength value as calculated using § 4.1.3.2 of Annex 2 to the GE06 Agreement with regard to allowance for multiple interference, Table AP1.10 and the methodology given in the GE06 Agreement. This allocation shall in no way adversely affect the broadcast development or undermine new entries of the broadcast service to the GE06 Plan. Additional measures shall be used by administrations implementing stations in the mobile services to protect stations in the broadcasting stations of neighbouring administrations such as a distance limitation from the border of a neighbouring country. (WRC-23)

Agenda item 8

MOD

5.291A *Additional allocation:* in Germany, Austria, Denmark, Estonia, Liechtenstein, 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

5.293 *Different category of service:* in Canada, Chile, Cuba, the United States, Guyana and Panama, the allocation of the frequency bands 470-512 MHz and 614-806 MHz to the fixed service is on a primary basis (see No. **5.33**), subject to agreement obtained under No. **9.21**. In the Bahamas, Barbados, Canada, Chile, Cuba, the United States, Guyana, Jamaica, Mexico and Panama, the allocation of the frequency bands 470-512 MHz and 614-698 MHz to the mobile service is on a primary basis (see No. **5.33**), subject to agreement obtained under No. **9.21**. In Argentina and Ecuador, the allocation of the frequency band 470-512 MHz to the fixed and mobile services is on a primary basis (see No. **5.33**), subject to agreement obtained under No. **9.21**. (WRC-23)

Agenda item 1.5

MOD

5.294 *Additional allocation:* in Saudi Arabia, Cameroon, Côte d'Ivoire, Egypt, Ethiopia, Israel, Libya, Palestine*, the Syrian Arab Republic, Chad and Yemen, the frequency band 470-582 MHz is also allocated to the fixed service on a secondary basis. (WRC-23)

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* Pursuant to Resolution 99 (Rev. Dubai, 2018) of the Plenipotentiary Conference and taking into account the Israeli-Palestinian Interim Agreement of 28 September 1995.

MOD

5.296 *Additional allocation:* in Albania, Algeria, Germany, Angola, Saudi Arabia, Austria, Bahrain, Belgium, Benin, Bosnia and Herzegovina, Botswana, Bulgaria, Burkina Faso, Burundi, Cameroon, Vatican, Congo (Rep. of the), Côte d'Ivoire, Croatia, Denmark, Djibouti, Egypt, United Arab Emirates, Spain, Estonia, Eswatini, Finland, France, Gabon, Gambia, Georgia, Ghana, Hungary, Iraq, Ireland, Iceland, Israel, Italy, Jordan, Kenya, Kuwait, Lesotho, Latvia, Lebanon, Libya, Liechtenstein, Lithuania, Luxembourg, North Macedonia, Malawi, Mali, Malta, Morocco, Mauritius, Mauritania, Moldova, Monaco, Mozambique, Namibia, Niger, Nigeria, Norway, Oman, Uganda, Palestine*, the Netherlands, Poland, Portugal, Qatar, the Syrian Arab Republic, Slovakia, the Czech Republic, Romania, the United Kingdom, Rwanda, San Marino, Senegal, Serbia, Sudan, South Africa, Sweden, Switzerland, Tanzania, Chad, Togo, Tunisia, Turkey, Ukraine, Zambia and Zimbabwe, the frequency band 470-694 MHz is also allocated on a secondary basis to the land mobile service, intended for applications ancillary to broadcasting and programme-making. Stations of the land mobile service in the countries listed in this footnote shall not cause harmful interference to existing or planned stations operating in accordance with the Table in countries other than those listed in this footnote. (WRC-23)

Agenda item 8

MOD

5.296A In Micronesia, the Solomon Islands, Tuvalu and Vanuatu, the frequency band 470-698 MHz, or portions thereof, and in Bangladesh, Lao P.D.R., Maldives, New Zealand and Viet Nam, the frequency band 610-698 MHz, or portions thereof, are identified for use by these administrations wishing to implement International Mobile Telecommunications (IMT) – see Resolution **224 (Rev.WRC-19/23)**. 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. The mobile allocation in this frequency band shall not be used for IMT systems unless subject to agreement obtained under No. **9.21** and shall not cause harmful interference to, or claim protection from, the broadcasting service of neighbouring countries. Nos. **5.43** and **5.43A** apply. (WRC-23)

Agenda item 1.5

MOD

5.300 *Additional allocation:* in Saudi Arabia, Cameroon, Egypt, the United Arab Emirates, Iraq, Israel, Jordan, Libya, Oman, Palestine*, Qatar, the Syrian Arab Republic and Sudan, the frequency band 582-790 MHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a secondary basis. (WRC-23)

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* Pursuant to Resolution 99 (Rev. Dubai, 2018) of the Plenipotentiary Conference, and taking into account the Israeli-Palestinian Interim Agreement of 28 September 1995.

* Pursuant to Resolution 99 (Rev. Dubai, 2018) of the Plenipotentiary Conference, and taking into account the Israeli-Palestinian Interim Agreement of 28 September 1995.

Agenda item 8

MOD

5.308 *Different category of service:* in Belize, Colombia, El Salvador and Guatemala, the frequency band 614-698 MHz is allocated to the mobile service on a primary basis. Stations of the mobile service within the frequency band are subject to agreement obtained under No. **9.21**. (WRC-23)

MOD

5.308A In the Bahamas, Barbados, Belize, Canada, Colombia, El Salvador, the United States, Guatemala, Jamaica and Mexico, the frequency band 614-698 MHz, or portions thereof, is identified for International Mobile Telecommunications (IMT) – see Resolution **224 (Rev.WRC-19/23)**. 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. Mobile service stations of the IMT system within the frequency band are subject to agreement obtained under No. **9.21** and shall not cause harmful interference to, or claim protection from, the broadcasting service of neighbouring countries. Nos. **5.43** and **5.43A** apply. (WRC-23)

MOD

5.312 *Additional allocation*: in Armenia, Azerbaijan, Belarus, the Russian Federation, Georgia, Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, Turkmenistan and Ukraine, the frequency band 645-862 MHz, and in Bulgaria the frequency bands 726-753 MHz, 778-811 MHz and 822-852 MHz, are also allocated to the aeronautical radionavigation service on a primary basis. (WRC-23)

Agenda item 4

MOD

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-19/23)**. (WRC-23)

MOD

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-19/23)** and **749 (Rev.WRC-23)** shall apply, as appropriate. (WRC-23)

Agenda item 1.5

MOD

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-23)**, **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)

Agenda item 8

MOD

5.322 In Region 1, in the frequency band 862-960 MHz, stations of the broadcasting service shall be operated only in the African Broadcasting Area (see Nos. **5.10** to **5.13**) excluding Algeria, Burundi, Djibouti, Egypt, Spain, Lesotho, Libya, Morocco, Malawi, Namibia, Nigeria, South Africa, Tanzania, Zimbabwe and Zambia, subject to agreement obtained under No. **9.21**. (WRC-23)

Agenda item 1.4

MOD

890-1 300 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td rowspan="3">890-942
FIXED
MOBILE except aeronautical mobile 5.317A ADD 5.14A
BROADCASTING 5.322
Radiolocation

5.323</td><td>890-902
FIXED
MOBILE except aeronautical mobile 5.317A ADD 5.14A
Radiolocation
5.318 5.325</td><td rowspan="3">890-942
FIXED
MOBILE 5.317A ADD 5.14B
BROADCASTING
Radiolocation

5.327</td></tr>
<tr><td>902-928
FIXED
Amateur
Mobile except aeronautical mobile 5.325A ADD 5.14A
Radiolocation
5.150 5.325 5.326</td></tr>
<tr><td>928-942
FIXED
MOBILE except aeronautical mobile 5.317A ADD 5.14A
Radiolocation
5.325</td></tr>
<tr><td>942-960
FIXED
MOBILE except aeronautical mobile 5.317A ADD 5.14A
BROADCASTING 5.322
5.323</td><td>942-960
FIXED
MOBILE 5.317A ADD 5.14A</td><td>942-960
FIXED
MOBILE 5.317A ADD 5.14B
BROADCASTING

5.320</td></tr>
</table>

Agenda item 9.1(9.1-b)

MOD

890-1 300 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td>1 240-1 300</td><td colspan="2">EARTH EXPLORATION-SATELLITE (active)
RADIOLOCATION
RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.328B 5.329 5.329A
SPACE RESEARCH (active)
Amateur
5.282 5.330 5.331 5.332 5.335 5.335A ADD 5.A91B</td></tr>
</table>

ADD

5.A91B Administrations authorizing operation of the amateur and amateur-satellite services in the frequency band 1 240-1 300 MHz, or portions thereof, shall ensure that the amateur and amateur-satellite services do not cause harmful interference to radionavigation-satellite service (space-to-Earth) receivers in accordance with No. **5.29** (see the most recent version of Recommendation ITU-R M.2164). The authorizing administration, upon receipt of a report of harmful interference caused by a station of the amateur or amateur-satellite services, shall take all necessary steps to rapidly eliminate such interference. (WRC-23)

Agenda item 8

MOD

5.325A *Different category of service:* in Argentina, Brazil, Costa Rica, Cuba, Dominican Republic, El Salvador, Ecuador, the French overseas departments and communities in Region 2, Guatemala, Paraguay, Uruguay and Venezuela, the frequency band 902-928 MHz is allocated to the land mobile service on a primary basis. In Mexico, the frequency band 902-928 MHz is allocated to the mobile, except aeronautical mobile, service on a primary basis. In Colombia, the frequency band 902-915 MHz is allocated to the land mobile service on a primary basis. (WRC-23)

MOD

5.330 *Additional allocation:* in Angola, Saudi Arabia, Bahrain, Bangladesh, Cameroon, China, Djibouti, Egypt, the United Arab Emirates, Eritrea, Ethiopia, Guyana, India, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Japan, Jordan, Kuwait, Nepal, Oman, Pakistan, Palestine*, the Philippines, Qatar, the Syrian Arab Republic, Somalia, Sudan, South Sudan, Chad, Togo and Yemen, the frequency band 1 215-1 300 MHz is also allocated to the fixed and mobile services on a primary basis. (WRC-23)

MOD

5.331 *Additional allocation:* in Algeria, Germany, Saudi Arabia, Australia, Austria, Bahrain, Belarus, Belgium, Benin, Bosnia and Herzegovina, Brazil, Burkina Faso, Burundi, Cameroon, China, Korea (Rep. of), Croatia, Denmark, Djibouti, Egypt, the United Arab Emirates, Estonia, the Russian Federation, Finland, France, Ghana, Greece, Guinea, Equatorial Guinea, Hungary, India, Indonesia, Iran (Islamic Republic of), Iraq, Ireland, Israel, Jordan, Kenya, Kuwait, Lesotho, Latvia, Lebanon, Liechtenstein, Lithuania, Luxembourg, North Macedonia, Madagascar, Mali, Mauritania, Montenegro, Nigeria, Norway, Oman, Pakistan, Palestine*, the Kingdom of the Netherlands, Poland, Portugal, Qatar, the Syrian Arab Republic, Türkiye, Dem. People's Rep. of Korea, Slovakia, the United Kingdom, Serbia, Slovenia, Somalia, Sudan, South Sudan, Sri Lanka, South Africa, Sweden, Switzerland, Thailand, Togo, Venezuela and Viet Nam, the frequency band 1 215-1 300 MHz is also allocated to the radionavigation service on a primary basis. In Canada and the United States, the frequency band 1 240-1 300 MHz is also allocated to the radionavigation

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* Pursuant to Resolution 99 (Rev. Dubai, 2018) of the Plenipotentiary Conference and taking into account the Israeli-Palestinian Interim Agreement of 28 September 1995.

* Pursuant to Resolution 99 (Rev. Dubai, 2018) of the Plenipotentiary Conference and taking into account the Israeli-Palestinian Interim Agreement of 28 September 1995.

service, and use of the radionavigation service shall be limited to the aeronautical radionavigation service. (WRC-23)

MOD

5.346 In Algeria, Angola, Saudi Arabia, Bahrain, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Congo (Rep. of the), Côte d'Ivoire, Djibouti, Egypt, United Arab Emirates, Eswatini, Gabon, Gambia, Ghana, Guinea, Iraq, Jordan, Kenya, Kuwait, Lesotho, Lebanon, Liberia, Madagascar, Malawi, Mali, Morocco, Mauritius, Mauritania, Mozambique, Namibia, Niger, Nigeria, Oman, Uganda, Palestine**, Qatar, Dem. Rep. of the Congo, Rwanda, Senegal, Seychelles, Somalia, Sudan, South Sudan, South Africa, Tanzania, Chad, Togo, Tunisia, Zambia, and Zimbabwe, the frequency band 1 452-1 492 MHz is identified for use by administrations listed above wishing to implement International Mobile Telecommunications (IMT) in accordance with Resolution **223 (Rev.WRC-19/23)**. This identification does not preclude the use of this frequency band by any other application of the services to which it is allocated and does not establish priority in the Radio Regulations. The use of this frequency band for the implementation of IMT is subject to agreement obtained under No. **9.21** with respect to the aeronautical mobile service used for aeronautical telemetry in accordance with No. **5.342**. See also Resolution **761 (Rev.WRC-19)**. (WRC-23)

MOD

5.349 *Different category of service:* in Saudi Arabia, Azerbaijan, Bahrain, Cameroon, Djibouti, Egypt, Iran (Islamic Republic of), Iraq, Israel, Kuwait, Lebanon, North Macedonia, Morocco, Qatar, Syrian Arab Republic, Kyrgyzstan, Turkmenistan and Yemen, the allocation of the frequency band 1 525-1 530 MHz to the mobile, except aeronautical mobile, service is on a primary basis (see No. **5.33**). (WRC-23)

Agenda item 4

MOD

5.351A For the use of the frequency 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-23)**. (WRC-23)

MOD

5.353A In applying the procedures of Section II of Article **9** to the mobile-satellite service in the frequency bands 1 530-1 544 MHz and 1 626.5-1 645.5 MHz, priority shall be given to accommodating the spectrum requirements for distress, urgency and safety communications of the Global Maritime Distress and Safety System (GMDSS). Maritime mobile-satellite distress, urgency

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** The use by Palestine of the allocation to the mobile service in the frequency band 1 452-1 492 MHz identified for IMT is noted, pursuant to Resolution 99 (Rev. Dubai, 2018) of the Plenipotentiary Conference and taking into account the Israeli-Palestinian Interim Agreement of 28 September 1995.

and safety communications shall have priority access and immediate availability over all other mobile satellite communications operating within a network. Mobile-satellite systems shall not cause unacceptable interference to, or claim protection from, distress, urgency and safety communications of the GMDSS. Account shall be taken of the priority of safety-related communications in the other mobile-satellite services. (The provisions of Resolution **222 (Rev.WRC-23)** shall apply.) (WRC-23)

MOD

5.357A In applying the procedures of Section II of Article **9** to the mobile-satellite service in the frequency bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz, priority shall be given to accommodating the spectrum requirements of the aeronautical mobile-satellite (R) service providing transmission of messages with priority 1 to 6 in Article **44**. Aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article **44** shall have priority access and immediate availability, by pre-emption if necessary, over all other mobile-satellite communications operating within a network. Mobile-satellite systems shall not cause unacceptable interference to, or claim protection from, aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article **44**. Account shall be taken of the priority of safety-related communications in the other mobile-satellite services. (The provisions of Resolution **222 (Rev.WRC-23)** shall apply.) (WRC-23)

Agenda item 8

MOD

5.359 *Additional allocation:* in Germany, Saudi Arabia, Armenia, Azerbaijan, Belarus, Cameroon, the Russian Federation, Georgia, Guinea, Guinea-Bissau, Jordan, Kazakhstan, Kuwait, Lithuania, Mauritania, Uganda, Uzbekistan, Pakistan, Poland, the Syrian Arab Republic, Kyrgyzstan, the Dem. People's Rep. of Korea, Romania, Tajikistan, Tunisia and Turkmenistan, the frequency bands 1 550-1 559 MHz, 1 610-1 645.5 MHz and 1 646.5-1 660 MHz are also allocated to the fixed service on a primary basis. Administrations are urged to make all practicable efforts to avoid the implementation of new fixed-service stations in these frequency bands. (WRC-23)

Agenda item 1.11

MOD

1 610-1 660 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 610-1 610.6 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION 5.341 5.355 5.359 5.364 5.366 5.367 MOD 5.368 5.369 5.371 5.372	**1 610-1 610.6** MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) 5.341 5.364 5.366 5.367 MOD 5.368 5.370 5.372	**1 610-1 610.6** MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION Radiodetermination-satellite (Earth-to-space) 5.341 5.355 5.359 5.364 5.366 5.367 MOD 5.368 5.369 5.372

1 610.6-1 613.8 MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION 5.149 5.341 5.355 5.359 5.364 5.366 5.367 MOD 5.368 5.369 5.371 5.372	**1 610.6-1 613.8** MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) 5.149 5.341 5.364 5.366 5.367 MOD 5.368 5.370 5.372	**1 610.6-1 613.8** MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION Radiodetermination-satellite (Earth-to-space) 5.149 5.341 5.355 5.359 5.364 5.366 5.367 MOD 5.368 5.369 5.372
1 613.8-1 621.35 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to-Earth) 5.208B 5.341 5.355 5.359 5.364 5.365 5.366 5.367 MOD 5.368 5.369 5.371 5.372 ADD 5.111Z	**1 613.8-1 621.35** MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) Mobile-satellite (space-to-Earth) 5.208B 5.341 5.364 5.365 5.366 5.367 MOD 5.368 5.370 5.372 ADD 5.111Z	**1 613.8-1 621.35** MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to-Earth) 5.208B Radiodetermination-satellite (Earth-to-space) 5.341 5.355 5.359 5.364 5.365 5.366 5.367 MOD 5.368 5.369 5.372 ADD 5.111Z
1 621.35-1 626.5 MARITIME MOBILE-SATELLITE (space-to-Earth) 5.373 5.373A MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION	**1 621.35-1 626.5** MARITIME MOBILE-SATELLITE (space-to-Earth) 5.373 5.373A MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION	**1 621.35-1 626.5** MARITIME MOBILE-SATELLITE (space-to-Earth) 5.373 5.373A MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION
Mobile-satellite (space-to-Earth) except maritime mobile satellite (space-to-Earth) 5.208B 5.341 5.355 5.359 5.364 5.365 5.366 5.367 MOD 5.368 5.369 5.371 5.372	RADIODETERMINATION-SATELLITE (Earth-to-space) Mobile-satellite (space-to-Earth) except maritime mobile satellite (space-to-Earth) 5.208B 5.341 5.364 5.365 5.366 5.367 MOD 5.368 5.370 5.372	Mobile-satellite (space-to-Earth) except maritime mobile satellite (space-to-Earth) Radiodetermination-satellite (Earth-to-space) 5.208B 5.341 5.355 5.359 5.364 5.365 5.366 5.367 MOD 5.368 5.369 5.372

ADD

5.111Z The maritime mobile-satellite service in the frequency bands 1 614.4225-1 618.725 MHz or 1 616.3-1 620.38 MHz (Earth-to-space) (see *resolves* 5 of Resolution **COM4/5 (WRC-23)**) and 2 483.59-2 499.91 MHz (space-to-Earth) when they are used for GMDSS is limited to the geostationary-satellite networks identified in Resolution **COM4/5 (WRC-23)** and their associated earth stations located within a service area from 75°E to 135°E longitude and from 10°N to 55°N latitude. Resolution **COM4/5 (WRC-23)** applies. (WRC-23)

MOD

1 610-1 660 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 626.5-1 660	MOBILE-SATELLITE (Earth-to-space) 5.351A 5.341 5.351 5.353A 5.354 5.355 5.357A 5.359 5.362A 5.374 MOD 5.375 5.376	

MOD

5.368 The provisions of No. **4.10** do not apply with respect to the radiodetermination-satellite and mobile-satellite services in the frequency band 1 610-1 626.5 MHz. However, No. **4.10** applies in the frequency band 1 610-1 626.5 MHz with respect to the aeronautical radionavigation-satellite service when operating in accordance with No. **5.366**, the aeronautical mobile-satellite (R) service when operating in accordance with No. **5.367**, and in the frequency bands 1 614.4225-1 618.725 MHz or 1 616.3-1 620.38 MHz (Earth-to-space) (see *resolves* 5 of Resolution **COM4/5 (WRC-23)**) and 1 621.35-1 626.5 MHz with respect to the maritime mobile-satellite service when used for GMDSS. In applying the procedure of Section II of Article **9**, the provisions of No. **4.10** do not apply for the frequency bands 1 614.4225-1 618.725 MHz or 1 616.3-1 620.38 MHz (Earth-to-space) (see *resolves* 5 of Resolution **COM4/5 (WRC-23)**) and 2 483.59-2 499.91 MHz (space-to-Earth) for the maritime mobile-satellite service when used for the GMDSS with satellite networks or systems for which complete coordination information has been received by the Radiocommunication Bureau before 20 November 2023. Resolution **COM4/5 (WRC-23)** applies. (WRC-23)

MOD

5.375 The use of the frequency band 1 645.5-1 646.5 MHz by the mobile-satellite service (Earth-to-space) and for inter-satellite links is limited to distress, urgency and safety communications (see Article **31**). (WRC-23)

Agenda item 4

MOD

5.379B The use of the band 1 668-1 675 MHz by the mobile-satellite service is subject to coordination under No. **9.11A**. (WRC-23)

MOD

5.379D For sharing of the frequency 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)

Agenda item 1.4

MOD

1 710-2 170 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 710-1 930	FIXED MOBILE 5.384A MOD 5.388A 5.149 5.341 5.385 5.386 5.387 5.388	
1 930-1 970 FIXED MOBILE MOD 5.388A 5.388	**1 930-1 970** FIXED MOBILE MOD 5.388A Mobile-satellite (Earth-to-space) 5.388	**1 930-1 970** FIXED MOBILE MOD 5.388A 5.388
1 970-1 980	FIXED MOBILE MOD 5.388A 5.388	
1 980-2 010	FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.351A 5.388 5.389A 5.389B 5.389F	
2 010-2 025 FIXED MOBILE MOD 5.388A 5.388	**2 010-2 025** FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.388 5.389C 5.389E	**2 010-2 025** FIXED MOBILE MOD 5.388A 5.388
2 025-2 110	SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space) FIXED MOBILE 5.391 SPACE RESEARCH (Earth-to-space) (space-to-space) 5.392	
2 110-2 120	FIXED MOBILE MOD 5.388A SPACE RESEARCH (deep space) (Earth-to-space) 5.388	
2 120-2 160 FIXED MOBILE MOD 5.388A 5.388	**2 120-2 160** FIXED MOBILE MOD 5.388A Mobile-satellite (space-to-Earth) 5.388	**2 120-2 160** FIXED MOBILE MOD 5.388A 5.388
2 160-2 170 FIXED MOBILE MOD 5.388A 5.388	**2 160-2 170** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.388 5.389C 5.389E	**2 160-2 170** FIXED MOBILE MOD 5.388A 5.388

Agenda item 8

MOD

5.387 *Additional allocation:* in Belarus, Georgia, Kyrgyzstan, Romania, Tajikistan and Turkmenistan, the frequency band 1 770-1 790 MHz is also allocated to the meteorological-satellite service on a primary basis, subject to agreement obtained under No. **9.21**. (WRC-23)

Agenda item 4

MOD

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-19/23)**). (WRC-23)

Agenda item 1.4

MOD

5.388A The frequency bands 1 710-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3 and the frequency bands 1 710-1 980 MHz and 2 110-2 160 MHz in Region 2 are identified for the use by high altitude platform stations as International Mobile Telecommunications (IMT) base stations (HIBS). 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. Resolution **221 (Rev.WRC-23)** shall apply. HIBS shall not claim protection from existing primary services. No. **5.43A** does not apply. Such use of HIBS in the frequency bands 1 710-1 785 MHz in Regions 1 and 2, and 1 710-1 815 MHz in Region 3 is limited to reception by HIBS, and in the frequency band 2 110-2 170 MHz is limited to transmission from HIBS. (WRC-23)

SUP

5.388B

Agenda item 4

MOD

5.389A The use of the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz by the mobile-satellite service is subject to coordination under No. **9.11A** and to the provisions of Resolution **716 (Rev.WRC-23)**. (WRC-23)

MOD

5.389C The use of the frequency bands 2 010-2 025 MHz and 2 160-2 170 MHz in Region 2 by the mobile-satellite service is subject to coordination under No. **9.11A** and to the provisions of Resolution **716 (Rev.WRC-23)**. (WRC-23)

Agenda item 1.11

MOD

2 170-2 520 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
2 483.5-2 500 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.351A RADIODETERMINATION-SATELLITE (space-to-Earth) 5.398 Radiolocation 5.398A 5.150 5.399 5.401 5.402 ADD 5.111Z MOD 5.368	**2 483.5-2 500** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.351A RADIOLOCATION RADIODETERMINATION-SATELLITE (space-to-Earth) 5.398 5.150 5.402 ADD 5.111Z MOD 5.368	**2 483.5-2 500** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.351A RADIOLOCATION RADIODETERMINATION-SATELLITE (space-to-Earth) 5.398 5.150 5.401 5.402 ADD 5.111Z MOD 5.368

Agenda item 1.4

MOD

2 170-2 520 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
2 500-2 520 FIXED 5.410 MOBILE except aeronautical mobile 5.384A ADD 5.14C 5.412	**2 500-2 520** FIXED 5.410 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A ADD 5.14C	**2 500-2 520** FIXED 5.410 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A ADD 5.14C MOBILE-SATELLITE (space-to-Earth) 5.351A 5.407 5.414 5.414A 5.404 5.415A

ADD

5.14C The frequency band 2 500-2 690 MHz in Regions 1 and 2, and the frequency band 2 500-2 655 MHz in Region 3 are identified for use by high-altitude platform stations as International Mobile Telecommunications (IMT) base stations (HIBS). 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. Resolution **COM4/4 (WRC-23)** shall apply. HIBS shall not claim protection from existing primary services. No. **5.43A** does not apply. Such use of HIBS in the frequency bands 2 500-2 510 MHz in Regions 1 and 2, and 2 500-2 535 MHz in Region 3 is limited to reception by HIBS. (WRC-23)

Agenda item 8

MOD

5.394 In the United States, the use of the frequency band 2 360-2 395 MHz by the aeronautical mobile service for telemetry has priority over other uses by the mobile services. In Canada, the use of the frequency band 2 360-2 400 MHz by the aeronautical mobile service for telemetry has priority over other uses by the mobile services. (WRC-23)

Agenda item 1.4

MOD

2 520-2 700 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td>2 520-2 655
FIXED 5.410
MOBILE except aeronautical mobile 5.384A ADD 5.14C
BROADCASTING-SATELLITE 5.413 5.416

5.339 5.412 5.418B 5.418C</td><td>2 520-2 655
FIXED 5.410
FIXED-SATELLITE (space-to-Earth) 5.415
MOBILE except aeronautical mobile 5.384A ADD 5.14C
BROADCASTING-SATELLITE 5.413 5.416

5.339 5.418B 5.418C</td><td>2 520-2 535
FIXED 5.410
FIXED-SATELLITE (space-to-Earth) 5.415
MOBILE except aeronautical mobile 5.384A ADD 5.14C
BROADCASTING-SATELLITE 5.413 5.416
5.403 5.414A 5.415A
2 535-2 655
FIXED 5.410
MOBILE except aeronautical mobile 5.384A ADD 5.14C
BROADCASTING-SATELLITE 5.413 5.416
5.339 5.418 5.418A 5.418B 5.418C</td></tr>
<tr><td>2 655-2 670
FIXED 5.410
MOBILE except aeronautical mobile 5.384A ADD 5.14C
BROADCASTING-SATELLITE 5.208B 5.413 5.416
Earth exploration-satellite (passive)
Radio astronomy
Space research (passive)

5.149 5.412</td><td>2 655-2 670
FIXED 5.410
FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.415
MOBILE except aeronautical mobile 5.384A ADD 5.14C
BROADCASTING-SATELLITE 5.413 5.416
Earth exploration-satellite (passive)
Radio astronomy
Space research (passive)
5.149 5.208B</td><td>2 655-2 670
FIXED 5.410
FIXED-SATELLITE (Earth-to-space) 5.415
MOBILE except aeronautical mobile 5.384A
BROADCASTING-SATELLITE 5.208B 5.413 5.416
Earth exploration-satellite (passive)
Radio astronomy
Space research (passive)

5.149 5.420</td></tr>
</table>

2 670-2 690 FIXED 5.410 MOBILE except aeronautical mobile 5.384A ADD 5.14C Earth exploration-satellite (passive) Radio astronomy Space research (passive) 5.149 5.412	**2 670-2 690** FIXED 5.410 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.208B 5.415 MOBILE except aeronautical mobile 5.384A ADD 5.14C Earth exploration-satellite (passive) Radio astronomy Space research (passive) 5.149	**2 670-2 690** FIXED 5.410 FIXED-SATELLITE (Earth-to-space) 5.415 MOBILE except aeronautical mobile 5.384A MOBILE-SATELLITE (Earth-to-space) 5.351A 5.419 Earth exploration-satellite (passive) Radio astronomy Space research (passive) 5.149

Agenda item 1.2

MOD

2 700-3 600 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
3 300-3 400 RADIOLOCATION 5.149 5.429 MOD 5.429A MOD 5.429B 5.430	**3 300-3 400** RADIOLOCATION Amateur Fixed Mobile 5.149 5.429C 5.429D	**3 300-3 400** RADIOLOCATION Amateur 5.149 5.429 5.429E 5.429F

MOD

2 700-3 600 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
3 300-3 400 RADIOLOCATION 5.149 5.429 5.429A 5.429B 5.430	**3 300-3 400** MOBILE except aeronautical mobile ADD 5.A12 RADIOLOCATION Amateur Fixed 5.149 MOD 5.429C MOD 5.429D	**3 300-3 400** RADIOLOCATION Amateur 5.149 5.429 5.429E 5.429F

ADD

5.A12 Stations in the mobile, except aeronautical mobile, service operating in the frequency band 3 300-3 400 MHz in Region 2 shall not cause harmful interference to, or claim protection from, systems operating in the radiolocation service. (WRC-23)

Agenda item 8

MOD

5.429 *Additional allocation:* in Saudi Arabia, Bahrain, Bangladesh, Benin, Brunei Darussalam, Cambodia, Cameroon, China, Congo (Rep. of the), Korea (Rep. of), Côte d'Ivoire, Djibouti, Egypt, the United Arab Emirates, India, Indonesia, Iran (Islamic Republic of), Iraq, Japan, Jordan, Kenya, Kuwait, Lao P.D.R., Lebanon, Libya, Malaysia, Mongolia, Myanmar, New Zealand, Oman, Uganda, Pakistan, Palestine*, Qatar, the Syrian Arab Republic, the Dem. Rep. of the Congo, the Dem. People's Rep. of Korea, Singapore, Somalia, Sudan, Thailand, Viet Nam and Yemen, the frequency band 3 300-3 400 MHz is also allocated to the fixed and mobile services on a primary basis. Mongolia, New Zealand and the countries bordering the Mediterranean shall not claim protection for their fixed and mobile services from the radiolocation service. (WRC-23)

Agenda item 1.2

MOD

5.429A *Additional allocation*: in Angola, Botswana, Burkina Faso, Burundi, Cabo Verde, Central African Republic, Comoros, Djibouti, Eritrea, Eswatini, Ethiopia, Gambia, Ghana, Guinea, Guinea-Bissau, Equatorial Guinea, Lesotho, Liberia, Madagascar, Malawi, Mauritius, Mauritania, Mozambique, Namibia, Niger, Nigeria, Palestine*, the Dem. Rep. of the Congo, Rwanda, Sao Tomé and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Sudan, South Africa, Tanzania, Chad, Togo, Zambia and Zimbabwe, the frequency band 3 300-3 400 MHz is allocated to the mobile, except aeronautical mobile, service on a primary basis. Stations in the mobile service operating in the frequency band 3 300-3 400 MHz shall not cause harmful interference to, or claim protection from, stations operating in the radiolocation service. (WRC-23)

MOD

5.429B In the following countries of Region 1: Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Comoros, Congo (Rep. of the), Côte d'Ivoire, Djibouti, Egypt, Eritrea, Eswatini, Ethiopia, Gambia, Ghana, Guinea, Guinea-Bissau, Equatorial Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mauritius, Mauritania, Mongolia, Mozambique, Namibia, Niger, Nigeria, Uganda, the Dem. Rep. of the Congo, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, Sudan, South Sudan, South Africa, Tanzania, Chad, Togo, Zambia and Zimbabwe, the frequency band 3 300-3 400 MHz is identified for the implementation of International Mobile Telecommunications (IMT). The use of this frequency band shall be in accordance with Resolution **223 (Rev.WRC-23)**. The use of the frequency band 3 300-3 400 MHz by IMT stations in the mobile service shall not cause harmful interference to, or claim protection from, systems in the radiolocation service, and administrations wishing to implement IMT shall obtain the agreement of neighbouring countries to protect operations within the radiolocation service. This identification does not preclude the use of this

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* Pursuant to Resolution 99 (Rev. Dubai, 2018) of the Plenipotentiary Conference, and taking into account the Israeli-Palestinian Interim Agreement of 28 September 1995.

* Pursuant to Resolution 99 (Rev. Dubai, 2018) of the Plenipotentiary Conference and taking into account the Israeli-Palestinian Interim Agreement of 28 September 1995.

frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. (WRC-23)

MOD

5.429C *Different category of service*: in Argentina, Brazil, Cuba, the Dominican Republic, Guatemala, Mexico, Paraguay and Uruguay, the frequency band 3 300-3 400 MHz is also allocated to the fixed service on a primary basis. Stations in the fixed service operating in the frequency band 3 300-3 400 MHz shall not cause harmful interference to, or claim protection from, stations operating in the radiolocation service. (WRC-23)

MOD

5.429D In Region 2, the use of the mobile, except aeronautical mobile, service in the frequency band 3 300-3 400 MHz is identified for the implementation of International Mobile Telecommunications (IMT). Such use shall be in accordance with Resolution **223 (Rev.WRC-23)**. The use of the frequency band 3 300-3 400 MHz by IMT stations in the mobile service shall not cause harmful interference to, or claim protection from, systems in the radiolocation service, and administrations wishing to implement IMT shall obtain the agreement of neighbouring countries to protect operations within the radiolocation service. This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. (WRC-23)

Agenda item 8

MOD

5.429F In the following countries in Region 3: Cambodia, India, Indonesia, Lao P.D.R., Pakistan, the Philippines, Singapore and Viet Nam, the use of the frequency band 3 300-3 400 MHz is identified for the implementation of International Mobile Telecommunications (IMT). Such use shall be in accordance with Resolution **223 (Rev.WRC-19/23)**. The use of the frequency band 3 300-3 400 MHz by IMT stations in the mobile service shall not cause harmful interference to, or claim protection from, systems in the radiolocation service. Before an administration brings into use a base or mobile station of an IMT system in this frequency band, it shall seek agreement under No. **9.21** with neighbouring countries to protect the radiolocation service. This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. (WRC-23)

MOD

5.433A In Australia, Bangladesh, Brunei Darussalam, China, French overseas communities of Region 3, Korea (Rep. of), India, Indonesia, Iran (Islamic Republic of), Japan, New Zealand, Pakistan, the Philippines, the Dem. People's Rep. of Korea and Singapore, the frequency band 3 500-3 600 MHz is identified for International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. At the stage of coordination the provisions of Nos. **9.17** and **9.18** also apply. Before an administration brings into use a (base or mobile) station of the mobile service in this frequency band it shall ensure that the power flux-density (pfd) produced at 3 m above ground does not exceed -154.5 dB(W/($m^2 \cdot 4$ kHz)) for more than 20% of time at the border of the territory of any other administration. This limit may be exceeded on the territory of any country whose administration has so agreed. In order to ensure that the pfd limit at the border of the territory of any other administration is met, the calculations and verification shall be made, taking into account all relevant information, with the mutual agreement of both administrations (the administration responsible for the terrestrial station and the administration responsible for the earth station), with the assistance of the Bureau if so requested. In case of disagreement, the calculation and verification of the pfd shall be made by the Bureau, taking into account the information referred to above. Stations of the mobile service in the frequency band 3 500-3 600 MHz shall not claim more protection from space stations than that provided in Table **21-4** of the Radio Regulations (Edition of 2004). (WRC-23)

Agenda item 1.3

MOD

3 600-4 800 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td rowspan="2">3 600-3 800
FIXED
FIXED-SATELLITE (space-to-Earth)
MOBILE except aeronautical mobile ADD 5.A13A ADD 5.A13B ADD 5.A13C ADD 5.A13D</td><td>3 600-3 700
FIXED
FIXED-SATELLITE (space-to-Earth)
MOBILE except aeronautical mobile 5.434
Radiolocation 5.433</td><td>3 600-3 700
FIXED
FIXED-SATELLITE (space-to-Earth)
MOBILE except aeronautical mobile
Radiolocation
5.435</td></tr>
<tr><td rowspan="2">3 700-4 200
FIXED
FIXED-SATELLITE (space-to-Earth)
MOBILE except aeronautical mobile</td></tr>
<tr><td>3 800-4 200
FIXED
FIXED-SATELLITE (space-to-Earth)
Mobile</td></tr>
</table>

ADD

5.A13A The use of the frequency band 3 600-3 800 MHz by the mobile, except aeronautical mobile, service on a primary basis in Region 1 is subject to agreement obtained under No. **9.21** if the power flux-density (pfd) limit below is exceeded. The provisions of Nos. **9.17** and **9.18** shall also apply in the coordination phase. Before an administration in Region 1 brings into use a station

in the mobile service in the frequency band 3 600-3 800 MHz, for the protection of stations in the fixed and fixed-satellite services, it shall ensure that the pfd produced at 3 m above ground does not exceed −154.5 dB(W/(m^2 · 4 kHz)) for more than 20% of the time at the border of the territory of any other administration. Stations in the mobile service operating in the frequency band 3 600-3 800 MHz shall not claim more protection from space stations than that provided in Table **21-4** of the Radio Regulations. (WRC-23)

ADD

5.A13B *Different category of service:* In Angola, Botswana, Guinea, Lesotho, Malawi and South Sudan, the frequency band 3 700-3 800 MHz is allocated to the mobile service on a secondary basis. (WRC-23)

ADD

5.A13C In Angola, Botswana, Guinea, Lesotho, Malawi and South Sudan, the frequency band 3 600-3 700 MHz is identified for International Mobile Telecommunications (IMT). This identification does not preclude the use of the frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. The conditions of No. **5.A13A** shall apply. (WRC-23)

ADD

5.A13D In Algeria, Saudi Arabia, Azerbaijan, Bahrain, Belarus, Benin, Burkina Faso, Burundi, Cameroon, Central African Rep., Comoros, Congo (Rep. of the), Côte d'Ivoire, Djibouti, Egypt, United Arab Emirates, Eswatini, Gabon, Gambia, Ghana, Guinea, Iraq, Jordan, Kazakhstan, Kenya, Kuwait, Lebanon, Liberia, Libya, Madagascar, Mali, Morocco, Mauritius, Mauritania, Mozambique, Namibia, Niger, Nigeria, Oman, Uganda, Uzbekistan, Palestine*, Qatar, the Syrian Arab Republic, the Dem. Rep. of the Congo, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Somalia, Sudan, South Africa, Tanzania, Chad, Togo, Tunisia, Yemen, Zambia and Zimbabwe, the frequency band 3 600-3 800 MHz is identified for International Mobile Telecommunications (IMT). This identification does not preclude the use of the frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. The conditions of No. **5.A13A** shall apply. (WRC-23)

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* Pursuant to Resolution 99 (Rev. Dubai, 2018) of the Plenipotentiary Conference, and taking into account the Israeli-Palestinian Interim Agreement of 28 September 1995.

Agenda item 1.2

MOD

3 600-4 800 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td rowspan="2">3 600-4 200
FIXED
FIXED-SATELLITE (space-to-Earth)
Mobile</td><td>3 600-3 700
FIXED
FIXED-SATELLITE (space-to-Earth)
MOBILE except aeronautical mobile MOD 5.434
Radiolocation 5.433</td><td>3 600-3 700
FIXED
FIXED-SATELLITE (space-to-Earth)
MOBILE except aeronautical mobile
Radiolocation
5.435</td></tr>
<tr><td colspan="2">3 700-4 200
FIXED
FIXED-SATELLITE (space-to-Earth)
MOBILE except aeronautical mobile ADD 5.36A12</td></tr>
</table>

ADD

5.36A12 In the Bahamas, Belize, Brazil, Canada, Colombia, Costa Rica, United States, Guatemala, the French overseas departments and communities in Region 2, Greenland, the overseas countries and territories within the Kingdom of the Netherlands in Region 2, Paraguay, Peru, Trinidad and Tobago and Uruguay, the frequency band 3 700-3 800 MHz is identified for use by any of these administrations wishing to implement International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. Administrations wishing to implement IMT shall obtain the agreement of neighbouring countries to ensure the protection of the fixed-satellite service (space-to-Earth). (WRC-23)

MOD

5.434 In Region 2, the frequency band 3 600-3 700 MHz is identified for use by administrations wishing to implement International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. Administrations wishing to implement IMT shall obtain the agreement of neighbouring countries to ensure the protection of the fixed-satellite service (space-to-Earth). (WRC-23)

Agenda item 4

MOD

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)

Agenda item 1.1

MOD

4 800-5 250 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
4 800-4 990	FIXED MOBILE 5.440A 5.441A MOD 5.441B 5.442 Radio astronomy 5.149 5.339 5.443	

MOD

5.441B In Angola, Argentina, Armenia, Azerbaijan, Benin, Botswana, Brazil, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Chile, China, Colombia, Congo (Rep. of the), Côte d'Ivoire, Djibouti, Eswatini, Russian Federation, Gabon, Ghana, Guinea, Iran (Islamic Republic of), Iraq, Kazakhstan, Lao P.D.R., Lesotho, Liberia, Madagascar, Malawi, Mali, Mongolia, Namibia, Niger, Uganda, Uzbekistan, the Dem. Rep. of the Congo, Kyrgyzstan, the Dem. People's Rep. of Korea, South Sudan, South Africa, Chad, Togo, Viet Nam, Zambia and Zimbabwe, the frequency band 4 800-4 990 MHz, or portions thereof, is identified for use by administrations wishing to implement International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. The use of IMT stations is subject to agreement obtained under No. **9.21** with concerned administrations, and IMT stations shall not claim protection from stations of other applications of the mobile service. In addition, before an administration brings into use an IMT station in the mobile service, it shall ensure that the power flux-density (pfd) produced by this station does not exceed −155 dB(W/(m^2 · 1 MHz)) produced up to 19 km above sea level at 20 km from the coast, defined as the low-water mark, as officially recognized by the coastal State. Resolution **223 (Rev.WRC-23)** applies. (WRC-23)

Agenda item 4

MOD

5.446A The use of the frequency bands 5 150-5 350 MHz and 5 470-5 725 MHz by the stations in the mobile, except aeronautical mobile, service shall be in accordance with Resolution **229 (Rev.WRC-23)**. (WRC-23)

MOD

5.447 *Additional allocation:* in Côte d'Ivoire, Egypt, Lebanon, the Syrian Arab Republic and Tunisia, the frequency band 5 150-5 250 MHz is also allocated to the mobile service, on a primary basis, subject to agreement obtained under No. **9.21**. In this case, the provisions of Resolution **229 (Rev.WRC-23)** do not apply. (WRC-23)

MOD

5.447F In the frequency band 5 250-5 350 MHz, stations in the mobile service shall not claim protection from the radiolocation service, the Earth exploration-satellite service (active) and the space research service (active). The radiolocation service, the Earth exploration-satellite service (active) and the space research service (active) shall not impose more stringent conditions upon the mobile service than those stipulated in Resolution **229 (Rev.WRC-23)**. (WRC-23)

MOD

5.450A In the frequency band 5 470-5 725 MHz, stations in the mobile service shall not claim protection from radiodetermination services. The radiodetermination services shall not impose more stringent conditions upon the mobile service than those stipulated in Resolution **229 (Rev.WRC-23)**. (WRC-23)

Agenda item 1.2

MOD

5 570-6 700 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 925-6 700	FIXED 5.457 FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B MOBILE 5.457C ADD 5.6A12 ADD 5.6B12 ADD 5.6C12 5.149 5.440 5.458	

ADD

5.6A12 The frequency bands 6 425-7 125 MHz in Region 1 and 7 025-7 125 MHz in Region 3 are identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT). 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. Resolution **COM4/7 (WRC-23)** applies.

The frequency bands are also used for the implementation of wireless access systems (WAS), including radio local area networks (RLANs). (WRC-23)

ADD

5.6B12 In Cambodia, Lao P.D.R. and the Maldives, the frequency band 6 425-7 025 MHz is identified for the terrestrial component of International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. Resolution **COM4/7 (WRC-23)** applies. (WRC-23)

ADD

5.6C12 In Brazil and Mexico, the frequency band 6 425-7 125 MHz is identified for the terrestrial component of International Mobile Telecommunications (IMT). The use of this frequency band for the implementation of IMT is subject to seeking agreement under No. **9.21** with neighbouring countries. This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. Resolution **COM4/7 (WRC-23)** applies.

The frequency band is also used for the implementation of wireless access systems (WAS), including radio local area networks (RLANs). (WRC-23)

Agenda item 8

MOD

5.453 *Additional allocation:* in Saudi Arabia, Bahrain, Bangladesh, Brunei Darussalam, Cameroon, China, Congo (Rep. of the), Korea (Rep. of), Côte d'Ivoire, Djibouti, Egypt, the United Arab Emirates, Eswatini, Gabon, Guinea, Equatorial Guinea, India, Indonesia, Iran (Islamic Republic of), Iraq, Japan, Jordan, Kenya, Kuwait, Lebanon, Libya, Madagascar, Malaysia, Niger, Nigeria, Oman, Uganda, Pakistan, the Philippines, Qatar, the Syrian Arab Republic, the Dem. People's Rep. of Korea, Singapore, Somalia, Sri Lanka, Tanzania, Chad, Thailand, Togo, Viet Nam and Yemen, the frequency band 5 650-5 850 MHz is also allocated to the fixed and mobile services on a primary basis. In this case, the provisions of Resolution **229** (**Rev.WRC-23**) do not apply. In addition, in Afghanistan, Angola, Benin, Bhutan, Botswana, Burkina Faso, Burundi, Dem. Rep. of the Congo, Fiji, Ghana, Kiribati, Lesotho, Malawi, Maldives, Mauritius, Micronesia, Mongolia, Mozambique, Myanmar, Namibia, Nauru, New Zealand, Papua New Guinea, Rwanda, Solomon Islands, South Sudan, South Africa, Tonga, Vanuatu, Zambia and Zimbabwe, the frequency band 5 725-5 850 MHz is allocated to the fixed service on a primary basis, and stations operating in the fixed service shall not cause harmful interference to and shall not claim protection from other primary services in the frequency band. (WRC-23)

Agenda item 4

MOD

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

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)

Agenda item 1.2

MOD

6 700-7 250 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
6 700-7 075	FIXED FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.441 MOBILE ADD 5.6A12 ADD 5.6B12 ADD 5.6C12 5.458 5.458A 5.458B	
7 075-7 145	FIXED MOBILE ADD 5.6A12 ADD 5.6C12 5.458 5.459	

Agenda item 7(C)

MOD

7 250-8 500 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
7 250-7 300	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOD 5.461	
7 300-7 375	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MOD 5.461	
7 375-7 450	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MARITIME MOBILE-SATELLITE (space-to-Earth) 5.461AA 5.461AB ADD 5.A7(C)3	
7 450-7 550	FIXED FIXED-SATELLITE (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MARITIME MOBILE-SATELLITE (space-to-Earth) 5.461AA 5.461AB 5.461A ADD 5.A7(C)3	
7 550-7 750	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MARITIME MOBILE-SATELLITE (space-to-Earth) 5.461AA 5.461AB ADD 5.A7(C)3	

7 750-7 900	FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) 5.461B MOBILE except aeronautical mobile
7 900-8 025	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE MOD 5.461

ADD

5.A7(C)3 In the frequency band 7 375-7 750 MHz, non-geostationary-satellite systems operating in the fixed-satellite service for which complete coordination or notification information, according to the case, is received by the Bureau as of *the date of entry into force of the Final Acts of WRC-23* shall not cause unacceptable interference to and shall not claim protection from geostationary-satellite networks in the maritime mobile-satellite service operating in accordance with these Regulations. No. **5.43A** does not apply. (WRC-23)

MOD

5.461 *Additional allocation:* the frequency bands 7 250-7 375 MHz (space-to-Earth) and 7 900-8 025 MHz (Earth-to-space) are also allocated to the mobile-satellite service on a primary basis, subject to agreement obtained under No. **9.21**, with the exception that No. **9.21** shall not apply to the geostationary-satellite networks in the mobile-satellite service for which complete coordination information is received by the Bureau as of *the date of entry into force of the Final Acts of WRC-23* with respect to non-geostationary-satellite systems for which complete coordination or notification information, according to the case, is received by the Bureau as of *the date of entry into force of the Final Acts of WRC-23*. Non-geostationary-satellite systems for which complete coordination or notification information, according to the case, is received by the Bureau as of *the date of entry into force of the Final Acts of WRC-23* shall not cause unacceptable interference to and shall not claim protection from geostationary-satellite networks in the mobile-satellite service operating in accordance with these Regulations. No. **5.43A** does not apply. (WRC-23)

Agenda item 8

MOD

5.469 *Additional allocation:* in Armenia, Azerbaijan, Belarus, the Russian Federation, Georgia, Hungary, Lithuania, Uzbekistan, Poland, Kyrgyzstan, the Czech Rep., Romania, Tajikistan, Turkmenistan and Ukraine, the frequency band 8 500-8 750 MHz is also allocated to the land mobile and radionavigation services on a primary basis. (WRC-23)

Agenda item 1.2

MOD

10-10.7 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
10-10.4 EARTH EXPLORATION-SATELLITE (active) 5.474A 5.474B 5.474C FIXED MOBILE RADIOLOCATION Amateur 5.474D 5.479	**10-10.4** EARTH EXPLORATION-SATELLITE (active) 5.474A 5.474B 5.474C RADIOLOCATION Amateur 5.474D 5.479 MOD 5.480 ADD 5.10B12	**10-10.4** EARTH EXPLORATION-SATELLITE (active) 5.474A 5.474B 5.474C FIXED MOBILE RADIOLOCATION Amateur 5.474D 5.479
10.4-10.45 FIXED MOBILE RADIOLOCATION Amateur	**10.4-10.45** RADIOLOCATION Amateur MOD 5.480 ADD 5.10B12	**10.4-10.45** FIXED MOBILE RADIOLOCATION Amateur
10.45-10.5 RADIOLOCATION Amateur Amateur-satellite MOD 5.481	**10.45-10.5** RADIOLOCATION Amateur Amateur-satellite MOD 5.481 ADD 5.10B12	**10.45-10.5** RADIOLOCATION Amateur Amateur-satellite MOD 5.481

ADD

5.10B12 In the following countries in Region 2: Brazil, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Paraguay, Peru and Uruguay, the frequency band 10-10.5 GHz is identified for the implementation of the terrestrial component of International Mobile Telecommunications (IMT). The implementation of this identification in Mexico is subject to seeking agreement with the United States under No. **9.21**. The use of the frequency band 10-10.5 GHz by IMT stations in the mobile service shall not claim protection from systems in the radiolocation service. This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. Resolution **COM4/6 (WRC-23)** applies. (WRC-23)

MOD

5.480 *Additional allocation:* in Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, El Salvador, Ecuador, Guatemala, Honduras, Jamaica, Mexico, Paraguay, the overseas countries and territories within the Kingdom of the Netherlands in Region 2, Peru, Suriname and Uruguay, the frequency band 10-10.45 GHz is also allocated to the fixed and mobile services on a primary basis. In Venezuela, the frequency band 10-10.45 GHz is also allocated to the fixed service on a primary basis. (WRC-23)

MOD

5.481 *Additional allocation*: in Algeria, Germany, Angola, Brazil, China, Colombia, Costa Rica, Côte d'Ivoire, Cuba, Djibouti, the Dominican Republic, Egypt, El Salvador, Ecuador, Spain, Guatemala, Hungary, Jamaica, Japan, Kenya, Morocco, Mexico, Nigeria, Oman, Uzbekistan, Pakistan, Palestine*, Paraguay, Peru, the Dem. People's Rep. of Korea, Romania, Somalia, Suriname, Tunisia and Uruguay, the frequency band 10.45-10.5 GHz is also allocated to the fixed and mobile services on a primary basis. (WRC-23)

Agenda item 1.19

MOD

5.484A The use of the frequency bands 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 13.75-14.5 GHz (Earth-to-space), 17.3-17.7 GHz (space-to-Earth) in Region 2, 17.8-18.6 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space), 29.5-30 GHz (Earth-to-space) by a non-geostationary-satellite system in the fixed-satellite service is subject to application of the provisions of No. **9.12** for coordination with other non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete coordination or notification information, as appropriate, for the non-geostationary-satellite systems in the fixed-satellite service and of the complete coordination or notification information, as appropriate, for the geostationary-satellite networks, and No. **5.43A** does not apply. Non-geostationary-satellite systems in the fixed-satellite service in the above bands shall be operated in such a way that any unacceptable interference that may occur during their operation shall be rapidly eliminated. In Region 2, No. **22.2** shall continue to apply in the frequency band 17.3-17.7 GHz. (WRC-23)

Agenda item 1.15

MOD

11.7-13.4 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
12.75-13.25	FIXED FIXED-SATELLITE (Earth-to-space) 5.441 ADD 5.A115 MOBILE Space research (deep space) (space-to-Earth)	

* Pursuant to Resolution 99 (Rev. Dubai, 2018) of the Plenipotentiary Conference, and taking into account the Israeli-Palestinian Interim Agreement of 28 September 1995.

ADD

5.A115 The frequency band 12.75-13.25 GHz (Earth-to-space) may be used by earth stations in motion, limited to earth stations on aircraft and vessels, communicating with geostationary space stations in the fixed-satellite service. Resolution **COM5/2 (WRC-23)** shall apply. (WRC-23)

Agenda item 8

MOD

5.494 *Additional allocation:* in Algeria, Saudi Arabia, Bahrain, Cameroon, the Central African Rep., Congo (Rep. of the), Côte d'Ivoire, Djibouti, Egypt, the United Arab Emirates, Eritrea, Ethiopia, Gabon, Ghana, Guinea, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Madagascar, Mali, Morocco, Mongolia, Nigeria, Oman, Palestine*, Qatar, the Syrian Arab Republic, the Dem. Rep. of the Congo, Somalia, Sudan, South Sudan, Chad, Togo and Yemen, the frequency band 12.5-12.75 GHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis. (WRC-23)

MOD

5.500 *Additional allocation:* in Algeria, Saudi Arabia, Bahrain, Brunei Darussalam, Cameroon, Djibouti, Egypt, the United Arab Emirates, Gabon, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Jordan, Kuwait, Lebanon, Madagascar, Malaysia, Mali, Morocco, Mauritania, Niger, Nigeria, Oman, Qatar, the Syrian Arab Republic, Singapore, Somalia, Sudan, South Sudan, Chad and Tunisia, the frequency band 13.4-14 GHz is also allocated to the fixed and mobile services on a primary basis. In Pakistan, the frequency band 13.4-13.75 GHz is also allocated to the fixed and mobile services on a primary basis. (WRC-23)

MOD

5.501 *Additional allocation:* in Hungary, Japan, Kyrgyzstan, Romania and Turkmenistan, the frequency band 13.4-14 GHz is also allocated to the radionavigation service on a primary basis. (WRC-23)

Agenda item 4

MOD

5.506A In the frequency 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)

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* Pursuant to Resolution 99 (Rev. Dubai, 2018) of the Plenipotentiary Conference and taking into account the Israeli-Palestinian Interim Agreement of 28 September 1995.

MOD

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)

Agenda item 8

MOD

5.508 *Additional allocation:* in Germany, Italy, Libya, North Macedonia and the United Kingdom, the frequency band 14.25-14.3 GHz is also allocated to the fixed service on a primary basis. (WRC-23)

MOD

5.508A In the frequency band 14.25-14.3 GHz, the power flux-density produced on the territory of the countries of Saudi Arabia, Bahrain, Botswana, China, Côte d'Ivoire, Egypt, Guinea, India, Iran (Islamic Republic of), Italy, Kuwait, Nigeria, Oman, the Syrian Arab Republic, the United Kingdom and Tunisia by any aircraft earth station in the aeronautical mobile-satellite service shall not exceed the limits given in Annex 1, Part B of Recommendation ITU-R M.1643-0, unless otherwise specifically agreed by the affected administration(s). The provisions of this footnote in no way derogate the obligations of the aeronautical mobile-satellite service to operate as a secondary service in accordance with No. **5.29**. (WRC-23)

MOD

5.509A In the frequency band 14.3-14.5 GHz, the power flux-density produced on the territory of the countries of Saudi Arabia, Bahrain, Botswana, Cameroon, China, Côte d'Ivoire, Egypt, Gabon, Guinea, India, Iran (Islamic Republic of), Italy, Kuwait, Morocco, Nigeria, Oman, the Syrian Arab Republic, the United Kingdom, Sri Lanka, Tunisia and Viet Nam by any aircraft earth station in the aeronautical mobile-satellite service shall not exceed the limits given in Annex 1, Part B of Recommendation ITU-R M.1643-0, unless otherwise specifically agreed by the affected administration(s). The provisions of this footnote in no way derogate the obligations of the aeronautical mobile-satellite service to operate as a secondary service in accordance with No. **5.29**. (WRC-23)

Agenda item 1.13

MOD

14.5-15.4 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
14.8-15.35	FIXED MOBILE SPACE RESEARCH ADD 5.A113 5.339	

ADD

5.A113 The allocation of the frequency band 14.8-15.35 GHz to the space research service on a primary basis is limited to satellite systems operating in the space-to-space, space-to-Earth and Earth-to-space directions at distances from the Earth of less than 2×10^6 km in accordance with Resolution **COM5/7 (WRC-23)**. Other uses of the frequency band by the space research service are on a secondary basis. The use of the frequency band 14.8-15.35 GHz by the space research service (space-to-Earth) (Earth-to-space) is on a secondary basis with respect to the terrestrial services in Algeria, Saudi Arabia, Bahrain, Korea (Rep. of), Egypt, the United Arab Emirates, the United States, India, Iraq, Japan, Kuwait, Libya, Morocco, Mauritania, Oman, Qatar, the Syrian Arab Republic, Tunisia and Yemen. (WRC-23)

Agenda item 8

MOD

5.511 *Additional allocation:* in Saudi Arabia, Bahrain, Cameroon, Djibouti, Egypt, the United Arab Emirates, Guinea, Iran (Islamic Republic of), Iraq, Israel, Kuwait, Lebanon, Oman, Pakistan, Qatar, the Syrian Arab Republic and Somalia, the frequency band 15.35-15.4 GHz is also allocated to the fixed and mobile services on a secondary basis. (WRC-23)

Agenda item 1.19

MOD

15.4-18.4 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
…		
17.3-17.7 FIXED-SATELLITE (Earth-to-space) 5.516 (space-to-Earth) 5.516A 5.516B Radiolocation 5.514	**17.3-17.7** FIXED-SATELLITE (Earth-to-space) 5.516 (space-to-Earth) MOD 5.484A MOD 5.517 ADD 5.A119 ADD 5.C119 BROADCASTING-SATELLITE Radiolocation 5.514 5.515	**17.3-17.7** FIXED-SATELLITE (Earth-to-space) 5.516 Radiolocation 5.514
…		
18.1-18.4	FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B 5.517A (Earth-to-space) 5.520 INTER-SATELLITE ADD 5.A117 MOBILE 5.519 5.521	

ADD

5.A119 In addition to the need to comply with the coordination criteria in Annex 4 of Article 7 of Appendix **30A**, under assumed free-space propagation conditions, the power flux-density of an assignment in the fixed-satellite service (space to-Earth) of a geostationary-satellite network in the frequency band 17.3-17.7 GHz in Region 2 shall not exceed the value of −98 dB(W/(m^2 · 27 MHz)) at points in the geostationary-satellite orbit with geocentric orbital separation angles between 152.6° and 162.6°. (WRC-23)

ADD

5.C119 In the frequency band 17.3-17.7 GHz, the use of the fixed-satellite service (space-to-Earth) by geostationary-satellite space stations in Region 2 shall not cause harmful interference to space station receivers nor claim protection from the broadcasting-satellite service feeder-link earth stations operating under Appendix **30A** in all three Regions, nor put any limitations or restrictions on the locations of the broadcasting-satellite service feeder-link earth stations anywhere within the service area of the feeder link. The notifying administration for the fixed-satellite service (space-to-Earth), when submitting Appendix **4** information elements, shall provide a firm, objective, actionable, measurable and enforceable commitment that, in the event of harmful interference being reported to space station receivers in Appendix **30A**, it shall take immediate action to eliminate the interference or reduce it to an acceptable level. (WRC-23)

Agenda item 1.17

ADD

5.A117 For use of the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz, or parts thereof, by space stations in the inter-satellite service, Resolution **COM5/8 (WRC-23)** shall apply. Such use is limited to space research, space operation and/or Earth exploration-satellite applications, and also transmissions of data originating from industrial and medical activities in space. When using these frequencies, administrations shall ensure that this inter-satellite service is used only for the aforementioned purposes and is not subject to coordination under No. **9.11A**. For use of the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz, 27.5-29.1 GHz and 29.5-30 GHz by space stations, the allocation is limited to inter-satellite links between non-geostationary satellites or between non-geostationary satellites and geostationary satellites. For use of the frequency band 29.1-29.5 GHz by space stations, the allocation is limited to inter-satellite links between non-geostationary satellites and geostationary satellites. No. **4.10** does not apply. (WRC-23)

Agenda item 1.10

MOD

15.4-18.4 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
15.4-15.41 RADIOLOCATION 5.511E 5.511F AERONAUTICAL RADIONAVIGATION		
15.41-15.43 RADIOLOCATION 5.511E 5.511F AERONAUTICAL RADIONAVIGATION Aeronautical mobile (OR) ADD 5.AA110	**15.41-15.43** RADIOLOCATION 5.511E 5.511F AERONAUTICAL RADIONAVIGATION	**15.41-15.43** RADIOLOCATION 5.511E 5.511F AERONAUTICAL RADIONAVIGATION ADD 5.A110
15.43-15.63 FIXED-SATELLITE (Earth-to-space) 5.511A RADIOLOCATION 5.511E 5.511F AERONAUTICAL RADIONAVIGATION Aeronautical mobile (OR) ADD 5.AA110 5.511C	**15.43-15.63** FIXED-SATELLITE (Earth-to-space) 5.511A RADIOLOCATION 5.511E 5.511F AERONAUTICAL RADIONAVIGATION 5.511C	**15.43-15.63** FIXED-SATELLITE (Earth-to-space) 5.511A RADIOLOCATION 5.511E 5.511F AERONAUTICAL RADIONAVIGATION 5.511C ADD 5.A110
15.63-15.7 RADIOLOCATION 5.511E 5.511F AERONAUTICAL RADIONAVIGATION Aeronautical mobile (OR) ADD 5.AA110	**15.63-15.7** RADIOLOCATION 5.511E 5.511F AERONAUTICAL RADIONAVIGATION	**15.63-15.7** RADIOLOCATION 5.511E 5.511F AERONAUTICAL RADIONAVIGATION ADD 5.A110

ADD

5.AA110 Stations in the aeronautical mobile (OR) service operating in the frequency band 15.41-15.7 GHz shall not cause harmful interference to the radio astronomy service operating in the frequency band 15.35-15.4 GHz. The aggregate power flux-density (pfd) received from stations in the aeronautical mobile (OR) service operating in the frequency band 15.41-15.7 GHz at any radio astronomy station operating in the frequency band 15.35-15.4 GHz shall be in compliance with the protection criteria provided in Recommendations ITU-R RA.769-2 and ITU-R RA.1513-2, unless specifically agreed by the affected administration(s). (WRC-23)

ADD

5.A110 *Additional allocation*: in Indonesia, the frequency band 15.41-15.7 GHz is also allocated to the aeronautical mobile (OR) service on a secondary basis. Stations in the aeronautical mobile (OR) service operating in the frequency band 15.41-15.7 GHz shall not cause harmful interference to the radio astronomy service operating in the frequency band 15.35-15.4 GHz. The aggregate power flux-density (pfd) received from stations in the aeronautical mobile (OR) service operating in the frequency band 15.41-15.7 GHz at any radio astronomy station operating in the

frequency band 15.35-15.4 GHz shall be in compliance with the protection criteria provided in Recommendations ITU-R RA.769-2 and ITU-R RA.1513-2, unless specifically agreed by the affected administration(s). (WRC-23)

Agenda item 1.16

MOD

15.4-18.4 GHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td rowspan="2">17.7-18.1
FIXED
FIXED-SATELLITE
(space-to-Earth) 5.484A 5.517A
ADD 5.A116
(Earth-to-space) 5.516
MOBILE</td><td>17.7-17.8
FIXED
FIXED-SATELLITE
(space-to-Earth) 5.517 5.517A
ADD 5.A116
(Earth-to-space) 5.516
BROADCASTING-SATELLITE
Mobile
5.515</td><td rowspan="2">17.7-18.1
FIXED
FIXED-SATELLITE
(space-to-Earth) 5.484A 5.517A
ADD 5.A116
(Earth-to-space) 5.516
MOBILE</td></tr>
<tr><td>17.8-18.1
FIXED
FIXED-SATELLITE
(space-to-Earth) 5.484A 5.517A
ADD 5.A116
(Earth-to-space) 5.516
MOBILE
5.519</td></tr>
<tr><td>18.1-18.4</td><td colspan="2">FIXED
FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B 5.517A
ADD 5.A116
(Earth-to-space) 5.520
MOBILE
5.519 5.521</td></tr>
</table>

ADD

5.A116 The operation of aeronautical and maritime earth stations in motion communicating with non-geostationary space stations in the fixed-satellite service in the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) shall be subject to the application of Resolution **COM5/3 (WRC-23)**. (WRC-23)

Agenda item 8

MOD

5.514 *Additional allocation:* in Algeria, Saudi Arabia, Bahrain, Bangladesh, Cameroon, Djibouti, El Salvador, the United Arab Emirates, Guatemala, India, Iran (Islamic Republic of), Iraq, Israel, Italy, Japan, Jordan, Kuwait, Libya, Lithuania, Nepal, Nicaragua, Nigeria, Oman, Uzbekistan, Pakistan, Qatar, Kyrgyzstan, Somalia, Sudan and South Sudan, the frequency band

17.3-17.7 GHz is also allocated to the fixed and mobile services on a secondary basis. The power limits given in Nos. **21.3** and **21.5** shall apply. (WRC-23)

Agenda item 1.19

MOD

5.517 In Region 2, use of the fixed-satellite (space-to-Earth) service in the frequency band 17.3-17.8 GHz shall not cause harmful interference to nor claim protection from assignments in the broadcasting-satellite service operating in conformity with the Radio Regulations. (WRC-23)

Agenda item 4

MOD

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)

Agenda item 8

MOD

5.521 *Alternative allocation:* in the United Arab Emirates, the frequency band 18.1-18.4 GHz is allocated to the fixed, fixed-satellite (space-to-Earth) and mobile services on a primary basis (see No. **5.33**). The provisions of No. **5.519** also apply. (WRC-23)

Agenda item 1.16

MOD

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 5.517A ADD 5.A116 MOBILE	
…		
18.8-19.3	FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 5.517A 5.523A ADD 5.A116 MOBILE	
…		

19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A ADD 5.A116 Mobile-satellite (space-to-Earth) 5.524	**19.7-20.1** FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A ADD 5.A116 MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528 5.529	**19.7-20.1** FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A ADD 5.A116 Mobile-satellite (space-to-Earth) 5.524
20.1-20.2	FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A ADD 5.A116 MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528	

Agenda item 1.17

MOD

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 5.517A INTER-SATELLITE ADD 5.A117 MOBILE	
…		
18.8-19.3	FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 5.517A 5.523A INTER-SATELLITE ADD 5.A117 MOBILE	
19.3-19.7	FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) 5.517A 5.523B 5.523C 5.523D 5.523E INTER-SATELLITE ADD 5.A117 ADD 5.523X MOBILE	
19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A INTER-SATELLITE ADD 5.A117 Mobile-satellite (space-to-Earth) 5.524	**19.7-20.1** FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A INTER-SATELLITE ADD 5.A117 MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528 5.529	**19.7-20.1** FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A INTER-SATELLITE ADD 5.A117 Mobile-satellite (space-to-Earth) 5.524
20.1-20.2	FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A INTER-SATELLITE ADD 5.A117 MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528	

ADD

5.523X In order to protect feeder links of non-geostationary networks in the mobile-satellite service in the frequency band 19.3-19.7 GHz, the power flux-density values produced at the surface of the Earth for all angles of arrival by a space station in the inter-satellite service operating in this band in accordance with Resolution **COM5/8 (WRC-23)** shall not exceed −140 dB(W/m^2) in any 1 MHz within 150 km of any of the above feeder-link earth stations recorded in the Master International Frequency Register. (WRC-23)

Agenda item 7(C)

MOD

18.4-22 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
20.2-21.2	FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Standard frequency and time signal-satellite (space-to-Earth) 5.524 ADD 5.B7(C)3	

ADD

5.B7(C)3 In the frequency bands 20.2-21.2 GHz and 30-31 GHz, non-geostationary-satellite systems for which complete coordination or notification information, according to the case, is received by the Bureau as of *the date of entry into force of the Final Acts of WRC-23* shall not cause unacceptable interference to and shall not claim protection from geostationary-satellite networks in the mobile-satellite service operating in accordance with these Regulations. No. **5.43A** does not apply. (WRC-23)

Agenda item 8

MOD

5.524 *Additional allocation:* in Afghanistan, Algeria, Saudi Arabia, Bahrain, Brunei Darussalam, Cameroon, China, Congo (Rep. of the), Costa Rica, Djibouti, Egypt, the United Arab Emirates, Gabon, Guatemala, Guinea, India, Iran (Islamic Republic of), Iraq, Israel, Japan, Jordan, Kuwait, Lebanon, Malaysia, Mali, Morocco, Mauritania, Nepal, Nigeria, Oman, Pakistan, Palestine*, the Philippines, Qatar, the Syrian Arab Republic, the Dem. Rep. of the Congo, the Dem. People's Rep. of Korea, Singapore, Somalia, Sudan, South Sudan, Chad, Togo and Tunisia, the frequency band 19.7-21.2 GHz is also allocated to the fixed and mobile services on a primary basis. This additional use shall not impose any limitation on the power flux-density of space stations in the fixed-satellite service in the frequency band 19.7-21.2 GHz and of space stations in the mobile-satellite service in the frequency band 19.7-20.2 GHz where the allocation to the mobile-satellite service is on a primary basis in the latter frequency band. (WRC-23)

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* Pursuant to Resolution 99 (Rev. Dubai, 2018) of the Plenipotentiary Conference and taking into account the Israeli-Palestinian Interim Agreement of 28 September 1995.

Agenda item 4

MOD

5.527A The operation of earth stations in motion communicating with the FSS is subject to Resolution **156 (Rev.WRC-23)**. (WRC-23)

MOD

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)

Agenda item 1.10

MOD

22-24.75 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
22-22.2 FIXED MOBILE except aeronautical mobile (R) ADD 5.B110 ADD 5.C110 ADD 5.D110 ADD 5.E110 ADD 5.F110 5.149	**22-22.2** FIXED MOBILE except aeronautical mobile 5.149	**22-22.2** FIXED MOBILE except aeronautical mobile ADD 5.G110 5.149
22.2-22.21	FIXED MOBILE except aeronautical mobile 5.149	

ADD

5.B110 The use of the aeronautical mobile (OR) service in the frequency band 22-22.2 GHz is limited to non-safety applications. (WRC-23)

ADD

5.C110 Aircraft stations in the aeronautical mobile (OR) service operating in the frequency band 22-22.2 GHz are subject to agreement obtained under No. **9.21** with respect to the fixed

service and shall not cause harmful interference to, nor claim protection from, the fixed service. The following power flux-density values shall be used as a threshold for coordination under No. **9.21**:

-110 dB(W/(m^2 · MHz))	for	$0° \le \theta \le 12.6°$
$2.86\,\theta - 146$ dB(W/(m^2 · MHz))	for	$12.6° < \theta \le 15°$
$0.87\,\theta - 116$ dB(W/(m^2 · MHz))	for	$15° < \theta \le 30°$
$0.067\,\theta - 92$ dB(W/(m^2 · MHz))	for	$30° < \theta \le 90°$

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

This criterion should be applied at the border of the territory of another administration for any aircraft station located at an altitude of up to 15 km above the ground. In conducting the calculations, the most recent version of Recommendation ITU-R P.525 should be used. (WRC-23)

ADD

5.D110 Stations in the aeronautical mobile (OR) service operating in the frequency band 22-22.2 GHz shall not cause harmful interference to the radio astronomy service operating in the frequency band 22.21-22.5 GHz. The aggregate power flux-density (pfd) received from these stations at any radio astronomy station operating in the frequency band 22.21-22.5 GHz shall be in compliance with the protection criteria provided in Recommendations ITU-R RA.769-2 and ITU-R RA.1513-2, unless specifically agreed by the affected administration(s). (WRC-23)

ADD

5.E110 In order to protect stations of the Earth exploration-satellite service (passive) operating in the frequency band 22.21-22.5 GHz, the unwanted equivalent isotropically radiated power (e.i.r.p.) of stations operating in the aeronautical mobile (OR) service shall not exceed −23 dBW in any 100 MHz band in the frequency band 22.21-22.5 GHz. (WRC-23)

ADD

5.F110 The use of the aeronautical mobile (OR) service in the frequency band 22-22.2 GHz outside national boundaries shall not cause harmful interference to, or claim protection from, services in other countries operating in accordance with the Table of Frequency Allocations. (WRC-23)

ADD

5.G110 *Alternative allocation*: in Brunei Darussalam, Iran (Islamic Republic of), Malaysia, Singapore and Thailand, the frequency band 22-22.2 GHz is allocated to the mobile, except aeronautical mobile (R), service on a primary basis. The use of the service is limited to non-safety applications within national boundaries. The use of the aeronautical mobile (OR) service in the frequency band 22-22.2 GHz shall not cause harmful interference to, or claim protection from, services in other countries operating in accordance with the Table of Frequency Allocations. Furthermore, stations in the aeronautical mobile (OR) service operating in the frequency band 22-22.2 GHz shall not cause harmful interference to the radio astronomy service operating in the frequency band 22.21-22.5 GHz in other countries in accordance with the Table of Frequency Allocations. The aggregate power flux-density (pfd) received from these stations at any radio astronomy station operating in the frequency band 22.21-22.5 GHz shall be in compliance with the

protection criteria provided in Recommendations ITU-R RA.769-2 and ITU-R RA.1513-2, unless specifically agreed by the affected administration(s). In order to protect stations of the Earth exploration-satellite service (passive) operating in the frequency band 22.21-22.5 GHz, the unwanted equivalent isotropically radiated power (e.i.r.p.) of stations operating in the aeronautical mobile (OR) service shall not exceed −23 dBW in any 100 MHz band in the frequency band 22.21-22.5 GHz.

Aircraft stations in the aeronautical mobile (OR) service operating in the frequency band 22-22.2 GHz are subject to agreement obtained under No. **9.21** with respect to the fixed service and shall not cause harmful interference to, nor claim protection from, the fixed service. The following power flux-density (pfd) values shall be used as a threshold for coordination under No. **9.21**:

-110 dB(W/(m^2 · MHz))	for	$0° \le \theta \le 12.6°$
$2.86\,\theta - 146$ dB(W/(m^2 · MHz))	for	$12.6° < \theta \le 15°$
$0.87\,\theta - 116$ dB(W/(m^2 · MHz))	for	$15° < \theta \le 30°$
$0.067\,\theta - 92$ dB(W/(m^2 · MHz))	for	$30° < \theta \le 90°$

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

This criterion should be applied at the border of the territory of another administration for any aircraft station located at an altitude of up to 15 km above the ground. In conducting the calculations, the most recent version of Recommendation ITU-R P.525 should be used. (WRC-23)

Agenda item 4

MOD

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

5.532AB The frequency band 24.25-27.5 GHz is identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. Resolution **242 (Rev.WRC-23)** applies. (WRC-23)

Agenda item 1.17

MOD

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 5.517A 5.539 INTER-SATELLITE ADD 5.A117 MOBILE 5.538 5.540	
28.5-29.1	FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.523A 5.539 INTER-SATELLITE ADD 5.A117 MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540	
29.1-29.5	FIXED FIXED-SATELLITE (Earth-to-space) 5.516B 5.517A 5.523C 5.523E 5.535A 5.539 5.541A INTER-SATELLITE ADD 5.A117 MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540	
29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 INTER-SATELLITE ADD 5.A117 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542	**29.5-29.9** FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 INTER-SATELLITE ADD 5.A117 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.525 5.526 5.527 5.529 5.540	**29.5-29.9** FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 INTER-SATELLITE ADD 5.A117 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542

Agenda item 1.16

MOD

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 5.517A 5.539 ADD 5.A116 MOBILE 5.538 5.540	

28.5-29.1	FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.523A 5.539 ADD 5.A116 MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540	
…		
29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 ADD 5.A116 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542	**29.5-29.9** FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 ADD 5.A116 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.525 5.526 5.527 5.529 5.540	**29.5-29.9** FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 ADD 5.A116 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542

Agenda item 4

MOD

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

5.536A Administrations operating earth stations in the Earth exploration-satellite service or the space research service shall not claim protection from stations in the fixed and mobile services operated by other administrations. In addition, earth stations in the Earth exploration-satellite service or in the space research service should be operated taking into account the most recent version of Recommendation ITU-R SA.1862. Resolution **242 (Rev.WRC-23)** applies. (WRC-23)

Agenda item 8

MOD

5.536B In Algeria, Saudi Arabia, Austria, Bahrain, Belgium, Brazil, China, Korea (Rep. of), Denmark, Egypt, United Arab Emirates, Estonia, Finland, Hungary, India, Iran (Islamic Republic of), Iraq, Ireland, Israel, Italy, Jordan, Kenya, Kuwait, Lebanon, Libya, Lithuania, Moldova, Norway, Oman, Uganda, Pakistan, the Philippines, Poland, Portugal, Qatar, the Syrian Arab Republic, Türkiye, Dem. People's Rep. of Korea, Slovakia, the Czech Rep., Romania, the United Kingdom, Singapore, Slovenia, Somalia, Sudan, Sweden, Tanzania, Viet Nam and Zimbabwe, earth stations operating in the Earth exploration-satellite service in the frequency band 25.5-27 GHz shall

not claim protection from, or constrain the use and deployment of, stations of the fixed and mobile services. Resolution **242 (Rev.WRC-23)** applies. (WRC-23)

MOD

5.542 *Additional allocation:* in Algeria, Saudi Arabia, Bahrain, Brunei Darussalam, Cameroon, China, Congo (Rep. of the), Djibouti, Egypt, the United Arab Emirates, Eritrea, Ethiopia, Guinea, India, Iran (Islamic Republic of), Iraq, Japan, Jordan, Kuwait, Lebanon, Malaysia, Mali, Morocco, Mauritania, Nepal, Oman, Pakistan, Palestine*, Philippines, Qatar, the Syrian Arab Republic, the Dem. People's Rep. of Korea, Somalia, Sudan, South Sudan, Sri Lanka and Chad, the frequency band 29.5-31 GHz is also allocated to the fixed and mobile services on a secondary basis. The power limits specified in Nos. **21.3** and **21.5** shall apply. (WRC-23)

Agenda item 1.17

MOD

29.9-34.2 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
29.9-30	FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 INTER-SATELLITE ADD 5.A117 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.543 5.525 5.526 5.527 5.538 5.540 5.542	

Agenda item 1.16

MOD

29.9-34.2 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
29.9-30	FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 ADD 5.A116 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.543 5.525 5.526 5.527 5.538 5.540 5.542	

* Pursuant to Resolution 99 (Rev. Dubai, 2018) of the Plenipotentiary Conference and taking into account the Israeli-Palestinian Interim Agreement of 28 September 1995.

Agenda item 7(C)

MOD

29.9-34.2 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
30-31	FIXED-SATELLITE (Earth-to-space) 5.338A MOBILE-SATELLITE (Earth-to-space) Standard frequency and time signal-satellite (space-to-Earth) 5.542 ADD 5.B7(C)3	

Agenda item 4

MOD

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)

Agenda item 8

MOD

5.546 *Different category of service:* in Saudi Arabia, Armenia, Azerbaijan, Bahrain, Belarus, Djibouti, Egypt, the United Arab Emirates, Spain, Estonia, the Russian Federation, Georgia, Hungary, Iran (Islamic Republic of), Israel, Jordan, Lebanon, Moldova, Mongolia, Oman, Uzbekistan, Poland, the Syrian Arab Republic, Türkiye, Kyrgyzstan, Romania, the United Kingdom, Somalia, South Africa, Tajikistan and Turkmenistan, the allocation of the frequency band 31.5-31.8 GHz to the fixed and mobile, except aeronautical mobile, services is on a primary basis (see No. **5.33**). (WRC-23)

Agenda item 4

MOD

5.547 The bands 31.8-33.4 GHz, 37-40 GHz, 40.5-43.5 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz are available for high-density applications in the fixed service. Administrations should take this into account when considering regulatory provisions in relation to these bands. Because of the potential deployment of high-density applications in the fixed-satellite service in the bands 39.5-40 GHz and 40.5-42 GHz (see No. **5.516B**), administrations should further take into account potential constraints to high-density applications in the fixed service, as appropriate. (WRC-23)

MOD

5.548 In designing systems for the inter-satellite service in the band 32.3-33 GHz, for the radionavigation service in the band 32-33 GHz, and for the space research service (deep space) in the band 31.8-32.3 GHz, administrations shall take all necessary measures to prevent harmful interference between these services, bearing in mind the safety aspects of the radionavigation service (see Recommendation **707 (Rev.WRC-23)**). (WRC-23)

Agenda item 9.1(9.1-d)

MOD

34.2-40 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
36-37	EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) 5.149 5.550A	
37-37.5	FIXED MOBILE except aeronautical mobile 5.550B SPACE RESEARCH (space-to-Earth) 5.547	
37.5-38	FIXED FIXED-SATELLITE (space-to-Earth) 5.550C ADD 5.A91D MOBILE except aeronautical mobile 5.550B SPACE RESEARCH (space-to-Earth) Earth exploration-satellite (space-to-Earth) 5.547	

ADD

5.A91D Non-geostationary-satellite systems in the fixed-satellite service operating with an apogee altitude above 407 km and below 2 000 km in the frequency band 37.5-38 GHz shall not exceed an unwanted emission e.i.r.p. density of −21 dB(W/100 MHz) per space station for angles greater than 65.0° from nadir relative to the space station in the fixed-satellite service in the frequency band 36-37 GHz in order to protect the Earth exploration-satellite service (passive) operating in the latter frequency band. (WRC-23)

Agenda item 4

MOD

5.550B The frequency band 37-43.5 GHz, or portions thereof, is identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. Because of the potential deployment of FSS earth stations within the frequency range

37.5-42.5 GHz and high-density applications in the fixed-satellite service in the frequency bands 39.5-40 GHz in Region 1, 40-40.5 GHz in all Regions and 40.5-42 GHz in Region 2 (see No. **5.516B**), administrations should further take into account potential constraints to IMT in these frequency bands, as appropriate. Resolution **243 (Rev.WRC-23)** applies. (WRC-23)

MOD

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)

Agenda item 8

MOD

5.553A In Algeria, Angola, Bahrain, Belarus, Benin, Botswana, Brazil, Burkina Faso, Cabo Verde, Korea (Rep. of), Côte d'Ivoire, Croatia, Djibouti, Egypt, United Arab Emirates, Estonia, Eswatini, Gabon, Gambia, Ghana, Greece, Guinea, Guinea-Bissau, Hungary, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lesotho, Latvia, Liberia, Lithuania, Madagascar, Malawi, Mali, Morocco, Mauritius, Mauritania, Mozambique, Namibia, Niger, Nigeria, Oman, Qatar, Senegal, Seychelles, Sierra Leone, Slovenia, Somalia, Sudan, South Africa, Sweden, Tanzania, Togo, Tunisia, Zambia and Zimbabwe, the frequency band 45.5-47 GHz is identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT), taking into account No. **5.553**. With respect to the aeronautical mobile service and radionavigation service, the use of this frequency band for the implementation of IMT is subject to agreement obtained under No. **9.21** with concerned administrations and shall not cause harmful interference to, or claim protection from these services. This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. Resolution **244 (Rev.WRC-23**) applies. (WRC-23)

Agenda item 4

MOD

5.553B In Region 2 and Algeria, Angola, Saudi Arabia, Australia, Bahrain, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Rep., Comoros, Congo (Rep. of the), Korea (Rep. of), Côte d'Ivoire, Djibouti, Egypt, United Arab Emirates, Eswatini, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Equatorial Guinea, India, Iran (Islamic Republic of), Iraq, Japan, Jordan, Kenya, Kuwait, Lesotho, Liberia, Libya, Lithuania, Madagascar, Malaysia, Malawi, Mali, Morocco, Mauritius, Mauritania, Mozambique, Namibia, Niger, Nigeria, Oman, Uganda, Qatar, the Syrian Arab Republic, the Dem. Rep. of the Congo, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Singapore, Slovenia, Somalia, Sudan, South Sudan, South Africa, Sweden, Tanzania, Chad, Togo, Tunisia, Zambia and Zimbabwe, the frequency band 47.2-

48.2 GHz is identified for use by administrations wishing to implement International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which it is allocated, and does not establish any priority in the Radio Regulations. Resolution **243 (Rev.WRC-23)** applies. (WRC-23)

MOD

5.559AA The frequency band 66-71 GHz is identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which this frequency band is allocated and does not establish priority in the Radio Regulations. Resolution **241 (Rev.WRC-23)** applies. (WRC-23)

Agenda item 1.14

MOD

200-248 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
232-235	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Radiolocation	
235-238	EARTH EXPLORATION-SATELLITE (passive) ADD 5.B114 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE SPACE RESEARCH (passive) 5.563A 5.563B	
238-239.2	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE	
239.2-240	EARTH EXPLORATION-SATELLITE (passive) FIXED-SATELLITE (space-to-Earth) RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE	
240-241	EARTH EXPLORATION-SATELLITE (passive) RADIOLOCATION	
241-242.2	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite 5.149	

242.2-244.2	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite 5.138 5.149
244.2-247.2	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite 5.138 5.149
247.2-248	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite 5.149

ADD

5.B114 In the frequency band 235-238 GHz, stations in the Earth exploration-satellite service (passive) shall not claim protection from stations in the fixed and mobile services. (WRC-23)

Agenda item 4

MOD

5.564A For the operation of fixed and land mobile service applications in frequency bands in the range 275-450 GHz:

The frequency bands 275-296 GHz, 306-313 GHz, 318-333 GHz and 356-450 GHz are identified for use by administrations for the implementation of land mobile and fixed service applications where no specific conditions are necessary to protect Earth exploration-satellite service (passive) applications.

The frequency bands 296-306 GHz, 313-318 GHz and 333-356 GHz may only be used by fixed and land mobile service applications when specific conditions to ensure the protection of Earth exploration-satellite service (passive) applications are determined in accordance with Resolution **731 (Rev.WRC-23)**.

In those portions of the frequency range 275-450 GHz where radio astronomy applications are used, specific conditions (e.g. minimum separation distances and/or avoidance angles) may be necessary to ensure protection of radio astronomy sites from land mobile and/or fixed service applications, on a case-by-case basis, in accordance with Resolution **731 (Rev.WRC-23)**.

The use of the above-mentioned frequency bands by land mobile and fixed service applications does not preclude use by, and does not establish priority over, any other applications of radio services in the range of 275-450 GHz. (WRC-23)

ARTICLE 9

Procedure for effecting coordination with or obtaining agreement of other administrations[1, 2, 3, 4, 5, 6, 7, 8] (WRC-19)

MOD

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[4] **A.9.4** Resolution **49 (Rev.WRC-23)**, Resolution **552 (Rev.WRC-23)** or Resolution **32 (Rev.WRC-23)**, as appropriate, shall also be applied with respect to those satellite networks and satellite systems that are subject to it. (WRC-23)

Agenda item 9.2

Section I − Advance publication of information on satellite networks or satellite systems

General

SUP

9.1A

SUP

9.2C

Section II − Procedure for effecting coordination[13, 14]

Sub-Section IIA − Requirement and request for coordination

MOD

9.30 Requests for coordination made under Nos. **9.7** to **9.14** and **9.21** shall be sent by the requesting administration to the Bureau, together with the appropriate information listed in Appendix **4** to these Regulations. Any additional frequency bands subsequently added to the request for coordination, or any modification to the request for coordination involving a change of the orbital location for a space station using the geostationary-satellite orbit, shall be given a new date of receipt with respect to the application of Nos. **11.44**, **11.44.1** and **11.48**. (WRC-23)

Sub-Section IIC − Action upon a request for coordination

MOD

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[28] **9.52.1** An administration believing that:

i) unacceptable interference may be caused to its existing or planned satellite networks or systems not subject to the coordination procedure under Section II of Article **9,** or

ii) unacceptable interference may be caused to its existing or planned satellite networks or systems subject to Section II of Article **9** by an incoming frequency assignment to a space station subject to this Section only with respect to terrestrial services, or

iii) unacceptable interference may be caused to its existing or planned satellite networks or systems subject to Section II of Article **9** by an incoming frequency assignment to a space station subject to this Section only with respect to a list of administrations provided in the relevant footnote to Article **5**, and that list does not include the potentially affected administration,

may send its comments to the requesting administration. A copy of these comments may also be sent to the Bureau. Such comments shall however not by themselves constitute a disagreement under No. **9.52**. Thereafter, both administrations shall endeavour to cooperate in joint efforts to resolve any difficulties, with the assistance of the Bureau, if so requested by either of the parties, and shall exchange any additional relevant information that may be available. (WRC-23)

Agenda item 4

ARTICLE 11

Notification and recording of frequency assignments[1, 2, 3, 4, 5, 6, 7] (WRC-19)

MOD

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[2] **A.11.2** Resolution **49 (Rev.WRC-23)**, Resolution **552 (Rev.WRC-23)** or Resolution **32 (Rev.WRC-23)**, as appropriate, shall also be applied with respect to those satellite networks and satellite systems that are subject to it. (WRC-23)

Agenda item 1.4

Section I − Notification

MOD

11.26A Notices relating to assignments of high-altitude platform station as International Mobile Telecommunications base station in the frequency bands identified in Nos. **5.14A**, **5.14B**, MOD **5.388A** and **5.14C** shall reach the Bureau not earlier than three years before the assignments are brought into use. (WRC-23)

Agenda item 9.2

Section II − Examination of notices and recording of frequency assignments in the Master Register

MOD

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[11] **11.28.1** In case of satellite networks or systems not subject to the coordination procedure under Section II of Article **9**, an administration believing that unacceptable interference may be caused to its existing or planned satellite networks or systems by submitted modifications to the characteristics initially published under No. **9.2B** may provide its comments to the notifying administration with copy to the Bureau. The Bureau shall publish any such comments received on its website. Both administrations shall thereafter cooperate to resolve any difficulties. (WRC-23)

MOD

11.44 The notified date[MOD 23, 24, 25] of bringing into use of any frequency assignment to a space station of a satellite network or system shall be not later than seven years following the date of receipt by the Bureau of the relevant complete information under No. **9.1** or **9.2** in the case of satellite networks or systems not subject to Section II of Article **9** or under No. **9.30** in the case of satellite networks or systems subject to Section II of Article **9**. Any frequency assignment not brought into use within the required period shall be cancelled by the Bureau after having informed the administration at least three months before the expiry of this period. (WRC-23)

MOD

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[23] **11.44.1** In the case of space station frequency assignments that are brought into use prior to the completion of the coordination process, and for which the Resolution **49 (Rev.WRC-23)** or Resolution **552 (Rev.WRC-23)** data, as appropriate, have been submitted to the Bureau, the assignment shall continue to be taken into consideration for a maximum period of seven years from the date of receipt of the relevant information under No. **9.30**. If the first notice for recording of the assignments in question under No. **11.15** related to No. **9.1** or No. **9.30** has not been received by the Bureau by the end of this seven-year period, the assignments shall be cancelled by the Bureau after having informed the notifying administration of its pending actions six months in advance. (WRC-23)

MOD

11.44A A notice not conforming to No. **11.44** shall be returned to the notifying administration with a recommendation to restart the advance publication procedure or the coordination procedure, as appropriate. (WRC-23)

Agenda item 7(D3)

MOD

11.44B A frequency assignment to a space station in the geostationary-satellite orbit shall be considered as having been brought into use when a space station in the geostationary-satellite orbit with the capability of transmitting or receiving that frequency assignment has been deployed and maintained at the notified orbital position for a continuous period of 90 days. The notifying administration shall so inform the Bureau within 30 days from the end of the 90-day period[25, 26, ADD 26*bis*]. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC. Resolution **40 (Rev.WRC-19)** shall apply. (WRC-23)

ADD

[26*bis*] **11.44B.3** and **11.44C.5** If the notifying administration has informed the Bureau of the date of commencement of the 90-day bringing-into-use period, but, as of 15 days after the end of the 90-day bringing-into-use period, has not yet informed the Bureau of the completion of the bringing-into-use period in accordance with Nos. **11.44B** or **11.44C**, the Bureau shall promptly send the notifying administration a reminder of its obligation to inform the Bureau of the completion of the bringing-into-use period under Nos. **11.44B** or **11.44C**. (WRC-23)

Agenda item 7(A)

MOD

11.44C A frequency assignment to a space station in a non-geostationary-satellite orbit network or system in the fixed-satellite service, the mobile-satellite service or the broadcasting-satellite service shall be considered as having been brought into use when a space station with the capability of transmitting or receiving that frequency assignment has been deployed and maintained on one of the notified orbital plane(s)[MOD 27] of the non-geostationary satellite network or system for a continuous period of 90 days, irrespective of the notified number of orbital planes and satellites per orbital plane in the network or system. The notifying administration shall so inform the Bureau within 30 days from the end of the 90-day period[25, ADD 26*bis*, 28, 29]. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC subsequently. (WRC-23)

MOD

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[27] **11.44C.1** and **11.44D.1** For the purposes of No. **11.44C** or No. **11.44D**, the term "notified orbital plane" means an orbital plane of the non-geostationary-satellite system, as provided to the Bureau in the most recent notification information for the system's frequency assignments, that corresponds to Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.4.i (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4**. For the purposes of No. **11.44C**, Resolution **COM5/4 (WRC-23)** shall apply. (WRC-23)

MOD

11.44D A frequency assignment to a space station in a non-geostationary satellite orbit network or system with "Earth" as the reference body, other than a frequency assignment to which No. **11.44C** applies, shall be considered as having been brought into use when a space station with the capability of transmitting or receiving that frequency assignment has been deployed on one of the notified orbital plane(s)[MOD 27] of the non-geostationary satellite network or system, irrespective of the notified number of orbital planes and satellites per orbital plane in the network or system. The notifying administration shall so inform the Bureau as soon as possible, but not later than 30 days after the end of the period referred to in No. **11.44**[25, 29]. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC subsequently. (WRC-23)

Agenda item 9.2

MOD

11.48 If, after the expiry of the period of seven years from the date of receipt of the relevant complete information referred to in No. **9.1** or **9.2** in the case of satellite networks or systems not subject to Section II of Article **9** or in No. **9.30** in the case of satellite networks or systems subject to Section II of Article **9**, the administration responsible for the satellite network has not brought the frequency assignments to stations of the network into use, or has not submitted the first notice for recording of the frequency assignments under No. **11.15**, or, where required, has not provided the due diligence information pursuant to Resolution **49 (Rev.WRC-23)**, as appropriate, the corresponding information published under Nos. **9.2B** and **9.38**, as appropriate, shall be cancelled, but only after the administration concerned has been informed at least six months before the expiry date referred to in Nos. **11.44** and **11.44.1** and, where required, § 10 of Annex 1 of Resolution **49 (Rev.WRC-23)**[MOD 31]. (WRC-23)

MOD

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31 **11.48.1** If the information pursuant to Resolution **552 (Rev.WRC-23)** has not been provided, the corresponding information published under No. **9.38** shall be cancelled 30 days after the end of the seven-year period following the date of receipt by the Bureau of the relevant complete information under No. **9.30**. (WRC-23)

Agenda item 7(A)

MOD

11.49 Wherever the use of a recorded frequency assignment to a space station of a satellite network or to all space stations of a non-geostationary-satellite system is suspended for a period exceeding six months, the notifying administration shall inform the Bureau of the date on which such use was suspended. When the recorded assignment is brought back into use, the notifying administration shall, subject to the provisions of Nos. **11.49.1**, **11.49.2**, **11.49.3** or **11.49.4**, as applicable, so inform the Bureau, as soon as possible. On receipt of the information sent under this provision, the Bureau shall make that information available as soon as possible on the ITU website and shall publish it in the BR IFIC. The date on which the recorded assignment is brought

back into use[32, ADD 32*bis*, 33, 34, 35, MOD 36] shall be not later than three years from the date on which the use of the frequency assignment was suspended, provided that the notifying administration informs the Bureau of the suspension within six months from the date on which the use was suspended. If the notifying administration informs the Bureau of the suspension more than six months after the date on which the use of the frequency assignment was suspended, this three-year time period shall be reduced. In this case, the amount by which the three-year period shall be reduced shall be equal to the amount of time that has elapsed between the end of the six-month period and the date that the Bureau is informed of the suspension. If the notifying administration informs the Bureau of the suspension more than 21 months after the date on which the use of the frequency assignment was suspended, the frequency assignment shall be cancelled. Ninety days before the end of the period of suspension, the Bureau shall send a reminder to the notifying administration. If the Bureau does not receive the declaration of the commencement of the bringing-back-into-use period within thirty days following the limit date of the period of suspension established in accordance with this provision, it shall cancel the entry in the Master Register. The Bureau shall, however, inform the administration concerned before taking such action. (WRC-23)

Agenda item 7(D3)

ADD

[32*bis*] **11.49.1*bis*** and **11.49.2*bis*** If the notifying administration has informed the Bureau of the date of commencement of the 90-day bringing-back-into-use period, but, as of 15 days after the end of the 90-day bringing-back-into-use period, has not yet informed the Bureau of the completion of the bringing-back-into-use period in accordance with Nos. **11.49.1** or **11.49.2**, the Bureau shall promptly send the notifying administration a reminder of its obligation to inform the Bureau of the completion of the bringing-back-into-use period under Nos. **11.49.1** or **11.49.2**, as applicable. (WRC-23)

Agenda item 7(A)

MOD

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[36] **11.49.5** For the purposes of Nos. **11.49.2** and **11.49.3**, the term "notified orbital plane" means an orbital plane of the non-geostationary-satellite system, as provided to the Bureau in the most recent notification information for the system's frequency assignments, that corresponds to Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.4.i (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4**. For the purposes of No. **11.49.2**, Resolution **COM5/4 (WRC-23)** shall apply. (WRC-23)

Section III – Maintenance of the recording of frequency assignments to non-geostationary-satellite systems in the Master Register (WRC-19)

MOD

11.51 For frequency assignments to some non-geostationary-satellite systems in specific frequency bands and services, Resolution **35 (Rev.WRC-23)** and Resolution **COM5/4 (WRC-23)** shall apply. (WRC-23)

Agenda item 1.11

ARTICLE 19

Identification of stations

Section I − General provisions

MOD

19.11 5) All transmissions by satellite emergency position-indicating radiobeacons (EPIRBs) operating in the band 406-406.1 MHz shall carry identification signals. (WRC-23)

Section V − Selective call numbers in the maritime mobile service

MOD

19.83 § 36 When stations of the maritime mobile service use selective calling devices in accordance with the most recent versions of Recommendations ITU-R M.476 and ITU-R M.625, their call numbers should be assigned by the responsible administrations in accordance with the provisions below. (WRC-23)

SUP

19.96A

MOD

19.97 3) Each administration shall choose the coast station identification numbers to be assigned to its coast stations from the blocks of the series supplied to it. (WRC-23)

Agenda item 2

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

19.98 *A − General*

MOD

19.99 § 39 When a station[6] 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

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

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)

ARTICLE 21

Terrestrial and space services sharing frequency bands above 1 GHz

Section I − Choice of sites and frequencies

MOD

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[2] **21.2.2** Information on this subject is given in the most recent version of Recommendation ITU-R SF.765. (WRC-23)

Section II − Power limits for terrestrial stations

MOD

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[4] **21.4.1** Information on this subject is given in the most recent version of Recommendation ITU-R SF.765. (WRC-23)

Agenda item 9.1

MOD

TABLE **21-2** (Rev.WRC-23)

Frequency band	Service	Limit as specified in Nos.
…	…	…
17.7-18.4 GHz 18.6-18.8 GHz 19.3-19.7 GHz 22.55-23.55 GHz 24.45-29.5 GHz	Fixed-satellite Earth exploration-satellite Space research Inter-satellite	**21.2**, **21.3**, **21.5** and **21.5A**

NOTE: Additional frequency bands above 29.5 GHz may be considered for inclusion in Table **21-2** by a future competent conference.

Agenda item 1.17

Section V − Limits of power flux-density from space stations

MOD

TABLE **21-4** (Rev.WRC-23)

<table>
<tr><th rowspan="2">Frequency band</th><th rowspan="2">Service*</th><th colspan="3">Limit in dB(W/m^2) for angles of arrival (δ) above the horizontal plane</th><th rowspan="2">Reference bandwidth</th></tr>
<tr><th>0°-5°</th><th>5°-25°</th><th>25°-90°</th></tr>
<tr><td colspan="6">...</td></tr>
<tr><td rowspan="2">17.7-19.3 GHz [7, 8]</td><td rowspan="2">Fixed-satellite (space-to-Earth)
Inter-satellite
Meteorological-satellite (space-to-Earth)</td><td>0°-5°</td><td>5°-25°</td><td>25°-90°</td><td rowspan="2">1 MHz</td></tr>
<tr><td>−115 [14, 15]
or
−115 − X [13]</td><td>−115 + 0.5(δ − 5) [14, 15]
or
−115 − X + ((10 + X)/20) (δ − 5) [13]</td><td>−105 [14, 15]
or
−105 [13]</td></tr>
<tr><td rowspan="2">17.7-19.3 GHz [7, 8]</td><td rowspan="2">Fixed-satellite (space-to-Earth)
Inter-satellite</td><td>0°-3°</td><td>3°-12°</td><td>12°-25°</td><td rowspan="2">−105 [16]</td><td rowspan="2">1 MHz</td></tr>
<tr><td>−120 [16]</td><td>−120 + (8/9) (δ − 3) [16]</td><td>−112 + (7/13) (δ − 12) [16]</td></tr>
</table>

19.3-19.7 GHz	Fixed-satellite (space-to-Earth) Inter-satellite	**0°-3°**	**3°-12°**	**12°-25°**	−105 [16]	1 MHz
		−120 [16]	−120 + (8/9) (δ − 3) [16]	−112 + (7/13) (δ − 12) [16]		

TABLE **21-4** (*continued*) (Rev.WRC-23)

Frequency band	**Service***	**Limit in dB(W/m²) for angles of arrival (δ) above the horizontal plane**			**Reference bandwidth**
		0°-5°	**5°-25°**	**25°-90°**	
19.3-19.7 GHz 21.4-22 GHz (Regions 1 and 3) 22.55-23.55 GHz 24.45-24.75 GHz 25.25-27.5 GHz	Fixed-satellite (space-to-Earth) Broadcasting-satellite Earth exploration-satellite (space-to-Earth) Inter-satellite Space research (space-to-Earth)	−115 [15]	−115 + 0.5(δ − 5) [15]	−105 [15]	1 MHz
27.500-27.501 GHz	Fixed-satellite (space-to-Earth)	−115	−115 + 0.5(δ − 5)	−105	1 MHz
27.5-30.0 GHz	Inter-satellite (non-geostationary satellite orbit)[xx]	−120	−120 + 0.5(δ − 5)	−110	1 MHz
…					

Agenda item 9.2

MOD

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[13] **21.16.6** The function X is defined as a function of the number, N, of satellites in the non-geostationary satellite constellation in the fixed-satellite service and N_v, as follows:

$X = 0$ dB for $N \leq 50$

$X = \frac{5}{119}(N - 50)$ dB for $50 < N \leq 288$

$X = \frac{1}{69}(N + 402)$ dB for $288 < N \leq 999$

$X = max\ \{20.3;\ 10 \log_{10}(N_v)\}$ dB for $1\,000 \leq N \leq 6\,000$

$X = 10 \log_{10}(N_v) + 1$ dB for $N > 6\,000$

[xx] The methodology included in Annex 2 to Resolution **COM5/8 (WRC-23)** shall be applied to calculate the pfd produced at the surface of the Earth by emissions from a non-geostationary-satellite space station transmitting in the frequency band 27.5-30.0 GHz.

where:

N_v[1] is the maximum number of visible space stations – considering a minimum elevation angle equal to 0 degrees – from any location on the surface of the Earth and within the service area of the non-GSO system. N_v does not depend on latitude; it encompasses the maximum number of visible satellites across all latitudes within the service area of the relevant non-GSO system.

In the frequency band 18.8-19.3 GHz, these limits apply to emissions of any space station in a non-geostationary-satellite system in the fixed-satellite service for which complete coordination or notification information, as appropriate, has been received by the Radiocommunication Bureau since 17 November 1995 and which was not operational by that date and in the inter-satellite service. (WRC-23)

Agenda item 1.17

MOD

14 **21.16.6A** These limits apply to emissions of a space station in the meteorological-satellite service and of a geostationary satellite in the fixed-satellite and inter-satellite services. They also apply to emissions of any space station in a non-geostationary-satellite system in the fixed-satellite service in the band 18.8-19.3 GHz for which complete coordination or notification information has been received by the Radiocommunication Bureau by 17 November 1995, or which was in operation by that date. (WRC-23)

MOD

16 **21.16.6C** These limits apply to all space stations that use highly-inclined orbits having an apogee altitude greater than 18 000 km and an orbital inclination between 35° and 145° in the band 17.7-19.7 GHz in the fixed-satellite service and that are not covered by Resolution **147 (WRC-07)**, and for which complete coordination or notification information, as appropriate, was received by the Radiocommunication Bureau after 16 November 2007, and in the inter-satellite service. (WRC-23)

Agenda item 4

ARTICLE 22

Space services[1]

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1 Where N_v is determined as follows: $N_v = \text{Max}(N_v(j = 0,1,2...))$ with $N_v(j) = \text{Max}(N_v(j(t)), N_v(j(t - 1)))$, where $N_v(j(t))$ represents all visible satellites (with elevation ≥ 0 degrees) at each time-step (t) on any point on the surface of the Earth (j).

Section II − Control of interference to geostationary-satellite systems

MOD

22.5CA 2) The limits given in Tables **22-1A** to **22-1E** may be exceeded on the territory of any country whose administration has so agreed (see also Resolution **140 (Rev.WRC-23)**). (WRC-23)

Agenda item 1.19

MOD

TABLE **22-1B** (WRC-23)

Limits to the epfd↓ radiated by non-geostationary-satellite systems in the fixed-satellite service in certain frequency bands[3, 6, 8, X]

Frequency band (GHz)	epfd↓ (dB(W/m²))	Percentage of time during which epfd↓ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter and reference radiation pattern[7]
17.3-17.7 in Region 2; 17.8-18.6	−175.4 −175.4 −172.5 −167 −164 −164	0 90 99 99.714 99.971 100	40	1 m Recommendation ITU-R S.1428-1
	−161.4 −161.4 −158.5 −153 −150 −150	0 90 99 99.714 99.971 100	1 000	
	−178.4 −178.4 −171.4 −170.5 −166 −164 −164	0 99.4 99.9 99.913 99.971 99.977 100	40	2 m Recommendation ITU-R S.1428-1
	−164.4 −164.4 −157.4 −156.5 −152 −150 −150	0 99.4 99.9 99.913 99.971 99.977 100	1 000	
	−185.4 −185.4 −180 −180 −172 −164 −164	0 99.8 99.8 99.943 99.943 99.998 100	40	5 m Recommendation ITU-R S.1428-1
	−171.4 −171.4 −166	0 99.8 99.8	1 000	

Frequency band (GHz)	epfd↓ (dB(W/m²))	Percentage of time during which epfd↓ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter and reference radiation pattern[7]
	−166 −158 −150 −150	99.943 99.943 99.998 100		

ADD

_____

X **22.5C.X** In Region 2, a non-geostationary-satellite system in the fixed-satellite service shall meet the limits of this table for the 17.3-17.7 GHz band with respect to geostationary-satellite systems in the broadcasting-satellite service and shall utilize the reference patterns of Recommendation ITU-R BO.1443-3. (WRC-23)

MOD

TABLE **22-3** (WRC-23)

Limits to the $epfd_{is}$ radiated by non-geostationary-satellite systems in the fixed-satellite service in certain frequency bands[19, Y]

Frequency band (GHz)	$epfd_{is}$ (dB(W/m²))	Percentage of time during which $epfd_{is}$ level may not be exceeded	Reference bandwidth (kHz)	Reference antenna beamwidth and reference radiation pattern[20]
10.7-11.7 (Region 1) 12.5-12.75 (Region 1) 12.7-12.75 (Region 2)	−160	100	40	4° Recommendation ITU-R S.672-4, *Ls* = −20
17.3-17.7 (Regions 1 and 2) 17.8-18.4	−160	100	40	4° Recommendation ITU-R S.672-4, *Ls* = −20

ADD

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Y **22.5F.Y** A non-geostationary-satellite system operating in Region 1 or 2, at any position in the orbit, shall meet the limits of this table for the 17.3-17.7 GHz band with respect to a receiving space station in the broadcasting-satellite feeder link of Appendix **30A**, in all three Regions. (WRC-23)

MOD

TABLE **22-4B** (WRC-23)

Operational limits to the epfd↓ radiated by non-geostationary-satellite systems in the fixed-satellite service in certain frequency bands[21, 25]

Frequency band (GHz)	**epfd↓ (dB(W/m²))**	**Percentage of time during which epfd↓ may not be exceeded**	**Reference bandwidth (kHz)**	**Geostationary-satellite system receive earth station antenna gain (dBi)**	**Orbital inclination of geostationary satellite (degrees)**
19.7-20.2	−157 −157 −155	100 100 100	40 40 40	≥ 49 ≥ 43 [25] ≥ 49	≤ 2.5 ≤ 2.5 > 2.5 and ≤ 4.5
19.7-20.2	−143 −143 −141	100 100 100	1 000 1 000 1 000	≥ 49 ≥ 43 [25] ≥ 49	≤ 2.5 ≤ 2.5 > 2.5 and ≤ 4.5
17.3-17.7 in Region 2 17.8-18.6	−164 −162	100 100	40 40	≥ 49 ≥ 49	≤ 2.5 > 2.5 and ≤ 4.5
17.3-17.7 in Region 2 17.8-18.6	−150 −148	100 100	1 000 1 000	≥ 49 ≥ 49	≤ 2.5 > 2.5 and ≤ 4.5

Agenda item 9.1(9.1-a)

ARTICLE 29A

Radio services related to Earth observation

ADD

ARTICLE 29B

Radio service related to space weather observations

29B.1 § 1 Space weather sensors may operate under the meteorological aids service in the subset MetAids (space weather) allocations.

29B.2 § 2 The importance of space weather observations and their service designation are highlighted in Resolution **COM 5/1 (WRC-23)**.

Agenda item 1.11

ARTICLE 31

Frequencies for the global maritime distress and safety system (GMDSS)

Section II − Survival craft stations

MOD

31.7 2) Equipment for transmitting locating signals from survival craft stations shall be capable of operating in the frequency band 9 200-9 500 MHz or on 161.975 MHz (AIS 1 of Appendix **18**) and 162.025 MHz (AIS 2 of Appendix **18**). (WRC-23)

ARTICLE 32

Operational procedures for distress communications in the global maritime distress and safety system (GMDSS) (WRC-07)

Section I − General

MOD

32.7 § 6 The phonetic alphabet and figure code in Appendix **14** and the abbreviations and signals in accordance with the most recent version of Recommendation ITU-R M.1172 should be used where applicable[MOD 1]. (WRC-23)

MOD

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[1] **32.7.1** The use of the Standard Marine Communication Phrases (SMCP) and, where language difficulties exist, the International Code of Signals, both published by the International Maritime Organization (IMO), is also recommended. It should be noted that the pronunciations for figures in Appendix **14** and IMO SMCP are different. (WRC-23)

Section II − Distress alerting and distress calling (WRC-07)

32.8 *A − General*

MOD

32.10A § 7A 1) A distress alert is false if it was transmitted without any indication that a mobile unit or person was in distress and required immediate assistance (see No. **32.9**). Administrations receiving a false distress alert shall report this infringement in accordance with Section V of Article **15**, if that alert:

a) was transmitted intentionally;

b) was not cancelled in accordance with No. **32.53A** and Resolution **349 (Rev.WRC-23)**;

c) could not be verified as a result of either the ship's failure to keep watch on appropriate frequencies in accordance with Nos. **31.16** to **31.20**, or its failure to respond to calls from an authorized rescue authority;

d) was repeated; or

e) was transmitted using a false identity.

Administrations receiving such a report shall take appropriate steps to ensure that the infringement does not recur. No action should normally be taken against any ship or mariner for reporting and cancelling a false distress alert. (WRC-23)

32.11 *B − Transmission of a distress alert or a distress call* (WRC-07)

B1 − Transmission of a distress alert or a distress call by a ship station or a ship earth station (WRC-07)

MOD

32.12 § 8 Ship-to-shore distress alerts or calls are used to alert rescue coordination centres via coast stations or coast earth stations that a ship is in distress. These alerts are based on the use of transmissions via satellites (from a ship earth station or a satellite EPIRB) and terrestrial services (from ship stations). (WRC-23)

32.20 *C − Receipt and acknowledgement of distress alerts and distress calls* (WRC-07)

C1 − Procedure for acknowledgement of receipt of distress alerts or a distress call (WRC-07)

MOD

32.21A 2) When acknowledging receipt of a distress alert sent by DSC[8], the acknowledgement in the terrestrial services shall be made by DSC or radiotelephony on the associated distress and safety frequency in the same band in which the distress alert was received, taking due account of the directions given in the most recent versions of Recommendations ITU-R M.493 and ITU-R M.541. (WRC-23)

MOD

32.23 § 15 When acknowledging by radiotelephony the receipt of a distress alert or a distress call from a ship station or a ship earth station, the acknowledgement should be given in the following form, taking into account Nos. **32.6** and **32.7**:

– the distress signal "MAYDAY";

– the name followed by the call sign, or the MMSI or other identification of the station sending the distress message;

– the words "THIS IS";

– the name and call sign or other identification of the station acknowledging receipt;
– the word “RECEIVED”;
– the distress signal “MAYDAY”. (WRC-23)

SUP

32.24

C3 − Receipt and acknowledgement by a ship station or ship earth station (WRC-07)

MOD

32.31 2) However, in order to avoid making unnecessary or confusing transmissions in response, a ship station, which may be at a considerable distance from the incident, receiving an HF distress alert, shall not acknowledge it but shall observe the provisions of Nos. **32.36** and **32.37**, and shall, if the distress alert is not acknowledged by a coast station within five minutes, relay the distress alert, but only to an appropriate coast station or coast earth station (see also Nos. **32.16** to **32.19H**). (WRC-23)

MOD

32.34A § 21A However, unless instructed to do so by a coast station or a rescue coordination centre, a ship station may only send an acknowledgement by DSC in the event that:

a) no acknowledgement by DSC from a coast station has been observed; and

b) no other communication by radiotelephony to or from the vessel in distress has been observed; and

c) at least five minutes have elapsed and the distress alert by DSC has been repeated (see No. **32.21A.1**). (WRC-23)

32.36 *D − Preparations for handling of distress traffic*

SUP

32.38

Section III − Distress traffic

32.39 *A − General and search and rescue coordinating communications*

SUP

32.43

SUP

32.44

MOD

32.47 in radiotelephony, the signal SEELONCE MAYDAY, pronounced as the French expression “silence, m’aider”. (WRC-23)

SUP

32.48

MOD

32.52 § 32 In radiotelephony, the message referred to in No. **32.51** should consist of the following taking into account Nos. **32.6** and **32.7**:

– the distress signal “MAYDAY”;

– the words “ALL STATIONS”, spoken three times;

– the words “THIS IS”;

– the name of the station sending that message, spoken three times;

– the call sign or other identification of the station sending the message;

– the time of handing in of the message;

– the MMSI (if the initial alert has been sent by DSC), the name and the call sign of the mobile station which was in distress;

– the words “SEELONCE FEENEE” pronounced as the French words “silence fini”. (WRC-23)

SUP

32.53

32.54 *B − On-scene communications*

MOD

32.56 2) Control of on-scene communications is the responsibility of the unit coordinating search and rescue operations[10]. Simplex communications shall be used so that all on-scene mobile stations may share relevant information concerning the distress incident. (WRC-23)

MOD

32.57 § 34 1) The preferred frequencies in radiotelephony for on-scene communications are 156.8 MHz and 2 182 kHz. (WRC-23)

MOD

32.59 § 35 The selection or designation of on-scene frequencies is the responsibility of the unit coordinating search and rescue operations[10]. Normally, once an on-scene frequency is established, a continuous aural watch is maintained by all participating on-scene mobile units on the selected frequency. (WRC-23)

32.60 *C − Locating and homing signals*

MOD

32.61 § 36 1) Locating signals are radio transmissions intended to facilitate the finding of a mobile unit in distress or the location of survivors. These signals include those transmitted by searching units, and those transmitted by the mobile unit in distress, by survival craft, by satellite EPIRBs, by radar SARTs and by AIS-SARTs to assist the searching units. (WRC-23)

ARTICLE 33

Operational procedures for urgency and safety communications in the global maritime distress and safety system (GMDSS)

Section II − Urgency communications

MOD

33.8 § 2 1) In a terrestrial system, urgency communications consist of an announcement, transmitted using digital selective calling, followed by the urgency call and message transmitted using radiotelephony or data. The announcement of the urgency message shall be made on one or more of the distress and safety calling frequencies specified in Section I of Article **31** using either digital selective calling and the urgency call format, or if not available, radio telephony procedures and the urgency signal. Announcements using digital selective calling should use the technical structure and content set forth in the most recent version of Recommendations ITU-R M.493 and ITU-R M.541. A separate announcement need not be made if the urgency message is to be transmitted through the maritime mobile-satellite service. (WRC-23)

MOD

33.12 § 6 The urgency call should consist of the following, taking into account Nos. **32.6** and **32.7**:

– the urgency signal “PAN PAN”, spoken three times;

– the name of the called station or “ALL STATIONS”, spoken three times;

– the words “THIS IS”;
– the name of the station transmitting the urgency message, spoken three times;
– the call sign or any other identification;
– the MMSI (if the initial announcement has been sent by DSC),

followed by the urgency message or followed by the details of the channel to be used for the message in the case where a working channel is to be used.

In radiotelephony, on the selected working frequency, the urgency call and message consist of the following, taking into account Nos. **32.6** and **32.7**:

– the urgency signal “PAN PAN”, spoken three times;
– the name of the called station or “ALL STATIONS”, spoken three times;
– the words “THIS IS”;
– the name of the station transmitting the urgency message, spoken three times;
– the call sign or any other identification;
– the MMSI (if the initial announcement has been sent by DSC);
– the text of the urgency message. (WRC-23)

SUP

33.13

SUP

33.17

SUP

33.18

Section III − Medical transports

MOD

33.20 § 11 1) For the purpose of announcing and identifying medical transports which are protected under the above-mentioned Conventions, the procedure of Section II of this Article is used. The urgency call shall be followed by the addition of the single word MAY-DEE-CAL pronounced as in French “médical”, in radiotelephony. (WRC-23)

Section IV − Safety communications

MOD

33.31 § 15 1) In a terrestrial system, safety communications consist of a safety announcement, transmitted using digital selective calling, followed by the safety call and message

transmitted using radiotelephony or data. The announcement of the safety message shall be made on one or more of the distress and safety calling frequencies specified in Section I of Article **31** using either digital selective calling techniques and the safety call format, or radiotelephony procedures and the safety signal. (WRC-23)

MOD

33.35 § 19 The complete safety call should consist of the following, taking into account Nos. **32.6** and **32.7**:

– the safety signal "SECURITE", spoken three times;
– the name of the called station or "ALL STATIONS", spoken three times;
– the words "THIS IS";
– the name of the station transmitting the safety message, spoken three times;
– the call sign or any other identification;
– the MMSI (if the initial announcement has been sent by DSC),

followed by the safety message or followed by the details of the channel to be used for the message in the case where a working channel is to be used.

In radiotelephony, on the selected working frequency, the safety call and message should consist of the following, taking into account Nos. **32.6** and **32.7**:

– the safety signal "SECURITE", spoken three times;
– the name of the called station or "ALL STATIONS", spoken three times;
– the words "THIS IS";
– the name of the station transmitting the safety message, spoken three times;
– the call sign or any other identification;
– the MMSI (if the initial alert has been sent by DSC);
– the text of the safety message. (WRC-23)

SUP

33.36

SUP

33.37

SUP

33.38

Section V − Transmission of maritime safety information[2]

33.39 *A − General*

ADD

33.40*bis* § 21 The transmission of maritime safety information using the NAVTEX system and/or the NAVDAT system is the responsibility of the administration, which shall inform the IMO in order to update the IMO Master Plan of shore-based facilities for the GMDSS (GMDSS Master Plan). (WRC-23)

MOD

33.41 § 22 The mode and format of the transmissions mentioned in Nos. **33.43**, **33.45**, **33.46**, **33.46A2** and **33.48** should be in accordance with the relevant ITU-R Recommendations. (WRC-23)

33.42 *B − International NAVTEX system*

MOD

33.43 § 23 Where maritime safety information is transmitted using the international NAVTEX system, taking into account No. **33.40*bis***, by means of narrow-band direct-printing telegraphy with forward error correction, the frequency 518 kHz shall be used (see Appendix **15**). (WRC-23)

33.44 *C − 490 kHz and 4 209.5 kHz*

ADD

33.46A1 *D − International NAVDAT system*

ADD

33.46A2 § 24A Where maritime safety information is transmitted using the international NAVDAT system, taking into account No. **33.40*bis***, the frequency 500 kHz and/or 4 226 kHz shall be used (see Appendix **15**). (WRC-23)

MOD

33.47 *E − High seas maritime safety information* (WRC-23)

MOD

33.48 § 25 The transmission of maritime safety information by means of narrow-band direct-printing telegraphy with forward error correction uses the frequencies 4 210 kHz, 6 314 kHz, 8 416.5 kHz, 12 579 kHz, 16 806.5 kHz, 19 680.5 kHz, 22 376 kHz and 26 100.5 kHz. The

transmission of maritime safety information by means of the NAVDAT system uses the frequencies 6 337.5 kHz, 8 443 kHz, 12 663.5 kHz, 16 909.5 kHz and 22 450.5 kHz. (WRC-23)

MOD

33.49 *F − Maritime safety information via satellite* (WRC-23)

MOD

33.50 § 26 Maritime safety information may be transmitted via satellite in the maritime mobile-satellite service using the frequency bands 1 530-1 545 MHz, 1 621.35-1 626.5 MHz and 2 483.59-2 499.91 MHz (see Appendix **15**). For the maritime mobile-satellite service in the frequency band 2 483.59-2 499.91 MHz, Resolution **COM4/5 (WRC-23)** applies when used for the GMDSS. (WRC-23)

Section VII − Use of other frequencies for safety (WRC-07)

MOD

33.53 § 28 Radiocommunications for safety purposes concerning ship reporting communications, communications relating to the navigation, movements and needs of ships and weather observation messages may be conducted on any appropriate communications frequency, including those used for public correspondence. In terrestrial systems, the frequency bands 415-535 kHz (see Article **52**), 1 606.5-4 000 kHz (see Article **52**), 4 000-27 500 kHz (see Appendix **17**) and 156-174 MHz (see Appendix **18**) are used for this function. In the maritime mobile-satellite service, frequencies in the frequency bands 1 530-1 544 MHz, 1 614.4225-1 618.725 MHz or 1 616.3-1 620.38 MHz (Earth-to-space) (see *resolves* 5 of Resolution **COM4/5 (WRC-23)**), 1 621.35-1 626.5 MHz, 1 626.5-1 645.5 MHz and 2 483.59-2 499.91 MHz (space-to-Earth) are used for this function as well as for distress alerting purposes (see No. **32.2**). For the frequency bands 1 614.4225-1 618.725 MHz or 1 616.3-1 620.38 MHz (Earth-to-space) (see *resolves* 5 of Resolution **COM4/5 (WRC-23)**) and 2 483.59-2 499.91 MHz (space-to-Earth) when used for the GMDSS, Resolution **COM4/5 (WRC-23)** applies. (WRC-23)

ARTICLE 34

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

MOD

Section I − Satellite emergency position-indicating radiobeacon signals (WRC-23)

Agenda item 2

MOD

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)

Agenda item 1.11

ARTICLE 47

Operator's certificates

Section III − Conditions for the issuing of certificates

MOD

TABLE **47-1** (WRC-23)

Requirements for radio electronic and operator's certificates

The relevant certificate is issued to a candidate who has given proof of the technical and professional knowledge and qualifications enumerated below, as indicated by an asterisk in the appropriate box	1st-class radio electronic certificate	2nd-class radio electronic certificate	General operator's certificate	Restricted operator's certificate
Knowledge of the principles of electricity and the theory of radio and of electronics sufficient to meet the requirements specified below:	*	*		
Theoretical knowledge of GMDSS radiocommunication equipment, including narrow-band direct-printing telegraph and radiotelephone transmitters and receivers, digital selective calling equipment, ship earth stations, satellite emergency position-indicating radiobeacons, marine antenna systems, radio equipment for survival craft together with all auxiliary items, including power supplies, as well as general knowledge of the principles of other equipment generally used for radionavigation, with particular reference to maintaining equipment in service.	*			

General theoretical knowledge of GMDSS radiocommunication equipment, including narrow-band direct-printing telegraph and radiotelephone transmitters and receivers, digital selective calling equipment, ship earth stations (including telegraphy), satellite emergency position-indicating radio beacons, marine antenna systems, radio equipment for survival craft together with all auxiliary items, including power supplies, as well as general knowledge of the principles of other equipment generally used for radionavigation, with particular reference to maintaining equipment in service.		*		
Practical knowledge of the operation and knowledge of the preventive maintenance of the equipment indicated above.	*	*		
Practical knowledge necessary for the location and repair (using appropriate testing equipment and tools) of faults in the equipment mentioned above which may occur during a voyage.	*			
Practical knowledge necessary for effecting repairs in the case of faults in the equipment indicated above, using the means available on board and, if necessary, replacing modular units.		*		

TABLE **47-1** (*end*) (WRC-23)

The relevant certificate is issued to a candidate who has given proof of the technical and professional knowledge and qualifications enumerated below, as indicated by an asterisk in the appropriate box	**1st-class radio electronic certificate**	**2nd-class radio electronic certificate**	**General operator's certificate**	**Restricted operator's certificate**
Detailed practical knowledge of the operation of all the GMDSS sub-systems and equipment.	*	*	*	
Practical knowledge of the operation of all the GMDSS sub-systems and equipment which is required while the ship is within the range of VHF coast stations (see NOTE 1).				*
Ability to send and to receive correctly by radiotelephony and telegraphy to and from ship earth stations.	*	*	*	
Ability to send and to receive correctly by radiotelephony.	*	*	*	*
Detailed knowledge of the regulations applying to radiocommunications, knowledge of the documents relating to charges for radiocommunications and knowledge of those provisions of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended which relate to radio.	*	*	*	
Knowledge of the regulations applying to radiotelephone communications and specifically of that part of those regulations relating to the safety of life.				*

Sufficient knowledge of one of the working languages of the Union. Candidates should be able to express themselves satisfactorily in that language, both orally and in writing.	*	*	*	
An elementary knowledge of one of the working languages of the Union. Candidates should be able to express themselves satisfactorily in that language, both orally and in writing. Administrations may waive the above language requirements for holders of a restricted operator's certificate when the ship station is confined to a limited area specified by the administration concerned. In such cases the certificate shall be suitably endorsed.				*

NOTE 1 − A restricted operator's certificate covers only the operation of GMDSS equipment required for GMDSS sea areas A1, and does not cover the operation of GMDSS A2/A3/A4 equipment fitted on a ship over and above the basic A1 requirements, even if the ship is in a sea area A1. GMDSS sea areas A1, A2, A3 and A4 are identified in the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended.

NOTE 2 − (SUP - WRC-12)

Agenda item 4

ARTICLE 48

Personnel

Section II − Class and minimum number of personnel for ship stations and ship earth stations

MOD

48.7 § 5 The personnel of ship stations and ship earth stations for which a radio installation is not compulsory either under international agreements or national regulations and which use the frequencies and techniques prescribed in Chapter **VII** shall be adequately qualified and certificated in accordance with the administration's requirements. Guidance concerning appropriate qualifications and certification is provided in Resolution **343 (Rev.WRC-12)**. That Resolution describes two appropriate certificates for use by personnel of ship stations and ship earth stations for which a radio installation is not compulsory.

Agenda item 2

ARTICLE 51

Conditions to be observed in the maritime services

Section I − Maritime mobile service

51.24 *C − Ship stations using digital selective calling*

51.32 C3 − Bands between 4 000 kHz and 27 500 kHz

MOD

51.35 *b)* send and receive class F1B or J2B emissions on an international calling channel (specified in Recommendation ITU-R M.541-11) in each of the HF maritime mobile bands necessary for their service; (WRC-23)

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51.39 *CA − Ship stations using narrow-band direct-printing telegraphy*

MOD

51.40 § 17 1) All ship stations using narrow-band direct-printing telegraphy equipment for general traffic should be able to send and receive on frequencies designated for narrow-band direct-printing telegraphy in the frequency bands in which they are operating. (WRC-23)

MOD

51.41 2) The characteristics of the narrow-band direct-printing equipment should be in accordance with the most recent versions of Recommendations ITU-R M.476, ITU-R M.625 and ITU-R M.627. (WRC-23)

51.42 CA1 − Bands between 415 kHz and 535 kHz

MOD

51.44 *a)* send and receive class F1B or J2B emissions for general traffic on the working frequencies necessary to carry out their service; (WRC-23)

51.48 CA3 − Bands between 4 000 kHz and 27 500 kHz

MOD

51.49 § 20 All ship stations equipped with narrow-band direct-printing telegraphy apparatus for general traffic to work in the authorized bands between 4 000 kHz and 27 500 kHz should be able to send and receive class F1B or J2B emissions on working frequencies in each of the HF maritime mobile bands necessary to carry out their service.

All ship stations equipped with narrow-band direct-printing telegraphy apparatus for MSI reception to work in the authorized bands between 4 000 kHz and 27 500 kHz shall be able to receive class F1B or J2B emissions on working frequencies in each of the HF maritime mobile bands necessary to carry out their service. (WRC-23)

ADD

51.49*bis* *Cbis – Ship stations using the automatic connection system* (WRC-23)

ADD

51.49*ter* The characteristics of the automatic connection system should be in accordance with the most recent versions of Recommendations ITU-R M.493 and ITU-R M.541. (WRC-23)

51.50 *D − Ship stations using radiotelephony*

51.59 D3 − Bands between 156 MHz and 174 MHz

ADD

51.64A1 *E − Ship stations receiving data transmissions* (WRC-23)

ADD

51.64A2 E1 − Bands between 415 kHz and 535 kHz (WRC-23)

ADD

51.64A3 § 24*bis* All ship stations equipped with NAVDAT apparatus for receiving digital data transmissions in the authorized bands between 415 kHz and 535 kHz shall be capable of receiving class W7D emissions on 500 kHz, if complying with the provisions of Chapter **VII**. (WRC-23)

ADD

51.64A4 E2 − Bands between 4 000 kHz and 27 500 kHz (WRC-23)

ADD

51.64A5 § 24*ter* All ship stations equipped with NAVDAT apparatus for receiving digital data transmissions in the authorized bands between 4 000 kHz and 27 500 kHz shall be capable of receiving class W7D emissions, if complying with the provisions of Chapter **VII**. (WRC-23)

ARTICLE 52

Special rules relating to the use of frequencies

Section I − General provisions

52.4 *B − Bands between 415 kHz and 535 kHz*

MOD

52.6 § 3 1) In the maritime mobile service, no assignments shall be made on the frequency 518 kHz other than for transmission by coast stations of meteorological and navigational warnings and urgent information to ships by means of automatic narrow-band direct-printing telegraphy (international NAVTEX system). In the maritime mobile service, no assignments shall be made on the frequency 500 kHz other than for transmission by coast stations of meteorological and navigational warnings and urgent information to ships by means of the international NAVDAT system. (WRC-23)

52.12 *D − Bands between 4 000 kHz and 27 500 kHz*

ADD

52.13A § 6*bis* In the maritime mobile service, no assignments shall be made on the frequency 4 226 kHz other than for transmission by coast stations of meteorological and navigational warnings and urgent information to ships by means of the international NAVDAT system. (WRC-23)

Section III − Use of frequencies for narrow-band direct-printing telegraphy

52.96 *B − Bands between 415 kHz and 535 kHz*

MOD

52.97 § 45 All ship stations equipped with narrow-band direct-printing apparatus for general traffic to work in the authorized bands between 415 kHz and 535 kHz should be able to

send and receive class F1B or J2B emissions as specified in No. **51.44**. Additionally, ship stations complying with the provisions of Chapter **VII** shall be able to receive class F1B emissions on 518 kHz (see No. **51.45**). (WRC-23)

52.99 *C − Bands between 1 606.5 kHz and 4 000 kHz* (WRC-03)

MOD

52.101 2) Narrow-band direct-printing telegraphy is forbidden in the band 2 170-2 194 kHz. (WRC-23)

52.102 *D − Bands between 4 000 kHz and 27 500 kHz*

MOD

52.103 § 47 All ship stations equipped with narrow-band direct-printing telegraph apparatus for general traffic to work in the authorized bands between 4 000 kHz and 27 500 kHz should be able to send and receive class F1B or J2B emissions as specified in No. **51.49**. All ship stations equipped with narrow-band direct-printing telegraph apparatus for receiving MSI to work in the authorized frequency bands between 4 000 kHz and 27 500 kHz shall be able to receive class F1B or J2B emissions as specified in No. **51.49**. The assignable frequencies are indicated in Appendices **15** and **17**. (WRC-23)

Section IV − Use of frequencies for digital selective-calling

52.110 *A − General*

MOD

52.111 § 50 The provisions described in this Section are applicable to calling and acknowledgement, when digital selective-calling techniques are used, except in cases of distress, urgency and safety, to which the provisions of Chapter **VII** apply. When the automatic connection system (ACS) is used, the provisions of Section **IV*bis*** should apply. (WRC-23)

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MOD

52.112 § 51 The characteristics of the digital selective-calling equipment shall be in accordance with Recommendation ITU-R M.541-11 and should be in accordance with the most recent version of Recommendation ITU-R M.493. (WRC-23)

52.141 *D − Bands between 4 000 kHz and 27 500 kHz*

D2 − Call and acknowledgement

MOD

52.149 2) The international digital selective-calling frequencies shall be as indicated in Recommendation ITU-R M.541-11 and may be used by any ship station. In order to reduce interference on these frequencies, they shall only be used when calling cannot be made on nationally assigned frequencies. (WRC-23)

MOD

52.153 2) The international digital selective-calling frequencies shall be as indicated in Recommendation ITU-R M.541-11 and may be assigned to any coast station. In order to reduce interference on these frequencies, they may be used as a general rule by coast stations to call ships of another nationality, or in cases where it is not known on which digital selective-calling frequencies within the frequency bands concerned the ship station is maintaining watch. (WRC-23)

Agenda item 1.11

52.157 *E − Bands between 156 MHz and 174 MHz*

E3 − Watch

ADD

Section IV*bis* − Use of frequencies for the automatic connection system (WRC-23)

ADD

52.xx0 *A – General* (WRC-23)

ADD

52.xx1 § y0 ACS is an automatic connection function using digital selective calling (DSC) for shore-to-ship, ship-to-shore or ship-to-ship communication with the most appropriate working frequency (or channel) in the MF and HF bands of the maritime mobile service.

The procedure for ACS shall not interrupt a reliable watch on a 24-hour basis on appropriate DSC distress alerting frequencies unless the equipment is transmitting.

When an ACS is utilized, it should be in accordance with the most recent versions of Recommendations ITU-R M.493 and ITU-R M.541. (WRC-23)

ADD

52.xx2 *B – Bands between 1 606.5 kHz and 4 000 kHz* (WRC-23)

ADD

52.xx3 § y1 The ACS frequency used for transmitting and receiving for both ship stations and coast stations is 2 174.5 kHz. (WRC-23)

ADD

52.xx4 *C – Bands between 4 000 kHz and 27 500 kHz* (WRC-23)

ADD

52.xx5 § y2 The ACS frequencies used for transmitting and receiving for both ship stations and coast stations are 4 177.5 kHz, 6 268 kHz, 8 376.5 kHz, 12 520 kHz and 16 695 kHz. (WRC-23)

Section VI − Use of frequencies for radiotelephony

52.182 *B − Bands between 1 606.5 kHz and 4 000 kHz* (WRC-03)

B2 − Call and reply

MOD

52.189 § 87 1) The frequency 2 182 kHz[1] is an international distress frequency for radiotelephony (see Appendix **15** and Resolution **354 (Rev.WRC-23)**). (WRC-23)

Agenda item 2

MOD

52.192 *b)* by coast stations to announce the transmission, on another frequency, of traffic lists as specified in Recommendation ITU-R M.1171-1. (WRC-23)

MOD

52.195 § 89 1) Before transmitting on the carrier frequency 2 182 kHz, a station shall, in accordance with Recommendation ITU-R M.1171-1, listen on this frequency for a reasonable period to make sure that no distress traffic is being sent. (WRC-23)

B4 − Additional provisions applying to Region 1

MOD

52.213 2) In exceptional circumstances, if frequency usage according to Nos. **52.203** to **52.208** or No. **52.210** is not possible, a ship station may use one of its own assigned national ship-to-shore frequencies for communication with a coast station of another nationality, under the express condition that the coast station as well as the ship station shall take precautions, in accordance with Recommendation ITU-R M.1171-1, to ensure that the use of such a frequency will not cause harmful interference to the service for which the frequency in question is authorized. (WRC-23)

52.216 *C − Bands between 4 000 kHz and 27 500 kHz*

C2 − Call and reply

MOD

52.224 § 99 1) Before transmitting on the carrier frequencies 4 125 kHz, 6 215 kHz, 8 291 kHz, 12 290 kHz or 16 420 kHz a station shall, in accordance with Recommendation ITU-R M.1171-1, listen on the frequency for a reasonable period to make sure that no distress traffic is being sent (see No. **52.221A**). (WRC-23)

52.230 *D − Bands between 156 MHz and 174 MHz*

D1 − Call and reply

MOD

52.234 *b)* by coast stations to announce the transmission on another frequency of traffic lists, in accordance with Recommendation ITU-R M.1171-1, and important maritime information. (WRC-23)

MOD

52.240 8) Before transmitting on the frequency 156.8 MHz, a station shall, in accordance with Recommendation ITU-R M.1171-1, listen on this frequency for a reasonable period to make sure that no distress traffic is being sent. (WRC-23)

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Section VII – Use of frequencies for data transmissions (WRC-12)

52.261 *A – General* (WRC-12)

ADD

52.262A1 *B – Bands between 415 kHz and 526.5 kHz* (WRC-23)

ADD

B1 – Mode of operation of stations (WRC-23)

ADD

52.262A2 The class of emission to be used for data transmissions in the bands between 415 kHz and 526.5 kHz should be in accordance with the most recent version of Recommendation ITU-R M.2010. Coast stations and ship stations should use radio systems specified in the most recent version of Recommendation ITU-R M.2010. (WRC-23)

MOD

52.263 *C – Bands between 4 000 kHz and 27 500 kHz* (WRC-23)

MOD

C1 – Mode of operation of stations (WRC-23)

MOD

52.264 The class of emission to be used for data transmissions in the bands between 4 000 kHz and 27 500 kHz should be in accordance with the most recent versions of Recommendations ITU-R M.1798 or ITU-R M.2058. Coast stations and ship stations should use radio systems specified in the most recent versions of Recommendations ITU-R M.1798 or ITU-R M.2058. (WRC-23)

ADD

52.265A1 Coast stations employing the class of emission in accordance with the most recent version of Recommendation ITU-R M.2058 in the frequency bands between 4 000 kHz and 27 500 kHz shall not exceed a mean power in the following values:

Band	*Maximum mean power*
4 MHz	5 kW
6 MHz	5 kW
8 MHz	10 kW
12 MHz	10 kW
16 MHz	10 kW
18/19 MHz	10 kW
22 MHz	10 kW

(WRC-23)

Agenda item 2

ARTICLE 54

Selective calling

MOD

54.2 2) Selective calling is carried out using a digital selective calling system which shall be in accordance with Recommendation ITU-R M.541-11, and may be in accordance with the most recent version of Recommendation ITU-R M.493. (WRC-23)

Agenda item 1.11

ADD

ARTICLE 54*bis*

Automatic connection system

ADD

***54bis*.1** § 1 1) The automatic connection system (ACS) using digital selective calling in MF and HF bands is designed to ensure reliable access to required radio links for mariners. (WRC-23)

ADD

***54bis*.2** 2) ACS should be in accordance with the most recent versions of Recommendations ITU-R M.541 and ITU-R M.493. (WRC-23)

Agenda item 2

ARTICLE 57

Radiotelephony

MOD

57.1 § 1 The procedure detailed in Recommendation ITU-R M.1171-1 shall be applicable to radiotelephone stations, except in cases of distress, urgency or safety. (WRC-23)

Agenda item 4

ARTICLE 59

Entry into force and provisional application of the Radio Regulations (WRC-12)

MOD

59.1 These Regulations, which complement the provisions of the Constitution and Convention of the International Telecommunication Union, and as revised and contained in the Final Acts of WRC-95, WRC-97, WRC-2000, WRC-03, WRC-07, WRC-12, WRC-15, WRC-19 and WRC-23, shall be applied, pursuant to Article 54 of the Constitution, on the following basis. (WRC-23)

ADD

59.17 The other provisions of these Regulations, as revised by WRC-23, shall enter into force on [1 January 2025], with the following exceptions: (WRC-23)

ADD

59.18 – the revised provisions for which other effective dates of application are stipulated in Resolution:

99 (Rev.WRC-23) […] (WRC-23)

Agenda item 9.2

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[1]

Footnotes to Tables 1 and 2

[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).

MOD

TABLE 1 (Rev.WRC-23)

Characteristics for terrestrial services

Column No.	Item identifier	Description of data items and requirements / Notice related to	Broadcasting (sound and television) stations in the VHF/UHF bands up to 960 MHz, for the application of No. 11.2 and No. 9.21	Broadcasting (sound) stations in the LF/MF bands, for the application of No. 11.2	Transmitting stations (except broadcasting stations in the planned LF/MF bands, in the HF bands governed by Article 12, and in the VHF/UHF bands up to 960 MHz), for the application of No. 11.2 and No. 9.21	Receiving land stations, for the application of No. 11.9 and No. 9.21	Typical transmitting stations, for the application of No. 11.17	Maritime mobile frequency allotment, for the application of plan modification under Appendix 25 (Nos. 25/1.1.1, 25/1.1.2, 25/1.25)	Broadcasting stations in the HF bands, for the application of No. 12.16	Item identifier
7.3.2	**7AA**	the code for the type of modulation The type of modulation denotes the use of DSB, SSB or any new modulation techniques recommended by ITU-R In the case of an LF/MF broadcasting station, required for a digital assignment subject to the GE75 Regional Agreement		+					**X**	**7AA**
7.3.x	**7B3**	the code rate Required for digital assignments subject to the GE75 Regional Agreement		+						**7B3**
9.3.3	**9EC**	the effective height of the antenna, in metres, above the mean level of the ground between 3 and 15 km from the transmitting antenna, at 36 different azimuths in 10° intervals (i.e. 0°, 10°, ..., 350°), measured in the horizontal plane from True North in a clockwise direction In the case of a transmitting station, required for an assignment subject to the GE06 Regional Agreement	**X**		+					**9EC**

Agenda item 9.1

MOD

TABLE 1 (Rev.WRC-23)

Characteristics for terrestrial services

Column No.	Item identifier	Description of data items and requirements / Notice related to	Broadcasting (sound and television) stations in the VHF/UHF bands up to 960 MHz, for the application of No. 11.2 and No. 9.21	Broadcasting (sound) stations in the LF/MF bands, for the application of No. 11.2	Transmitting stations (except broadcasting stations in the planned LF/MF bands, in the HF bands governed by Article 12, and in the VHF/UHF bands up to 960 MHz), for the application of No. 11.2 and No. 9.21	Receiving land stations, for the application of No. 11.9 and No. 9.21	Typical transmitting stations, for the application of No. 11.17	Maritime mobile frequency allotment, for the application of plan modification under Appendix 25 (Nos. 25/1.1.1, 25/1.1.2, 25/1.25)	Broadcasting stations in the HF bands, for the application of No. 12.16	Item identifier
…	**…**	…								
8.3	**8AA**	the power delivered to the antenna, in dBW For stations where the power delivered to the antenna cannot be measured: – the total radiated power (TRP*); or – the calculated TRP (e.i.r.p. minus antenna directivity); or – the calculated power delivered to the antenna (e.i.r.p. minus maximum antenna gain (9G)) * The TRP is to be understood here as the integral of the power transmitted from all antenna elements in different directions over the entire radiation sphere In the case of a transmitting station, required for an assignment: – in the bands below 28 MHz, in all services except the radionavigation service; or – in the bands above 28 MHz shared with space services; or – in the bands above 28 MHz not shared with space services: • in the aeronautical mobile service, meteorological aids service; or • in all other services, if the radiated power is not supplied In the case of a receiving land station, required if the associated transmitting station’s radiated power is not supplied In the case of a typical transmitting station, required if the radiated power is not supplied			+	+	+	**X**		**8AA**
…	**…**	…								

Agenda item 1.10

MOD

TABLE 1 (Rev.WRC-23)

Characteristics for terrestrial services

Column No.	Item identifier	Description of data items and requirements / Notice related to	Broadcasting (sound and television) stations in the VHF/UHF bands up to 960 MHz, for the application of No. 11.2 and No. 9.21	Broadcasting (sound) stations in the LF/MF bands, for the application of No. 11.2	Transmitting stations (except broadcasting stations in the planned LF/MF bands, in the HF bands governed by Article 12, and in the VHF/UHF bands up to 960 MHz), for the application of No. 11.2 and No. 9.21	Receiving land stations, for the application of No. 11.9 and No. 9.21	Typical transmitting stations, for the application of No. 11.17	Maritime mobile frequency allotment, for the application of plan modification under Appendix 25 (Nos. 25/1.1.1, 25/1.1.2, 25/1.25)	Broadcasting stations in the HF bands, for the application of No. 12.16	Item identifier
11		**COORDINATION AND AGREEMENT**								
…	**…**	…								
11.6	**11G**	a commitment from the notifying administration that the aggregate power flux-density (pfd) received from stations in the aeronautical mobile (OR) service at the location of any radio astronomy station operating in this frequency band shall be in compliance with the protection criteria provided in Recommendations ITU-R RA.769-2 and ITU-R RA.1513-2 Required for an assignment in the aeronautical mobile (OR) service in the frequency bands 15.41-15.7 GHz and 22-22.2 GHz			+	+	+			**11G**
11.7	**11G**	a commitment from the notifying administration that the unwanted equivalent isotropically radiated power (e.i.r.p.) of stations operating in the aeronautical mobile (OR) service shall not exceed −23 dBW in any 100 MHz band in the frequency band 22.21-22.5 GHz Required for an assignment in the aeronautical mobile (OR) service in the frequency band 22-22.2 GHz			+	+	+			**11G**
…	…	…								

Agenda item 1.4

MOD

TABLE 2 (REV.WRC-23)

Characteristics for frequency assignments to high-altitude platform stations and high-altitude platform stations as International Mobile Telecommunications base stations in the terrestrial services

Item identifier	*1 - GENERAL CHARACTERISTICS OF THE HAPS/HIBS*	Transmitting station in the frequency bands listed in Nos. 5.14A, 5.14B, MOD 5.388A and 5.14C for the application of No. 11.2	Receiving station in the frequency bands listed in Nos. 5.14A, 5.14B, MOD 5.388A and 5.14C for the application of No. 11.9	Transmitting station in the frequency 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 frequency bands listed in Nos. 5.457, 5.534A, 5.543B, 5.550D and 5.552A for the application of No. 11.9	Item identifier
	GENERAL INFORMATION					
...	...	...	...	...	...	...
	COMPLIANCE WITH TECHNICAL OR OPERATIONAL LIMITS					
1.14.b	a commitment that, for the purpose of protecting mobile earth stations in the territory of other administrations in the frequency bands 2 160-2 200 MHz in Region 2 and 2 170-2 200 MHz in Regions 1 and 3, the pfd of the unwanted emissions per HIBS does not exceed the limit of −165 dB(W/(m^2 · 4 kHz)) at the Earth's surface in the territory of other administrations in the frequency 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, for the purpose of protecting fixed-service systems in Armenia, Azerbaijan, Belarus, the Russian Federation, Kazakhstan, Mongolia, Uzbekistan, Kyrgyzstan, Tajikistan and Turkmenistan, the pfd of the unwanted emissions per HIBS at the Earth's surface of the countries listed above in this item 1.14cin the frequency band 2 025-2 110 MHz does not exceed the out-of-band pfd limits of −165 dB(W/(m^2 · MHz)) for angles of arrival (θ) less than or equal to 5° above the horizontal plane, −165 + 1.75 (θ − 5) dB(W/(m^2 · MHz)) for angles of arrival between 5° and 25° (included) and −130 dB(W/(m^2 · MHz)) for angles of arrival between 25° and 90° (included) (see Resolution **221 (Rev.WRC-23)**)	**X**				1.14.c

Item identifier	*1 – GENERAL CHARACTERISTICS OF THE HAPS/HIBS*	Transmitting station in the frequency bands listed in Nos. 5.14A, 5.14B, MOD 5.388A and 5.14C for the application of No. 11.2	Receiving station in the frequency bands listed in Nos. 5.14A, 5.14B, MOD 5.388A and 5.14C for the application of No. 11.9	Transmitting station in the frequency 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 frequency bands listed in Nos. 5.457, 5.534A, 5.543B, 5.550D and 5.552A for the application of No. 11.9	Item identifier
1.14.ca	a commitment that, for the purpose of protecting aeronautical radionavigation service systems in the territory of other administrations in the frequency band 2 700-2 900 MHz, the pfd level per HIBS operating in the frequency band 2 500-2 690 MHz produced at the surface of the Earth in the territory of other administrations shall not exceed the following unwanted emissions limit of −156.2 dB(W/(m^2 · MHz)) for angles of arrival (θ) less than or equal to 7° above the horizontal plane, −163 + 15 · log10 (θ − 4) dB(W/(m^2 · MHz)) for angles of arrival between 7° and 30.5°, −141 + 2.7 · log10 (θ − 4) dB(W/(m^2 · MHz)) for angles of arrival (θ) equal to 30.5°, −157 + 14 · log10 (θ − 4) dB(W/(m^2 · MHz)) for angles of arrival between 30.5° and 40.5° (included) and −101.5 dB(W/(m^2 · MHz)) for angles of arrival more than 40.5° (see Resolution **COM4/4 (WRC-23)**)	**X**				1.14.ca
1.14.cb	a commitment that, for the purpose of protecting radiolocation service systems in the territory of other administrations, in particular those systems operating in accordance with No. **5.423** in the frequency band 2 700-2 900 MHz, the pfd level per HIBS operating in the frequency band 2 500-2 690 MHz produced at the surface of the Earth in the territory of other administrations shall not exceed the following unwanted emissions limit of −165.6 dB(W/(m^2 · MHz)) for angles of arrival (θ) less than or equal to 37° above the horizontal plane, −165.6 + 5.5 (θ − 37) dB(W/(m^2 · MHz)) for angles of arrival between 37° and 45° and −121.6 + (θ − 45) /3 dB(W/(m^2 · MHz)) for angles of arrival (θ) between 45° and 90° (included) (see Resolution **COM4/4 (WRC-23)**)	**X**				1.14.cb
1.14.cc	a commitment that, for the purpose of protecting radio astronomy service stations in the frequency band 2 690-2 700 MHz, the pfd level of HIBS operating in the frequency band 2 500-2 690 MHz produced at any radio astronomy observatory site shall not exceed the following unwanted emissions limit of −177 dBm/MHz (see Resolution **COM4/4 (WRC-23)**)	**X**				1.14.cc

Item identifier	*1 – GENERAL CHARACTERISTICS OF THE HAPS/HIBS*	**Transmitting station in the frequency bands listed in Nos. 5.14A, 5.14B, MOD 5.388A and 5.14C for the application of No. 11.2**	**Receiving station in the frequency bands listed in Nos. 5.14A, 5.14B, MOD 5.388A and 5.14C for the application of No. 11.9**	**Transmitting station in the frequency 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 frequency bands listed in Nos. 5.457, 5.534A, 5.543B, 5.550D and 5.552A for the application of No. 11.9**	**Item identifier**
1.14.cd	a commitment that, for the purpose of protecting MSS (space-to-Earth) and RDSS (space-to-Earth) in the frequency band 2 483.5-2 500 MHz, the use of HIBS in the frequency band 2 500-2 690 MHz shall comply with an unwanted emission limit of −30 dBm/MHz in the frequency band 2 483.5-2 500 MHz (see Resolution **COM4/4 (WRC-23)**)	**X**				1.14.cd
1.14.ce	a commitment that, for the purpose of protecting MSS (Earth-to-space) in the frequency band 2 655-2 690 MHz in Region 3, the notifying administrations of HIBS shall ensure that, in case of causing unacceptable interference, it undertakes to immediately cease emission or reduce the interference to an acceptable level (see Resolution **COM4/4 (WRC-23)**)	**X**				1.14.ce
1.14.cf	a firm, objective, actionable, measurable, and enforceable commitment that, HIBS shall immediately eliminate unacceptable interference to existing primary services or reduce it to an acceptable level should such interference occur	**X**				1.14.cf
...	...	**...**	**...**	...	...	...

Item identifier	*2 – CHARACTERISTICS TO BE PROVIDED FOR EACH INDIVIDUAL OR COMPOSITE HAPS ANTENNA BEAM*	**Transmitting station in the frequency bands listed in Nos. 5.14A, 5.14B, MOD 5.388A and 5.14C for the application of No. 11.2**	**Receiving station in the frequency bands listed in Nos. 5.14A, 5.14B, MOD 5.388A and 5.14C for the application of No. 11.9**	**Transmitting station in the frequency 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 frequency bands listed in Nos. 5.457, 5.534A, 5.543B, 5.550D and 5.552A for the application of No. 11.9**	**Item identifier**

	IDENTIFICATION AND DIRECTION OF THE HAPS ANTENNA BEAM					
...	...	**...**	**...**	**...**	**...**	...
	ANTENNA CHARACTERISTICS					
2.9.e	the height of the antenna above ground level, in metres, in the case of a HAPS transmitting ground station Required for an assignment in the frequency bands shared with space services (space-to-Earth)				+	2.9.e
2.9.f	antenna diameter, in metres, in the case of a HAPS transmitting ground station Required in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz				+	2.9.f
...	...	...	...	...	...	...

Item identifier	***3 - CHARACTERISTICS TO BE PROVIDED FOR EACH FREQUENCY ASSIGNMENT FOR EACH INDIVIDUAL OR COMPOSITE HAPS ANTENNA BEAM***	**Transmitting station in the frequency bands listed in Nos. 5.14A, 5.14B, MOD 5.388A and 5.14C for the application of No. 11.2**	**Receiving station in the frequency bands listed in Nos. 5.14A, 5.14B, MOD 5.388A and 5.14C for the application of No. 11.9**	**Transmitting station in the frequency 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 frequency bands listed in Nos. 5.457, 5.534A, 5.543B, 5.550DB and 5.552A for the application of No. 11.9**	**Item identifier**
	ASSIGNED FREQUENCY					
...	...	**...**	**...**	**...**	**...**	...
	LOCATION OF THE ASSOCIATED ANTENNA(S)					
3.5.c	the geographical coordinates of the ground station(s) in the fixed service Required in the frequency bands 6 560-6 640 MHz and 25.25-27 GHz, 31-31.3 GHz, and 38-39.5 GHz; Required in the other frequency bands, if neither the geographical coordinates of a given zone (3.c.a) nor a geographical area (3.5.d) nor a circular area (3.5.e and 3.5.f) are provided			+	+	3.5.c
	For an area in which associated transmitting/receiving ground station(s) operate:					
3.5.c.a	the geographical coordinates of a given zone A minimum of six geographical coordinates are required, in degrees, minutes and seconds *Note* – For the fixed service in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz the geographical coordinates are provided for each of the UAC, SAC and if applicable RAC (see the most recent version of Recommendation ITU-R F.1500) Required if neither a circular area (3.5.e and 3.5.f) nor a geographical area (3.5.d) are provided	+	+	+	+	3.5.c.a
3.5.d	the code of the geographical area (see the Preface)	+	+	+	+	3.5.d

Item identifier	*3 - CHARACTERISTICS TO BE PROVIDED FOR EACH FREQUENCY ASSIGNMENT FOR EACH INDIVIDUAL OR COMPOSITE HAPS ANTENNA BEAM*	**Transmitting station in the frequency bands listed in Nos. 5.14A, 5.14B, MOD 5.388A and 5.14C for the application of No. 11.2**	**Receiving station in the frequency bands listed in Nos. 5.14A, 5.14B, MOD 5.388A and 5.14C for the application of No. 11.9**	**Transmitting station in the frequency 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 frequency bands listed in Nos. 5.457, 5.534A, 5.543B, 5.550DB and 5.552A for the application of No. 11.9**	**Item identifier**
	Note – For the fixed service in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz separate geographical areas are provided for each of the UAC, SAC and if applicable RAC (see the most recent version of Recommendation ITU-R F.1500) Required if neither a circular area (3.5.e and 3.5.f) nor the geographical coordinates of a given zone (3.5.c.a) are provided					
3.5.e	the geographical coordinates of the centre of the circular area in which the associated ground station(s) are operating The latitude and longitude are provided in degrees, minutes and seconds *Note* – For the fixed service in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz different centres of the circular area may be provided for the UAC, SAC and if applicable RAC (see the most recent version of Recommendation ITU-R F.1500) Required if neither a geographical area (3.5.d) or geographical coordinates of a given zone (3.5.c.a) are provided	+	+	+	+	3.5.e
3.5.f	the radius, in km, of the circular area *Note* – For the fixed service in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz, a separate radius is provided for each of the UAC, SAC and if applicable RAC (see the most recent version of Recommendation ITU-R F.1500) Required if neither a geographical area (3.5.d) nor geographical coordinates of a given zone (3.5.c.a) are provided	+	+	+	+	3.5.f
...	...	...	...	...	...	...
	POWER CHARACTERISTICS OF THE TRANSMISSION					
3.8	the symbol (X, Y or Z, as appropriate) describing the type of power (see Article **1**) corresponding to the class of emission	**X**	**X**	**X**	**X**	3.8.
3.8b	the radiated power, in dBW, in one of the forms described in Nos. **1.161** to **1.163** *Note* – For a receiving HAPS, the radiated power refers to the associated transmitting mobile station(s)		**X**			3.8b
3.8.aa	the power delivered to the antenna, in dBW, excluding the level of power control in 3.8.BA under clear-sky conditions	**X**		**X**	**X**	3.8.aa

Item identifier	*3 - CHARACTERISTICS TO BE PROVIDED FOR EACH FREQUENCY ASSIGNMENT FOR EACH INDIVIDUAL OR COMPOSITE HAPS ANTENNA BEAM*	**Transmitting station in the frequency bands listed in Nos. 5.14A, 5.14B, MOD 5.388A and 5.14C for the application of No. 11.2**	**Receiving station in the frequency bands listed in Nos. 5.14A, 5.14B, MOD 5.388A and 5.14C for the application of No. 11.9**	**Transmitting station in the frequency 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 frequency bands listed in Nos. 5.457, 5.534A, 5.543B, 5.550DB and 5.552A for the application of No. 11.9**	**Item identifier**
	Note – For a receiving HAPS, the power delivered to the antenna refers to the associated transmitting ground station(s)					
3.8.AB	the power density[1] averaged over the worst 1 MHz band delivered to the antenna under clear-sky conditions	**X**		**X**		3.8AB
3.8.BA	the range of power control, in dB *Note* – For a receiving HAPS, the power control refers to its use by the associated transmitting ground station(s) In the case of a transmitting HAPS, required in the frequency bands, 21.4-22 GHz, 24.25-25.25 GHz, 27-27.5 GHz, 31-31.3 GHz, 38-39.5 GHz, 47.2-47.5 GHz and 47.9-48.2 GHz In the case of a receiving HAPS, required in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz	**X**		**+**	**+**	3.8.BA
	POLARIZATION AND RECEIVING SYSTEM NOISE TEMPERATURE					
3.9.d	the code indicating the type of polarization (see the Preface)	**X**	**X**	**X**	**X**	3.9.d
3.9.j	the reference radiation pattern of the associated ground station(s) Required in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz			**+**	**+**	3.9.j
3.9.k	the lowest total receiving system noise temperature, in kelvins, referred to the output of the receiving antenna		**X**		**X**	3.9.k
	HOURS OF OPERATION					
3.10.b	the regular hours of operation (in hours and minutes from … to …) of the frequency assignment, in UTC	**X**	**X**	**X**	**X**	3.10.b

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MOD

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 HAPS station in the frequency bands listed in No. 5.388A for the application of No. 11.2	Receiving HAPS station in the frequency bands listed in No. 5.388A for the application of No. 11.9	Transmitting HAPS station in the frequency 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 HAPS station in the frequency bands listed in Nos. 5.457, 5.534A, 5.543B, 5.550D and 5.552A for the [illegible]	Item identifier
...	...					
	COMPLIANCE WITH TECHNICAL OR OPERATIONAL LIMITS					
…	…					
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

Item identifier	*1 - GENERAL CHARACTERISTICS OF THE HAPS*	Transmitting HAPS station in the frequency bands listed in No. 5.388A for the application of No. 11.2	Receiving HAPS station in the frequency bands listed in No. 5.388A for the application of No. 11.9	Transmitting HAPS station in the frequency 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 HAPS station in the frequency bands listed in Nos. 5.457, 5.534A, 5.543B, 5.550D and 5.552A for the [illegible]	Item identifier
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

Item identifier	*1 - GENERAL CHARACTERISTICS OF THE HAPS*	**Transmitting HAPS station in the frequency bands listed in No. 5.388A for the application of No. 11.2**	**Receiving HAPS station in the frequency bands listed in No. 5.388A for the application of No. 11.9**	**Transmitting HAPS station in the frequency 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 HAPS station in the frequency bands listed in Nos. 5.457, 5.534A, 5.543B, 5.550D and 5.552A for the**	**Item identifier**
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
...	**...**					

ANNEX 2

Characteristics of satellite networks, earth stations or radio astronomy stations[2] (Rev.WRC-12)

Footnotes to Tables A, B, C and D

[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)

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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 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) or for Appendix 30B ESIM in accordance with Resolution COM5/2 (WRC-23)	Items in Appendix	Radio astronomy
A.1	**IDENTITY OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIOASTRONOMY STATION**									**A.1**	
A.1.a	the identity of the satellite network or system	**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 only for modification, suppression or notification of Plan assignments In the case of Appendix **30B**, required only for a network derived from the Allotment Plan						+	+	+	A.1.b	
A.1.c	if different from A.1.a, the identity of the satellite network or system containing the service link frequency assignments Required only for frequency assignments to space stations in bands where the use of the allocation is limited to feeder links		+	+	+					A.1.c	
A.1.e	**Identity of the earth station or radio astronomy station:**									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.2*bis*	the country or geographical area in which the station is located, using the symbols from the Preface					**X**				A.1.e.2*bis*	**X**
A.1.e.3	**For a specific earth station or radio astronomy station:**									A.1.e.3	
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**	A.1.f.1	**X**
A.1.f.2	if the notice is submitted by the notifying administration in association with other administrations, the symbols of each of the administrations (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	indicator showing that the non-GSO satellite system is planned to be operated in accordance with Resolution **32 (Rev.WRC-23)** Required for advance publication and notification		**X**		+					A.1.g	
A.1.g.1	**Not used**									A.1.g.1	
A.1.g.2	**Not used**									A.1.g.2	

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 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) or for Appendix 30B ESIM in accordance with Resolution COM5/2 (WRC-23)	Items in Appendix	Radio astronomy
A.2	**DATE OF BRINGING INTO USE**									**A.2**	
A.2.a	the date (actual or foreseen, as appropriate) of bringing the frequency assignment (new or modified) into use For a frequency assignment to a GSO space station, including frequency assignments in Appendices **30**, **30A** and **30B**, and for a frequency assignment to an Appendix **30B** ESIM, the date of bringing into use is as defined in Nos. **11.44B** and **11.44.2** For a frequency assignment to a non-GSO space station, the date of bringing into use is as defined in Nos. **11.44C**, **11.44D**, **11.44E** and **11.44.2**, as applicable For a frequency assignment to a non-GSO satellite system with a short-duration mission, the date of bringing into use is as defined in Resolution **32 (Rev.WRC-23)** Whenever the assignment is changed in any of its basic characteristics (except for a change under A.1.a), the date to be given shall be that of the latest change (actual or foreseen, as appropriate) Required only for notification and, in the case of Appendices **30** and **30A**, also for simultaneous submissions for modifications to the Region 2 Plan or entry into the Regions 1 and 3 List under Article 4 and notification under Article 5, and, in the case of Appendix **30B**, also for simultaneous submissions for entry into the List under § 6.17 and notification under § 8.1 and, in the case of an Appendix **30B** ESIM, also for simultaneous submissions for entry in the Appendix **30B** ESIM List and notification under Section A and Section B, respectively, of Part 1 of Annex 1 to Resolution **COM5/2 (WRC-23)**			+	+	+	+	+	+	A.2.a	
A.2.b	for a space station, the period of validity of the frequency assignments (see Resolution **4 (Rev.WRC-03)** and Resolution **32 (Rev.WRC-23)**, as appropriate)		**X**	**X**	**X**					A.2.b	
A.2.c	the date (actual or foreseen, as appropriate) on which reception of the frequency band begins or on which any of the basic characteristics are modified									A.2.c	**X**
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		**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 system or station (see Article **15**)		**X**	**X**	**X**	**X**	**X**	**X**	**X**	A.3.b	**X**
A.4	**ORBITAL INFORMATION**									**A.4**	
A.4.a	**For a space station onboard a geostationary-satellite:**									A.4.a	
A.4.a.1	the nominal geographical longitude on the geostationary-satellite orbit (GSO)	**X**		**X**			**X**	**X**	**X**	A.4.a.1	
A.4.a.2	**Orbital tolerances**									A.4.a.2	
A.4.a.2.a	the planned longitudinal tolerance easterly limit			**X**			**X**	**X**	**X**	A.4.a.2.a	
A.4.a.2.b	the planned longitudinal tolerance westerly limit			**X**			**X**	**X**	**X**	A.4.a.2.b	
A.4.a.2.c	the planned inclination excursion			**X**					**X**	A.4.a.2.c	
A.4.a.4	**Not used**									A.4.a.4	
A.4.a.4.a	**Not used**									A.4.a.4.a	
A.4.a.4.b	**Not used**									A.4.a.4.b	

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 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) or for Appendix 30B ESIM in accordance with Resolution COM5/2 (WRC-23)	Items in Appendix	Radio astronomy
A.4.b	**For space station(s) onboard non-geostationary satellite(s):**									A.4.b	
A.4.b.1	the reference body code		**X**		**X**					A.4.b.1	
A.4.b.2	the number of orbital planes		**X**		**X**					A.4.b.2	
A.4.b.3	**For space station(s), where the Earth is the reference body:**									A.4.b.3	
A.4.b.3.a	indicator of whether the non-geostationary-satellite system represents a “constellation”, where the term “constellation” describes a satellite system, for which the relative distribution of the orbital planes and satellites is defined *Note* – Non-geostationary-satellite systems in frequency bands subject to the provisions of No. **9.12** or **9.12A** are considered as “constellations” only when they include more than one satellite. However, if subject to No. **22.5C**, **22.5D**, **22.5F** or **22.5L**, they are always considered as “constellations”		**X**		**X**					A.4.b.3.a	
A.4.b.3.b	indicator of whether all the orbital planes identified under A.4.b.2 describe a) a single configuration where all frequency assignments to the satellite system will be in use or b) multiple configurations that are mutually exclusive where a sub-set of the frequency assignments to the satellite system will be in use on one of the sub-sets of orbital parameters to be determined at the notification and recording stage of the satellite system Required only for the: 1) advance publication information for a non-geostationary-satellite system representing a constellation (A.4.b.3.a), and 2) coordination request for non-geostationary-satellite systems		**+**		**+**					A.4.b.3.b	
A.4.b.3.c	if the orbital planes identified under A.4.b.2 describe multiple mutually exclusive configurations, identification of the number of sub-sets of orbital characteristics that are mutually exclusive Required only for the: 1) advance publication information for a non-geostationary-satellite system representing a constellation (A.4.b.3.a), and 2) coordination request for non-geostationary-satellite systems		**+**		**+**					A.4.b.3.c	
A.4.b.3.d	if the orbital planes identified under A.4.b.3.b describe multiple mutually exclusive configurations, identification of the orbital planes’ id numbers that are associated with each of the mutually exclusive configurations Required only for the: 1) advance publication information for a non-geostationary-satellite system representing a constellation (A.4.b.3.a), and 2) coordination request for non-geostationary-satellite systems		**+**		**+**					A.4.b.3.d	
A.4.b.3.e	**For space stations of a non-geostationary fixed-satellite service system operating in the frequency band 3 400-4 200 MHz:**									A.4.b.3.e	
A.4.b.3.e.1	the maximum number of space stations (N_N) in a non-geostationary-satellite system simultaneously transmitting on a co-frequency basis in the fixed-satellite service in the Northern Hemisphere		**X**		**X**					A.4.b.3.e.1	
A.4.b.3.e.2	the maximum number of space stations (N_S) in a non-geostationary-satellite system simultaneously transmitting on a co-frequency basis in the fixed-satellite service in the Southern Hemisphere		**X**		**X**					A.4.b.3.e.2	
A.4.b.4	**For each orbital plane, where the Earth is the reference body:**									A.4.b.4	
A.4.b.4.a	the angle of inclination (i_j) of the orbital plane with respect to the Earth’s equatorial plane ($0° \leq i_j < 180°$)		**X**		**X**					A.4.b.4.a	

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 not subject to coordination under Section III 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) or for Appendix 30B ESIM in accordance with Resolution COM5/2 (WRC-23)	Items in Appendix	Radio astronomy
A.4.b.4.b	the number of satellites in the orbital plane		**X**		**X**					A.4.b.4.b	
A.4.b.4.c	the period		**X**		**X**					A.4.b.4.c	
A.4.b.4.d	the altitude, in kilometres, of the apogee of the space station		**X**		**X**					A.4.b.4.d	
A.4.b.4.e	the altitude, in kilometres, of the perigee of the space station		**X**		**X**					A.4.b.4.e	
A.4.b.4.f	the minimum altitude of the space station above the surface of the Earth at which any satellite transmits		**X**		**X**					A.4.b.4.f	
A.4.b.4.g	**Not used**									A.4.b.4.g	
A.4.b.4.h	the initial phase angle (ω_i) of the *i*-th satellite in its orbital plane at reference time $t = 0$, measured from the point of the ascending node ($0° \leq \omega_i < 360°$) Required only in the case of a non-geostationary-satellite system representing a "constellation" (A.4.b.3.a), and to be specified in: 1) the advance publication information, for any frequency assignment not subject to the provisions of Section II of Article **9** 2) the coordination request, for any frequency assignment subject to the provisions of Nos. **9.12**, **9.12A**, **22.5C**, **22.5D**, **22.5F** or **22.5L** 3) the notification, in all cases *Note* – The initial phase angle is the argument of perigee plus the true anomaly		+		+					A.4.b.4.h	
A.4.b.4.i	the argument of perigee (ω_p), measured in the orbital plane, in the direction of motion, from the ascending node to the perigee ($0° \leq \omega_p < 360°$) Required only when the altitudes of apogee and perigee (A.4.b.4.d and A.4.b.4.e) are different, and to be specified in: 1) the advanced publication information, for any frequency assignment not subject to the provisions of Section II of Article **9** 2) the coordination request, for any frequency assignment subject to the provisions of Nos. **9.12**, **9.12A**, **22.5C**, **22.5D**, **22.5F** or **22.5L** 3) the notification, in all cases		+		+					A.4.b.4.i	
A.4.b.4.j	the longitude of the ascending node (θ_j) for the *j*-th orbital plane, measured counter-clockwise in the equatorial plane from the Greenwich meridian to the point where the satellite orbit makes its South-to-North crossing of the equatorial plane ($0° \leq \theta_j < 360°$) at the reference time $t = 0$ Required only for orbits of a "constellation" (A.4.b.3.a), and to be specified in: 1) the advance publication information, for any frequency assignment not subject to the provisions of Section II of Article **9** 2) the coordination request, for any frequency assignment subject to the provisions of Nos. **9.12**, **9.12A**, **22.5C**, **22.5D**, **22.5F** or **22.5L** 3) the notification, in all cases		+		+					A.4.b.4.j	

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 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) or for Appendix 30B ESIM in accordance with Resolution COM5/2 (WRC-23)	Items in Appendix	Radio astronomy
A.4.b.4.k	Not used									A.4.b.4.k	
A.4.b.4.l	Not used									A.4.b.4.l	
A.4.b.4.m	indicator of whether the space station uses sun-synchronous orbit or not Required only in frequency bands not subject to the provisions of Nos **9.12** or **9.12A**		+		+					A.4.b.4.m	
A.4.b.4.n	if the space station uses sun-synchronous orbit (A.4.b.4.m), indicator of whether the space station references the local time of the ascending node (solar local time when the space station is crossing the equatorial plane in the South-North direction in hours:minutes format) or the descending node (solar local time when the space station is crossing the equatorial plane in the North-South direction in hours:minutes format)		**O**		**O**					A.4.b.4.n	
A.4.b.4.o	if the space station uses sun-synchronous orbit (A.4.b.4.m), the local time of the ascending (or descending, per A.4.b.4.n) node (solar local time when the space station is crossing the equatorial plane in the South-North (or North-South) direction in hours:minutes format)		**O**		**O**					A.4.b.4.o	
A.4.b.4.p	an indicator (Y/N) of whether the space station uses station-keeping to maintain the altitudes of the apogee and perigee during its operational lifetime				**X**					A.4.b.4.p	
A.4.b.4.q	for non-GSO satellite networks for which the indicator provided under A.4.b.4.p above is “N”, the altitude of the apogee and perigee (km) as a function of the time (days) beginning from the date of bringing into use for all orbital planes with different orbital characteristics				**O**					A.4.b.4.q	
A.4.b.4.r	the distance to the apogee of the space station (distance, in kilometres, between the apogee of the space station and the centre of the Earth) Required only for FSS, BSS or MSS systems subject to Resolution **COM5/4 (WRC-23)**				+					A.4.b.4.r	
A.4.b.4.s	the distance to the perigee of the space station (distance, in kilometres, between the perigee of the space station and the centre of the Earth) Required only for FSS, BSS or MSS systems subject to Resolution **COM5/4 (WRC-23)**				+					A.4.b.4.s	
A.4.b.5	**Not used**									A.4.b.5	
A.4.b.6	**For space stations operating in a frequency band subject to Nos. 22.5C, 22.5D, 22.5F or 22.5L, additional data elements to characterize properly the orbital operation of the non-geostationary-satellite system:**									A.4.b.6	
A.4.b.6 *bis*	an indicator showing whether the set of operating parameters is provided in A.14.d (extended set of operating parameters) or provided in A.4.b.6.a and A.4.b.7 (limited set of operating parameters)				**X**					A.4.b.6*bis*	
A.4.b.6.a	**For each range of latitudes:** the limited set of operating parameters									A.4.b.6.a	
A.4.b.6.a.1	the maximum number of non-geostationary satellites transmitting with overlapping frequencies to a given location				+					A.4.b.6.a.1	
A.4.b.6.a.2	the associated start of the latitude range				+					A.4.b.6.a.2	
A.4.b.6.a.3	the associated end of the latitude range				+					A.4.b.6.a.3	
A.4.b.6.b	**Not used**									A.4.b.6.b	
A.4.b.6.c	an indicator showing whether the space station uses station-keeping to maintain a repeating ground track				**X**					A.4.b.6.c	
A.4.b.6.d	if the space station uses station-keeping to maintain a repeating ground track, the time in seconds that it takes for the constellation to return to its starting position, i.e. such that all satellites are in the same location with respect to the Earth and each other				+					A.4.b.6.d	

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 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) or for Appendix 30B ESIM in accordance with Resolution COM5/2 (WRC-23)	Items in Appendix	Radio astronomy
A.4.b.6.e	an indicator showing whether the space station should be modelled with a specific precession rate of the ascending node of the orbit instead of the J_2 term				**X**					A.4.b.6.e	
A.4.b.6.f	if the space station is to be modelled with a specific precession rate of the ascending node of the orbit instead of the J_2 term, the precession rate in degrees/day, measured counter-clockwise in the equatorial plane				+					A.4.b.6.f	
A.4.b.6.g	**Not used**									A.4.b.6.g	
A.4.b.6.h	**Not used**									A.4.b.6.h	
A.4.b.6.i	**Not used**									A.4.b.6.i	
A.4.b.6.j	the longitudinal tolerance of the longitude of the ascending node				**X**					A.4.b.6.j	
A.4.b.7	**For space stations operating in a frequency band subject to Nos. 22.5C, 22.5D, 22.5F or 22.5L, the data elements to characterize properly the performance of the non-geostationary-satellite system: to be provided, if A.4.b.6*bis* indicates the limited set of operating parameters**									A.4.b.7	
A.4.b.7.a	the maximum number of non-geostationary satellites receiving simultaneously with overlapping frequencies from the associated earth stations within a given cell				+					A.4.b.7.a	
A.4.b.7.b	the average number of associated earth stations with overlapping frequencies per square kilometre within a cell				+					A.4.b.7.b	
A.4.b.7.c	the average distance, in kilometres, between co-frequency cells				+					A.4.b.7.c	
A.4.b.7.c*bis*	the minimum elevation angle at which any associated earth station can transmit to or receive from a non-geostationary satellite				+					A.4.b.7.c*bis*	
A.4.b.7.d	**For the exclusion zone about the geostationary-satellite orbit:**									A.4.b.7.d	
A.4.b.7.d.1	the type of zone (based on topocentric angle or satellite-based angle for establishing the exclusion zone)				+					A.4.b.7.d.1	
A.4.b.7.d.2	if the zone is based on a topocentric angle or a satellite-based angle, the width of the zone, in degrees				+					A.4.b.7.d.2	
A.4.b.7.d.3	**Not used**									A.4.b.7.d.3	
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**				A.4.c.1	
A.4.c.2	if communication is to be established with a geostationary space station, its orbital position					+				A.4.c.2	
A.5	**COORDINATIONS**									**A.5**	
A.5.a.1	the symbol of any administration (see the Preface) with which coordination has been successfully effected Required only for notification			+	+	+[1]				A.5.a.1	
A.5.a.1.a	the name of satellite network or system with which coordination has been successfully effected for all notified assignments			**O**						A.5.a.1.a	
A.5.a.2	the symbol of any intergovernmental organization (see the Preface) with which coordination has been successfully effected Required only for notification			+	+	+[1]				A.5.a.2	
A.5.a.2.a	the name of satellite network or system with which coordination has been successfully effected for all notified assignments			**O**						A.5.a.2.a	

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A.5.b.1	the symbol of any administration (see the Preface) with which coordination has been sought but not completed			**O**	**O**	**O**				A.5.b.1	
A.5.b.2	the symbol of any intergovernmental organization (see the Preface) with which coordination has been sought but not completed			**O**	**O**					A.5.b.2	
A.5.c	if either A.5.a.1 (and A.5.a.2) or A.5.b.1 (and A.5.b.2) has been supplied, the related provision code (see the Preface) under which coordination has been sought or completed			+	+	+ [1]				A.5.c	
A.6	**AGREEMENTS**									**A.6**	
A.6.a	if appropriate, the symbol of any administration or administration representing a group of administrations (see the Preface) with which agreement has been reached, including where the agreement is to exceed the limits prescribed in these Regulations			+	+	+ [1]	+	+	+	A.6.a	
A.6.a.1	the name of satellite network or system with which agreement has been reached for all notified assignments			**O**						A.6.a.1	
A.6.b	if appropriate, the symbol of any intergovernmental organization (see the Preface) with which agreement has been reached, including where the agreement is to exceed the limits prescribed in these Regulations			+	+	+ [1]	+	+	+	A.6.b	
A.6.b.1	the name of satellite network or system with which agreement has been reached for all notified assignments			**O**						A.6.b.1	
A.6.c	if agreement has been reached, the related provision code (see the Preface)			+	+	+ [1]	+	+	+	A.6.c	
A.7	**SPECIFIC EARTH STATION OR RADIO ASTRONOMY STATION SITE CHARACTERISTICS**									**A.7**	
A.7.a	horizon elevation angle and distance									A.7.a	
A.7.a.1	the horizon elevation angle, in degrees, for each azimuth around the earth station					+ [1]				A.7.a.1	
A.7.a.2	the distance, in kilometres, from the earth station to the horizon for each azimuth around the earth station					**O**				A.7.a.2	
A.7.b	minimum/maximum antenna main beam elevation									A.7.b	
A.7.b.1	the planned minimum angle of elevation of the antenna's main beam axis, in degrees, from the horizontal plane For determining the minimum elevation angle of an earth station, due regard should be given to possible inclined-orbit operation of the associated geostationary space station Required only for earth stations operating with geostationary satellite					+ [1]				A.7.b.1	**X**
A.7.b.2	the planned maximum angle of elevation of the antenna's main beam axis, in degrees, from the horizontal plane Required only for earth stations operating with geostationary satellite									A.7.b.2	**X**
A.7.c	operating azimuths of antenna main beam									A.7.c	

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A.7.c.1	the start azimuth for the planned range of operating azimuthal angles for the antenna's main beam axis, in degrees, clockwise from True North For determining the start azimuth of an earth station, due regard should be given to possible inclined-orbit operation of the associated geostationary space station Required only for earth stations operating with geostationary satellite					+ [1]				A.7.c.1	**X**
A.7.c.2	the end azimuth for the planned range of operating azimuthal angles for the antenna's main beam axis, in degrees, clockwise from True North For determining the end azimuth of an earth station, due regard should be given to possible inclined-orbit operation of the associated geostationary space station Required only for earth stations operating with geostationary satellite					+ [1]				A.7.c.2	**X**
A.7.d	the altitude, in metres, of the antenna above mean sea level					+ [1]				A.7.d	
A.7.e	the minimum angle of elevation of the antenna's main beam axis, in degrees, from the horizontal plane for each azimuth around the earth station Required only for earth stations operating with non-geostationary space stations					+				A.7.e	
A.7.f	the antenna diameter, in metres Required only for fixed-satellite service earth stations operating in the frequency bands 13.75-14 GHz, 14.5-14.75 GHz (in countries listed in Resolution **163 (WRC-15)** not for feeder links for the broadcasting-satellite service), 14.5-14.8 GHz (in countries listed in Resolution **164 (WRC-15)** not for feeder links for the broadcasting-satellite service), 24.65-25.25 GHz (Region 1) and 24.65-24.75 GHz (Region 3)					+ [1]				A.7.f	
A.8	**Not used**									**A.8**	
A.9	**Not used**									**A.9**	
A.10	**EARTH STATION COORDINATION AREA DIAGRAMS**									**A.10**	
A.10.a	the diagrams shall be drawn to an appropriate scale, indicating, for both transmission and reception, the location of the earth station and its associated coordination areas, or the coordination area related to the service area in which it is intended to operate the mobile earth station Required only for notification					+				A.10.a	
A.11	**REGULAR HOURS OF OPERATION**									**A.11**	
A.11.a	the start time UTC						**X**	**X**		A.11.a	
A.11.b	the stop time UTC						**X**	**X**		A.11.b	
A.12	**RANGE OF AUTOMATIC GAIN CONTROL, in dB**							**X**		**A.12**	
A.13	**REFERENCES TO THE PUBLISHED SPECIAL SECTIONS OF THE BUREAU'S INTERNATIONAL FREQUENCY INFORMATION CIRCULAR (see the Preface)**									**A.13**	
A.13.a	the reference and number of the advance publication information in accordance with No. 9.**1**			**X**	**X**					A.13.a	
A.13.b	the reference and number of the coordination request in accordance with No. **9.6** For the notification of an earth station, the reference to the Special Section of the associated satellite network or system has to be provided For the notification of an earth station coordinated under No. **9.7A**, the coordination Special Section number of this earth station has to be provided			**X**	**X**	**X**				A.13.b	

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A.13.c	the reference and number of the information in accordance with Article 4 of Appendix **30**						**X**			A.13.c	
A.13.d	the reference and number of the information in accordance with Article 4 of Appendix **30A**							**X**		A.13.d	
A.13.e	the reference and number of the information in accordance with Article 6 of Appendix **30B** or, in the case of an Appendix **30B** ESIM, the reference and number of the information in accordance with Resolution **COM5/2 (WRC-23)** and the reference to the supporting Appendix **30B** assignment(s)					**X**			**X**	A.13.e	
A.14	**FOR STATIONS OPERATING IN A FREQUENCY BAND SUBJECT TO Nos. 22.5C, 22.5D, 22.5F OR 22.5L: SPECTRUM MASKS**									**A.14**	
A.14.a	**For each e.i.r.p. mask used by the non-geostationary space station:**									A.14.a	
A.14.a.1	the mask identification code				**X**					A.14.a.1	
A.14.a.2	the lowest frequency for which the mask is valid				**X**					A.14.a.2	
A.14.a.3	the highest frequency for which the mask is valid				**X**					A.14.a.3	
A.14.a.4	the mask pattern defined in terms of the power in the reference bandwidth for a series of angles measured at the non-geostationary space station between the line to the sub-satellite point and the line to a point on the geostationary arc, together with the bandwidth used				**X**					A.14.a.4	
A.14.a.5	the reference bandwidth used for the mask pattern of A.14.a.4				**X**					A.14.a.5	
A.14.b	**For each associated earth station e.i.r.p. mask:**									A.14.b	
A.14.b.1	the mask identification code				**X**					A.14.b.1	
A.14.b.2	the lowest frequency for which the mask is valid				**X**					A.14.b.2	
A.14.b.3	the highest frequency for which the mask is valid				**X**					A.14.b.3	
A.14.b.4	**Not used**									A.14.b.4	
A.14.b.5	**Not used**									A.14.b.5	
A.14.b.6	the mask pattern defined in terms of the power in the reference bandwidth as a function of latitude and the off-axis angle between the non-geostationary earth station boresight line and the line from the non-geostationary earth station to a point on the GSO arc or as a function of latitude, the non-geostationary earth station pointing angles (azimuth, elevation) and the difference in longitude between the non-geostationary earth station and a point on the geostationary arc				**X**					A.14.b.6	
A.14.b.7	the reference bandwidth used for the mask pattern of A.14.b.6				**X**					A.14.b.7	
A.14.c	**For each pfd mask used by the non-geostationary space station:** *Note* – The space station pfd mask is defined by the maximum power flux-density generated by any space station in the interfering non-geostationary-satellite system as seen from any point on the surface of the Earth									A.14.c	
A.14.c.1	the mask identification code				**X**					A.14.c.1	
A.14.c.2	the lowest frequency for which the mask is valid				**X**					A.14.c.2	
A.14.c.3	the highest frequency for which the mask is valid				**X**					A.14.c.3	
A.14.c.4	the type of mask, among one of the following types: (Earth-based exclusion zone angle, difference in longitude, latitude) or (satellite azimuth, satellite elevation, latitude)				**X**					A.14.c.4	
A.14.c.5	the mask pattern of the power flux-density defined in three dimensions				**X**					A.14.c.5	
A.14.c.6	the reference bandwidth used for the mask pattern of A.14.c.5				**X**					A.14.c.6	

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A.14.d	**For each set of non-geostationary-satellite system operating parameters** to be provided, if A.4.b.6*bis* indicates the use of an extended set of operating parameters *Note* – There could be different sets of parameters at different frequency bands, but only one set of operating parameters for any frequency band used by the non-geostationary-satellite system									A.14.d	
A.14.d.1	the parameter set identification code				+					A.14.d.1	
A.14.d.2	the lowest frequency for which the mask is valid				+					A.14.d.2	
A.14.d.3	the highest frequency for which the mask is valid				+					A.14.d.3	
A.14.d.4	minimum limit of the latitude range of non-geostationary earth station locations in degrees North				+					A.14.d.4	
A.14.d.5	maximum limit of the latitude range of non-geostationary earth station locations in degrees North				+					A.14.d.5	
A.14.d.6	the average number of associated earth stations, per km^2, active at the same time				+					A.14.d.6	
A.14.d.7	the average distance, in kilometres, between co-frequency cell or beam footprint centre				+					A.14.d.7	
A.14.d.8	the minimum duration, in seconds, during which an earth station will track a non-geostationary satellite without handover for different ranges of latitude				+					A.14.d.8	
A.14.d.9	the maximum number of co-frequency tracked non-geostationary satellites for different ranges of latitude				+					A.14.d.9	
A.14.d.10	the exclusion zone angle (degrees), i.e. the minimum angle to the geostationary arc at the non-geostationary earth station at which it will operate, defined at the earth station's given latitude range *Note* – The exclusion zone angle could vary between non-geostationary-satellite system orbit planes. If the identification code of the orbital plane is not defined then it applies to all orbital planes				+					A.14.d.10	
A.14.d.11	the minimum elevation angle (degrees) of the non-geostationary earth station when it is receiving or transmitting within a given latitude (degrees North) and azimuth (degrees from North) range				+					A.14.d.11	
A.14.d.12	the minimum angle in degrees at the surface of the Earth between the lines to any two active non-GSO satellites. Assumed to be zero if not provided *Note* – Can only be specified if the minimum track duration in A.14.d.8 is set to zero				**O**					A.14.d.12	
A.14.d.13	the minimum angle in degrees at the non-GSO satellite between the lines to any two active non-GSO earth stations. Assumed to be zero if not provided				**O**					A.14.d.13	
A.14.d.14	the maximum number of non-geostationary earth stations tracked co-frequency by a non-geostationary satellite. If a value is not provided, it is assumed that the maximum number of earth stations tracked co-frequency by a non-geostationary satellite is equal to the number of earth stations created for the epfd↑ run				**O**					A.14.d.14	

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A.15	**COMMITMENT REGARDING COMPLIANCE WITH ADDITIONAL OPERATIONAL EQUIVALENT POWER FLUX-DENSITY, epfd↓, LIMITS**									**A.15**	
A.15.a	a commitment that the filed for system will meet the additional operational epfd↓ limits that are specified in Table **22-4A1** under No. **22.5I** Required only for non-geostationary-satellite systems operating in the fixed-satellite service in the frequency bands 10.7-11.7 GHz (in all Regions), 11.7-12.2 GHz (Region 2), 12.2-12.5 GHz (Region 3), and 12.5-12.75 GHz (Regions 1 and 3)				+					A.15.a	
A.16	**COMMITMENT REGARDING COMPLIANCE WITH OFF-AXIS POWER LIMITATIONS, POWER FLUX-DENSITY (pfd) LIMITS OR SEPARATION DISTANCE**									**A.16**	
A.16.a	a commitment that the associated earth stations operating with a geostationary-satellite network in the fixed-satellite service meet the off-axis power limitations given in Nos. **22.26** to **22.28** or **22.32** (as appropriate) under the conditions specified in Nos. **22.30**, **22.31** and **22.34** to **22.39** Required only for earth stations that are subject to those power limitations			+						A.16.a	
A.16.b	a commitment by administrations that the filed system will meet the single entry power flux-density limits that are specified in No. **5.502** Required only for specific earth station antennas less than 4.5 m in diameter operating with geostationary space stations in the fixed-satellite service in the frequency band 13.75-14 GHz					+				A.16.b	
A.16.c	a commitment by administrations that the earth station associated with the filed system will meet the separation distance as specified in No. **5.509E** and the power flux-density limits that are specified in No. **5.509D** Required only for earth stations of geostationary-satellite networks operating in the fixed-satellite service in the frequency band 14.5-14.8 GHz except feeder links for the broadcasting-satellite service			+						A.16.c	
A.17	**COMPLIANCE WITH POWER FLUX-DENSITY (pfd) LIMITS**									**A.17**	
A.17.a	a commitment of compliance with per-satellite power flux-density level produced at the Earth's surface of −129 dB(W/(m^2 · MHz)) in any 1 MHz band under free space propagation conditions Required only for satellite systems operating in the radionavigation-satellite service in the frequency band 1 164-1 215 MHz			+	+					A.17.a	
A.17.a*bis*	the equivalent power flux-density (epfd) produced at the site of a radio astronomy station in the frequency band 1 610.6-1 613.8 MHz, as defined in No. **5.372** Required only for non-geostationary-satellite systems operating in the mobile-satellite service (space-to-Earth) in the frequency band 1 613.8-1 626.5 MHz				+					A.17.a*bis*	

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A.17.b.1	the calculated aggregate power flux-density produced at the Earth's surface by any geostationary radionavigation-satellite system in the frequency band 4 990-5 000 MHz in a 10 MHz bandwidth, as defined in *resolves* 1 of Resolution **741 (Rev.WRC-15)** Required only for geostationary-satellite systems operating in the radionavigation-satellite service in the frequency band 5 010-5 030 MHz			+						A.17.b.1	
A.17.b.2	the calculated aggregate power flux-density produced at the Earth's surface by all space stations within any radionavigation-satellite service system in the frequency band 5 030-5 150 MHz in a 150 kHz bandwidth, as defined in No. **5.443B** Required only for satellite systems operating in the radionavigation-satellite service in the frequency band 5 010-5 030 MHz			+	+					A.17.b.2	
A.17.b.3	the equivalent power flux-density produced at the Earth's surface by all space stations within any non-geostationary radionavigation-satellite service system in the frequency band 4 990-5 000 MHz in a 10 MHz bandwidth, as defined in *resolves* 2 of Resolution **741 (Rev.WRC-15)** Required only for non-geostationary-satellite systems operating in the radionavigation-satellite service in the frequency band 5 010-5 030 MHz				+					A.17.b.3	
A.17.c	**Not used**									A.17.c	
A.17.d	the mean power flux-density produced at the Earth's surface by any spaceborne sensor, as defined in No. **5.549A** for the frequency band 35.5-36 GHz Required only for satellite systems operating in the Earth exploration-satellite service (active) or space research service (active) in the frequency band 35.5-36 GHz			+	+					A.17.d	
A.17.e.1	the calculated equivalent power flux-density produced at the site of a radio astronomy station in the frequency band 42.5-43.5 GHz, as defined in No. **5.551H** Required only for non-geostationary-satellite systems operating in the fixed-satellite service and broadcasting-satellite service in the frequency band 42-42.5 GHz				+					A.17.e.1	
A.17.e.2	the calculated power flux-density produced at the site of a radio astronomy station in the frequency band 42.5-43.5 GHz, as defined in No. **5.551I** Required only for geostationary-satellite systems operating in the fixed-satellite service and broadcasting-satellite service in the frequency band 42-42.5 GHz			+						A.17.e.2	
A.17.f	the calculated power flux-density produced at the site of a radio astronomy station in the frequency band 48.94-49.04 GHz, as defined in No. **5.555B** Required only for geostationary-satellite systems operating in the fixed-satellite service (space-to-Earth) in the frequency bands 48.2-48.54 GHz and 49.44-50.2 GHz			+						A.17.f	
A.17.g.1	a commitment to observe the limit on equivalent power flux-density (epfd) produced at the site of a radio astronomy station in the frequency band 15.35-15.4 GHz, as defined in *resolves* 1.3 of Resolution **COM5/7 (WRC-23)** Required only for non-geostationary-satellite systems operating in the space research service in the frequency band 14.8-15.35 GHz				+					A.17.g.1	
A.17.g.2	a commitment to observe the limit on power flux-density (pfd) produced at the site of a radio astronomy station in the frequency band 15.35-15.4 GHz, as defined in *resolves* 1.2 of Resolution **COM5/7 (WRC-23)** Required only for geostationary-satellite systems operating in the space research service in the frequency band 14.8-15.35 GHz			+						A.17.g.2	

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A.17.h	a commitment of compliance with the per-satellite power flux-density level produced at the Earth's surface of −170 dB(W/(m^2 · 14 kHz)) in any 14 kHz band in the frequency band 137-138 MHz under free-space propagation conditions Required only for out-of-band emissions from space stations operating in the aeronautical mobile-satellite (R) service in the frequency band 117.975-137 MHz				+					A.17.h	
A.18	**COMPLIANCE WITH NOTIFICATION OF AIRCRAFT EARTH STATION(S)**									**A.18**	
A.18.a	a commitment that the characteristics of the aircraft earth station (AES) in the aeronautical mobile-satellite service are within the characteristics of the specific and/or typical earth station published by the Bureau for the space station to which the AES is associated Required only for the frequency band 14-14.5 GHz, when an aircraft earth station in the aeronautical mobile-satellite service communicates with a space station in the fixed-satellite service			+	+					A.18.a	
A.19	**COMPLIANCE WITH § 6.26 OF ARTICLE 6 OF APPENDIX 30B OR WITH OTHER PROVISIONS REFERENCED BY ARTICLE 5**									**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 only if the notice is submitted under § 6.25 of Article 6 of Appendix **30B** or under paragraph 15*bis* of Section A of Part 1 of Annex 1 to Resolution **COM5/2 (WRC-23)**								+	A.19.a	
A.19.b	a commitment in accordance with *resolves* 1.5 of Resolution **156** (**Rev.WRC-23**) that the administration responsible for the use of the assignment shall implement *resolves* 1.4 of Resolution **156** (**Rev.WRC-23**) Required only for geostationary-satellite networks operating in the fixed-satellite service 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 (Rev.WRC-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 (Rev.WRC-23)**									**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**	

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 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) or for Appendix 30B ESIM in accordance with Resolution COM5/2 (WRC-23)	Items in Appendix	Radio astronomy
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 (Rev.WRC-23)** 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	
A.25	**COMPLIANCE WITH Nos. 22.22 to 22.25**									**A.25**	
A.25.a	a commitment by the administration of compliance with Nos. **22.22**, **22.23**, **22.24** and **22.25** Required only for notification of a satellite network or system with 'Moon' as the reference body				+					A.25.a	
A.25.b	a technical or operational description on how the notifying administration intends to ensure compliance with the requirements stipulated in Nos. **22.22** to **22.25**, using, where appropriate, the relevant protection criteria from the ITU-R Recommendations and Reports Required only for notification of a satellite network or system with "Moon" as the reference body				+					A.25.b	
A.26	**FOR A NON-GEOSTATIONARY-SATELLITE NETWORK OR SYSTEM NOT SUBJECT TO COORDINATION UNDER SECTION II OF ARTICLE 9 IN THE FREQUENCY BANDS 7 250-7 750 MHz (SPACE-TO-EARTH), 7 900-8 025 MHz (EARTH-TO-SPACE), 20.2-21.2 GHz (SPACE-TO-EARTH) AND 30-31 GHz (EARTH-TO-SPACE)**									**A.26**	
A.26.a	the maximum aggregate e.i.r.p. in a 1 MHz reference bandwidth of associated non-GSO earth stations operating co-frequency of a single non-GSO constellation/configuration towards any point within the geostationary arc Required for advance publication and notification		+		+					A.26.a	
A.26.b	the maximum aggregate pfd in a 1 MHz reference bandwidth caused by all non-GSO space stations operating co-frequency towards the same location in a single non-GSO constellation/configuration at any point of the Earth's surface within the visibility area of the GSO Required for advance publication and notification		+		+					A.26.b	
A.26.c	for the exclusion zone about the geostationary-satellite orbit, the type of zone (based on topocentric angle or satellite-based angle for establishing the exclusion zone) Required for advance publication and notification		+		+					A.26.c	
A.26.d	for the exclusion zone about the geostationary-satellite orbit, if the zone is based on a topocentric angle or a satellite-based angle, the width of the zone, in degrees Required for advance publication and notification		+		+					A.26.d	
A.27	**COMPLIANCE WITH RESOLUTION COM5/8 (WRC-23)**									**A.27**	
A.27.a	a commitment from the notifying administration of a non-GSO space station receiving in the frequency bands 27.5-28.6 GHz and 29.5-30.0 GHz that the equivalent power flux-density produced at any point in the geostationary-satellite orbit by emissions from all combined operations of inter-satellite and Earth-to-space links shall not exceed the limits given in Article **22**, Tables **22-1B**, **22-1C** and **22-2** Required only for non-GSO space stations submitted in accordance with Resolution **COM5/8 (WRC-23)**		+		+					A.27.a	
A.27.b	a commitment from the notifying administration of space stations receiving in the frequency band 27.5-30 GHz that, upon receiving a report of unacceptable interference, the notifying administration will follow the procedures in *further resolves* 3 of Resolution **COM5/8 (WRC-23)** Required only for non-GSO space stations submitted in accordance with Resolution **COM5/8 (WRC-23)**		+		+					A.27.b	
A.27.c	a commitment of compliance with the per-satellite power flux-density level in the frequency band 19.3-19.7 GHz, as defined in No. **5.523X** Required only for the notification of space stations submitted in accordance with Resolution **COM5/8 (WRC-23)**				+					A.27.c	

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 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) or for Appendix 30B ESIM in accordance with Resolution COM5/2 (WRC-23)	Items in Appendix	Radio astronomy
A.27.d	the exclusion zone angle in degrees, defined as a minimum angle between the geostationary arc and the inter-satellite link transmitting direction, measured at the non-geostationary transmitting space station Required only for non-geostationary space stations transmitting to another non-geostationary space station in the frequency bands 27.5-28.6 GHz and 29.5-30 GHz				+					A.27.d	
A.27.e	the mask pattern defined in terms of the e.i.r.p. in a 40 kHz bandwidth as a function of the off-axis angle between the non-geostationary transmitting space station boresight line and the line from the non-geostationary transmitting space station to a point on the geostationary-satellite orbit, and as a function of the latitude at nadir of the non-geostationary transmitting space station Required only for non-geostationary space stations transmitting to another non-geostationary space station in the frequency bands 27.5-29.1 GHz and 29.5-30 GHz or non-geostationary space stations transmitting to another geostationary space station in the frequency band 27.5-30 GHz				+					A.27.e	
A.27.f	**COMPLIANCE WITH *resolves* 3.3 OF RESOLUTION COM5/8 (WRC-23)**									A.27.f	
A.27.f.1	a commitment by the notifying administration for a non-GSO FSS system with an altitude of apogee of less than 20 000 km communicating with lower orbiting non-GSO space stations in the frequency bands 18.3-18.6 GHz and 18.8-19.1 GHz that the pfd shall be in conformity with the pfd limits on the Earth's surface specified in Annex 3 to Resolution **COM5/8 (WRC-23)** Required only for the notification of non-GSO space stations submitted in accordance with Resolution **COM5/8 (WRC-23)**				+					A.27.f.1	
A.28	**COMPLIANCE WITH THE UNWANTED EMISSION LIMIT IN No. 5.A91D**									**A.28**	
A.28.a	a commitment by the notifying administration for a non-GSO FSS system with an altitude of the apogee of more than 407 km and less than 2 000 km in the frequency band 37.5-38 GHz that the e.i.r.p. density in the frequency band 36-37 GHz shall be less than −21 dB(W/100 MHz) per space station for angles greater than 65° from nadir relative to the FSS space station Required only for notification				+					A.28.a	
A.29	**COMPLIANCE WITH *resolves* 1.1.2 OF RESOLUTION COM5/2 (WRC-23)**									**A.29**	
A.29.a	a commitment that the characteristics of Appendix **30B** ESIMs shall remain within the envelope of typical characteristics of notified Appendix **30B** earth stations associated with the satellite networks with which ESIMs communicate, as published by the Bureau Required only for the notification of earth stations in motion submitted in accordance with Resolution **COM5/2 (WRC-23)** Not required for a submission under Appendix **30B**								+	A.29.a	
A.30	**COMPLIANCE WITH *resolves* 1.1.3 OF RESOLUTION COM5/2 (WRC-23)**									**A.30**	
A.30.a	a commitment that the Appendix **30B** ESIM operation would be in conformity with the Radio Regulations and Resolution **COM5/2 (WRC-23)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **COM5/2 (WRC-23)** Not required for a submission under Appendix **30B**								+	A.30.a	
A.31	**COMPLIANCE WITH *resolves* 2.2 OF RESOLUTION COM5/2 (WRC-23)**									**A.31**	
A.31.a	a commitment that the Appendix **30B** ESIM operation would be in conformity with *resolves* 2.1 and *further resolves* 2, 2.1 and 2.2 of Resolution **COM5/2 (WRC-23)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **COM5/2 (WRC-23)** Not required for a submission under Appendix **30B**								+	A.31.a	
A.32	**COMPLIANCE WITH *further resolves* 2 OF RESOLUTION COM5/2 (WRC-23)**									**A.32**	

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 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) or for Appendix 30B ESIM in accordance with Resolution COM5/2 (WRC-23)	Items in Appendix	Radio astronomy
A.32.a	a commitment that, upon receiving a report of unacceptable interference, the notifying administration for the GSO FSS network with which the Appendix **30B** ESIM communicates shall follow the procedures in *resolves* 9 of Resolution **COM5/2 (WRC-23)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **COM5/2 (WRC-23)** Not required for a submission under Appendix **30B**								+	A.32.a	
A.33	**COMPLIANCE WITH *resolves* 10.5 OF RESOLUTION COM5/2 (WRC-23)**									**A.33**	
A.33.a	a point of contact for the purpose of tracing any suspected cases of unacceptable interference from earth stations on aircraft and vessels and to respond immediately to such requests Required only for the notification of earth stations in motion submitted in accordance with Resolution **COM5/2 (WRC-23)** Not required for a submission under Appendix **30B**								+	A.33.a	
A.34	**COMPLIANCE WITH *resolves* 1 OF RESOLUTION COM5/3 (WRC-23)**									**A.34**	
A.34.a	a commitment that the notifying administration will operate the non-GSO ESIMs in conformity with the Radio Regulations, including Resolution **COM5/3 (WRC-23)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **COM5/3 (WRC-23)**				+					A.34.a	
A.35	**COMPLIANCE WITH *resolves* 3.5 and *further resolves* 1, 2, 3 and 4 OF RESOLUTION COM5/3 (WRC-23)**									**A.35**	
A.35.a	a commitment that the notifying administration will operate the non-GSO ESIMs in conformity with *resolves* 3.5 and *further resolves* 1, 2, 3 and 4 of Resolution **COM5/3 (WRC-23)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **COM5/3 (WRC-23)**				+					A.35.a	
A.36	**FOR THE NOTIFICATION OF EARTH STATIONS IN MOTION SUBMITTED IN ACCORDANCE WITH RESOLUTION COM5/3 (WRC-23)**									**A.36**	
A.36.a	the minimum elevation angle at which any associated non-GSO A-ESIM can transmit to a non-GSO satellite in the frequency band 27.5-29.1 GHz and 29.5-30 GHz Required only for the notification of aeronautical earth stations in motion submitted in accordance with Resolution **COM5/3 (WRC-23)**				+					A.36.a	
A.36.b	the aircraft fuselage attenuation mask associated with the non-GSO A-ESIM and based on ITU-R Recommendations. If none provided, the fuselage attenuation mask in Table 4 of Annex 2 to Resolution **COM5/3 (WRC-23)** Required only for the notification of aeronautical earth stations in motion submitted in accordance with Resolution **COM5/3 (WRC-23)**				+					A.36.b	
A.36.c	a point of contact for the purpose of tracing any cases of unacceptable interference from non-GSO ESIMs and to respond immediately to requests from the focal point of the affected administration Required only for the notification of earth stations in motion submitted in accordance with Resolution **COM5/3 (WRC-23)**				+					A.36.c	
A.37	**COMPLIANCE WITH *resolves* 3.7.1 OF RESOLUTION COM5/3 (WRC-23)**									**A.37**	
A.37.a	a commitment that the notifying administration will operate the non-GSO ESIMs in conformity with *resolves* 3.7 and *further resolves* 1, 2, 3 and 4 of Resolution **COM5/3 (WRC-23)**, see *resolves* 3.7.1 of Resolution **COM5/3 (WRC-23)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **COM5/3 (WRC-23)**				+					A.37.a	
A.38	**COMPLIANCE WITH *further resolves* 1 OF RESOLUTION COM5/3 (WRC-23)**									**A.38**	

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 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) or for Appendix 30B ESIM in accordance with Resolution COM5/2 (WRC-23)	Items in Appendix	Radio astronomy
A.38.a	a firm, objective, actionable, measurable and enforceable commitment that in case of reported unacceptable interference, the notifying administration undertakes to immediately eliminate the interference or reduce it to an acceptable level Required only for the notification of earth stations in motion submitted in accordance with Resolution **COM5/3 (WRC-23)**				+					A.38.a	
A.39	**COMPLIANCE WITH RESOLUTION COM5/4 (WRC-23)**									**A.39**	
A.39.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.39.a	
A.40	**COMPLIANCE WITH § 4.1.13*bis* of ARTICLE 4 OF APPENDIX 30/30A (WRC-23) or § 6.15*quat* of ARTICLE 6 OF APPENDIX 30B (WRC-23)**									**A.40**	
A.40.a	a commitment to respect the power-flux density limits specified under § 4.1.13*bis* of Article 4 of Appendix **30/30A** or § 6.15*quat* of Article 6 of Appendix **30B**, as appropriate Required only for a submission under § 4.1.12 of Article 4 of Appendix **30/30A** or under §§ 6.17/6.25 of Article 6 of Appendix **30B**							+	+	A.40.a	

Agenda item 7(D2)

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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.14	**FOR STATIONS OPERATING IN A FREQUENCY BAND SUBJECT TO Nos. 22.5C, 22.5D, 22.5F OR 22.5L: SPECTRUM MASKS**										**A.14**	
…	…	…	…	…	…	…	…	…	…	…	…	…
A.14.b.6	the mask pattern defined in terms of the power in the reference bandwidth as a function of latitude and the off-axis angle between the non-geostationary earth station boresight line and the line from the non-geostationary earth station to a point on the GSO arc or as a function of latitude, the non-geostationary earth station pointing angles (azimuth, elevation) and the difference in longitude between the non-geostationary earth station and a point on the geostationary arc					**X**					A.14.b.6	
…	…	…	…	…	…	…	…	…	…	…	…	…
A.14.c.4	the type of mask, among one of the following types: (Earth-based exclusion zone angle, difference in longitude, latitude) or (satellite azimuth, satellite elevation, latitude)					**X**					A.14.c.4	
…	…	…	…	…	…	…	…	…	…	…	…	…
A.14.d	**For each set of non-geostationary-satellite system operating parameters** to be provided, if A.4.b.6*bis* indicates the use of an extended set of operating parameters *Note* – There could be different sets of parameters at different frequency bands, but only one set of operating parameters for any frequency band used by the non-geostationary-satellite system										A.14.d	
…	…	…	…	…	…	…	…	…	…	…	…	…
A.14.d.x1	the minimum angle in degrees at the surface of the Earth between the lines to any two active non-GSO satellites. Assumed to be zero if not provided. *Note* – Can only be specified if the minimum track duration in A.14.d.8 is set to zero					**O**					A.14.d.x1	
A.14.d.x2	the minimum angle in degrees at the non-GSO satellite between the lines to any two active non-GSO earth stations. Assumed to be zero if not provided					**O**					A.14.d.x2	
A.14.d.x3	the maximum number of non-geostationary earth stations tracked co-frequency by a non-geostationary satellite. If a value is not provided, it is assumed that the maximum number of earth stations tracked co-frequency by a non-geostationary satellite is equal to the number of earth stations created for the epfd↑ run					**O**					A.14.d.x3	
…	…	…	…	…	…	…	…	…	…	…	…	…

Agenda item 1.7

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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 III 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.17	**COMPLIANCE WITH POWER FLUX-DENSITY (pfd) LIMITS**										**A.17**	
…	…	…	…	…	…	…	…	…	…	…	…	…
A.17.f.1	a commitment of compliance with per-satellite power flux-density level produced at the Earth's surface of −170 dB(W/(m^2 · 14 kHz)) in any 14 kHz band in the frequency band 137-138 MHz under free-space propagation conditions Required only for out-of-band emissions from space stations operating in the aeronautical mobile-satellite (R) service in the frequency band 117.975-137 MHz					+					A.17.f.1	
…	…	…	…	…	…	…	…	…	…	…	…	…

Agenda item 4

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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 III 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** (**Rev.WRC-23**) that the administration responsible for the use of the assignment shall implement *resolves* 1.4 of Resolution **156** (**Rev.WRC-23**) Required only for geostationary-satellite networks operating in the fixed-satellite service 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	

MOD

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.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 (Rev.WRC-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	

MOD

TABLE B

CHARACTERISTICS TO BE PROVIDED FOR EACH SATELLITE ANTENNA BEAM OR EACH EARTH STATION OR RADIO ASTRONOMY ANTENNA (Rev.WRC-23)

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	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) or for an Appendix 30B ESIM in accordance with Resolution COM5/2 (WRC-23)	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**	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.1.c	if the beam is part of a multiple-beam network, the multiple beam identification code								+	B.1.c	
B.1.d	**For sensor operation**									**B.1.d**	
B.1.d.1	an indicator showing whether the beam is for an active or passive sensor		**X**	**X**	**X**					B.1.d.1	
B.2	**TRANSMISSION / RECEPTION INDICATOR FOR THE BEAM OF THE SPACE STATION OR THE ASSOCIATED SPACE STATION**		**X**	**X**	**X**	**+** [1]			**X**	**B.2**	
B.2*bis*	**Not used**									**B.2*bis***	
B.2*bis*.a	**Not used**									B.2*bis*.a	
B.2*bis*.b	**Not used**									B.2*bis*.b	
B.2.a	**For the space station transmitting beam, continuous/non-continuous transmission indicators**									**B.2.a**	
B.2.a.1	an indicator specifying whether the space station only transmits when visible from the notified service area In the case of non-geostationary-satellite systems, required only for frequency assignments not subject to Nos. **22.5C**, **22.5D**, **22.5F** or **22.5L**		**X**		**+**					B.2.a.1	
B.2.a.2	if the non-geostationary-satellite beam's transmissions are non-continuous, the minimum elevation angle above which transmissions occur when the space station is visible from the notified service area Not required for coordination and notification of frequency assignments subject to Nos. **22.5C**, **22.5D**, **22.5F** or **22.5L**		**O**		**O**					B.2.a.2	
B.3	**SPACE STATION ANTENNA CHARACTERISTICS**									**B.3**	
B.3.a	**For each space station antenna:**									B.3.a	
B.3.a.1	the maximum co-polar isotropic gain, in dBi Where a steerable beam (see No. **1.191**) is used, if the effective boresight area (see No. **1.175**) is identical with the global service area, the maximum antenna gain, in dBi, is applicable to all points on the Earth's visible surface		**X**	**X**	**X**		**X**	**X**	**X**	B.3.a.1	
B.3.a.2	if a non-elliptical beam, the maximum cross-polar isotropic antenna gain, in dBi						**+**	**+**		B.3.a.2	

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B.3.b	**Antenna gain contours:**									B.3.b	
B.3.b.1	the co-polar antenna gain contours plotted on a map of the Earth's surface, preferably in a radial projection from the satellite onto a plane perpendicular to the axis from the centre of the Earth to the satellite The space station antenna gain contours shall be drawn as isolines of the isotropic gain, at least for −2, −4, −6, −10 and −20 dB and at 10 dB intervals thereafter, as necessary, relative to the maximum antenna gain, when any of these contours is located either totally or partially anywhere within the limit of visibility of the Earth from the given geostationary satellite Whenever possible, the gain contours of the space station antenna should also be provided in a numerical format (e.g. equation or table) Where a steerable beam (see No. **1.191**) is used, if the effective boresight area (see No. **1.175**) is less than the global service area, the contours are the result of moving the boresight of the steerable beam around the limit defined by the effective boresight area and are to be provided as described above but shall also include the 0 dB relative gain isoline. In addition, for a steerable transmitting beam, except for the case of Appendix **30B**, see also No. **21.16** (and its associated Rules of Procedure) The antenna gain contours shall include the effects of the planned inclination excursion, longitudinal tolerance and the planned pointing accuracy of the antenna *Note* – Taking due account of applicable technical restrictions and allowing some reasonable degree of flexibility for satellite operations, administrations should, to the extent practicable, align the areas the satellite steerable beams could cover with the service area of their networks or systems with due regard to their service objectives. In the case of Appendix **30**, **30A**, **30B** or **30B** ESIM, required only for non-elliptical beams			**X**			+	+	+	B.3.b.1	
B.3.b.2	if a non-elliptical beam, the cross-polar gain contours shall be provided as defined under B.3.b.1						+	+		B.3.b.2	
B.3.c	**Antenna radiation patterns:**									B.3.c	
B.3.c.1	the co-polar antenna radiation pattern In the case of geostationary space stations required only for an antenna radiation beam that is directed towards another satellite In the case of Appendix **30**, **30A**, **30B** or **30B** ESIM, required only for elliptical antenna beams		**X**	+	**X**		+	+	+	B.3.c.1	
B.3.c.2	if an elliptical beam, the cross-polar antenna radiation pattern						+	+		B.3.c.2	
B.3.d	the pointing accuracy of the antenna In the case of Appendix **30**, **30A** or **30B**, required only for elliptical beams			**X**			+	+	+	B.3.d	
B.3.e	if the space station is operating in a frequency band allocated in the Earth-to-space direction and in the space-to-Earth direction, the gain of the antenna in the direction of those parts of the geostationary-satellite orbit which are not obstructed by the Earth. In the case of Appendix 30, required only for the frequency band 12.5-12.7 GHz			+			+	+		B.3.e	
B.3.f	**For a space station submitted in accordance with Appendix 30, 30A or 30B:**									B.3.f	
B.3.f.1	the boresight or aim point of the antenna beam (longitude and latitude)						**X**	**X**	**X**	B.3.f.1	
B.3.f.2	**For each elliptical beam:**									B.3.f.2	
B.3.f.2.a	the rotational accuracy, in degrees						**X**	**X**	**X**	B.3.f.2.a	
B.3.f.2.b	the major axis orientation, in degrees, anticlockwise from the Equator						**X**	**X**	**X**	B.3.f.2.b	
B.3.f.2.c	the major axis, in degrees, at the half-power beamwidth						**X**	**X**	**X**	B.3.f.2.c	
B.3.f.2.d	the minor axis, in degrees, at the half-power beamwidth						**X**	**X**	**X**	B.3.f.2.d	
B.4	**ADDITIONAL CHARACTERISTICS FOR NON-GEOSTATIONARY SPACE STATION ANTENNA**									**B.4**	
B.4.a.1	the reference number of each orbital plane in which the space station antenna characteristics are used		**X**		**X**					B.4.a.1	

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	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) or for an Appendix 30B ESIM in accordance with Resolution COM5/2 (WRC-23)	Items in Appendix	Radio astronomy
B.4.a.2	if the antenna characteristics of a space station are not common to every satellite in the specified orbital plane, the reference number of each satellite in the specified orbital plane, on which the space station antenna characteristics are used		+		+					B.4.a.2	
B.4.a.2 *bis*	for transmitting antennas with fixed beam pointed away from the nadir direction only, the satellite antenna gain $G(\theta_e)$ as a function of the elevation angle (θ_e) above the horizontal plane at the Earth's surface at the minimum altitude at which any satellite within the satellite system operates				**O**					B.4.a.2 *bis*	
B.4.a.2 *ter*	for transmitting antennas with steerable beam, the satellite antenna gain $G_{max}(\theta_e)$ as a function of the elevation angle (θ_e) above the horizontal plane at the Earth's surface				**O**					B.4.a.2 *ter*	
B.4.a.3	**For a space station submitted in accordance with Nos. 9.11A, 9.12, 9.12A or for active or passive sensors on board a non-geostationary-satellite network or system not subject to coordination under Section II of Article 9:**									B.4.a.3	
B.4.a.3.a	**For the orientation angles of the satellite transmitting and receiving antenna beams (required only for fixed beams):**									B.4.a.3.a	
B.4.a.3.a.1	the orientation angle alpha, in degrees (see the most recent version of Recommendation ITU-R SM.1413)		**X**		**X**					B.4.a.3.a.1	
B.4.a.3.a.2	the orientation angle beta, in degrees (see the most recent version of Recommendation ITU-R SM.1413)		**X**		**X**					B.4.a.3.a.2	
B.4.b	**For a space station submitted in accordance with Nos. 9.11A, 9.12 or 9.12A:**									B.4.b	
B.4.b.1	**Not used**									B.4.b.1	
B.4.b.1.a	**Not used**									B.4.b.1.a	
B.4.b.1.b	**Not used**									B.4.b.1.b	
B.4.b.2	**Not used**									B.4.b.2	
B.4.b.3	**Not used**									B.4.b.3	
B.4.b.4	**For each transmitting beam:**									B.4.b.4	
B.4.b.4.a	the maximum beam peak e.i.r.p./4 kHz				**X**					B.4.b.4.a	
B.4.b.4.a *bis*	for fixed beam pointed away from the nadir direction only, the maximum beam peak e.i.r.p./4 kHz *eirp*4kHz$_{max}$ (θ_e) as a function of the elevation angle (θ_e) above the horizontal plane at the Earth's surface at the minimum altitude at which any satellite within the satellite system operates				**O**					B.4.b.4.a *bis*	
B.4.b.4.a *ter*	for steerable beam, the maximum beam peak e.i.r.p./4 kHz *eirp*4kHz$_{max}$(θ_e) as a function of the elevation angle (θ_e) above the horizontal plane at the Earth's surface				**O**					B.4.b.4.a *ter*	
B.4.b.4.b	the average beam peak e.i.r.p./4 kHz				**X**					B.4.b.4.b	
B.4.b.4.c	the maximum beam peak e.i.r.p./1 MHz				**X**					B.4.b.4.c	
B.4.b.4.c *bis*	for fixed beam pointed away from the nadir direction only, the maximum beam peak e.i.r.p./1 MHz *eirp*1MHz$_{max}$ (θ_e) as a function of the elevation angle (θ_e) above the horizontal plane at the Earth's surface at the minimum altitude at which any satellite within the satellite system operates				**O**					B.4.b.4.c *bis*	
B.4.b.4.c *ter*	for steerable beam, the maximum beam peak e.i.r.p./1 MHz *eirp*1MHz$_{max}$ (θ_e) as a function of the elevation angle (θ_e) above the horizontal plane at the Earth's surface				**O**					B.4.b.4.c *ter*	
B.4.b.4.d	the average beam peak e.i.r.p./1 MHz				**X**					B.4.b.4.d	
B.4.b.5	the calculated peak value of power flux-density produced within ±5° inclination of the geostationary-satellite orbit Required only for the fixed-satellite service (space-to-Earth) in the frequency band 6 700-7 075 MHz				+					B.4.b.5	
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**			B.5.a	
B.5.b	the half-power beamwidth, in degrees						+ [1]			B.5.b	

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B.5.c	either the measured radiation pattern of the antenna or the reference radiation pattern to be used for coordination For coordination under No. **9.7A**, the reference radiation pattern is to be provided						**X**				B.5.c	
B.5.d	antenna dimension aligned with the geostationary arc (D_{GSO}), in metres (see the most recent version of Recommendation ITU-R S.1855) Except for Appendix **30** or **30A**						**O**				B.5.d	
B.6	**RADIO ASTRONOMY STATION ANTENNA CHARACTERISTICS**										**B.6**	
B.6.a	the antenna type (see the Preface)										B.6.a	**X**
B.6.b	the antenna dimensions (see the Preface)										B.6.b	**X**
B.6.c	the effective area of the antenna (see the Preface)										B.6.c	**X**

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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-23)

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 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) or for an Appendix 30B ESIM in accordance with Resolution COM5/2 (WRC-23)	Items in Appendix	Radio astronomy
C.1	**FREQUENCY RANGE**									**C.1**	
C.1.a	the lower limit of the frequency range within which the carriers and the bandwidth of the emission will be located for each Earth-to-space or space-to-Earth service area, or for each space-to-space relay	**X**	**X**						**X**	C.1.a	
C.1.b	the upper limit of the frequency range within which the carriers and the bandwidth of the emission will be located for each Earth-to-space or space-to-Earth service area, or for each space-to-space relay	**X**	**X**						**X**	C.1.b	
C.2	**ASSIGNED FREQUENCY (FREQUENCIES)**									**C.2**	

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C.2.a.1	347/5the 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-geostationary-satellite networks or systems, required for all space applications except passive sensors In the case of Appendix **30B**, required only for notification under Article **8** In the case of Appendix **30B** ESIM, required only for notification under Section B of Part 1 of Annex 1 to Resolution **COM5/2 (WRC-23)**		+	+	+	X	X	X	+	C.2.a.1	
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 or systems, 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-geostationary-satellite networks or systems, required for all space applications except passive sensors In the case of Appendix **30B**, required only for notification under Article **8** In the case of Appendix **30B** ESIM, required only for notification under Section B of Part 1 of Annex 1 to Resolution **COM5/2 (WRC-23)**		+	+	+	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 or systems, 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	C.4.a	X
C.4.b	the nature of service performed, using the symbols from the Preface		X	X	X	X				C.4.b	X
C.5	**RECEIVING SYSTEM NOISE TEMPERATURE**									**C.5**	
C.5.a	the lowest total receiving system noise temperature, in kelvins, referred to the output of the receiving antenna of the space station In the case of satellite networks or systems, required for all space applications except for active or passive sensors		+	+	+			X	X	C.5.a	
C.5.b	the lowest total receiving system noise temperature, in kelvins, referred to the output of the receiving antenna of the earth station under clear-sky conditions This value shall be indicated for the nominal value of the angle of elevation when the associated transmitting station is onboard a geostationary satellite and, in other cases, for the minimum value of the angle of elevation					X				C.5.b	
C.5.c	the overall receiving system noise temperature, in kelvins, referred to the output of the receiving antenna									C.5.c	X

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 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) or for an Appendix 30B ESIM in accordance with Resolution COM5/2 (WRC-23)	Items in Appendix	Radio astronomy
C.5.d	**For active sensors:**									C.5.d	
C.5.d.1	the system noise temperature at the output of the signal processor		**X**	**X**	**X**					C.5.d.1	
C.5.d.2	the receiver noise bandwidth		**X**	**X**	**X**					C.5.d.2	
C.6	**POLARIZATION**									**C.6**	
C.6.a	the type of polarization (see the Preface) For 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**		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** *(in accordance with Article **2** and Appendix **1**)* For advance publication of a non-geostationary-satellite network or system 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** (including simultaneous submissions for entry into the List under § 6.17 and notification under § 8.1) *Note* – For simultaneous submissions, the Bureau will use predefined values for the necessary bandwidth when examining the notice under § 6.17 of Article 6 of Appendix **30B** In the case of Appendix **30B** ESIM, required only for notification under Section B of Part 1 of Annex 1 to Resolution **COM5/2 (WRC-23)** (including simultaneous submissions for entry in the Appendix **30B** ESIM List and notification under Section A and Section B, respectively, of Part 1 of Annex 1 to Resolution **COM5/2 (WRC-23)**) *Note* – For simultaneous submissions, the Bureau will use predefined values for the necessary bandwidth when examining the notice under Annex 1 (except Section B) of Resolution **COM5/2 (WRC-23)**		**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**				C.7.b	
C.8	**POWER CHARACTERISTICS OF THE TRANSMISSION** *Not required for passive sensors*									**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	
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 satellite networks or systems, required if neither C.8.b.2 nor C.8.b.3.b is provided In the case of Appendix **30B**, required only for notification under Article **8**, or simultaneous submissions for entry into the List under § 6.17 and notification under § 8.1 In the case of Appendix **30B** ESIM, required only for notification under Section B of Part 1 of Annex 1 to Resolution **COM5/2 (WRC-23)** (including simultaneous submissions for entry in the Appendix **30B** ESIM List and notification under Section A and Section B, respectively, of Part 1 of Annex 1 to Resolution **COM5/2 (WRC-23)**)		+	+	+	**O**			+	C.8.a.2	

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C.8.a.3	the minimum power density, in dB(W/Hz), supplied to the input of the antenna for each carrier type[2] In the case of Appendix **30B** ESIM, required only for notification under Section B of Part 1 of Annex 1 to Resolution **COM5/2 (WRC-23)** (including simultaneous submissions for entry in the Appendix **30B** ESIM List and notification under Section A and Section B, respectively, of Part 1 of Annex 1 to Resolution **COM5/2 (WRC-23)**) to be used for examination of the power flux-density limits specified in Annex 2 to Resolution **COM5/2 (WRC-23)** Not required for a submission under Appendix **30B**								+	C.8.a.3	
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 In the case of satellite networks or systems, required if neither C.8.a.1 nor C.8.b.3.a is provided		+	+	+	+[1]	X	X		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 satellite networks or systems, required if neither C.8.a.2 nor C.8.b.3.b is provided In the case of Appendix **30B**, required only for submission under Article 6 In the case of Appendix **30B** ESIM, required only for submissions under Section A of Part 1 of Annex 1 to Resolution **COM5/2 (WRC-23)**		+	+	+	+[1]	X	X	+	C.8.b.2	
C.8.b.3	**For the case of active sensors:**									C.8.b.3	
C.8.b.3.a	the mean peak envelope power, in dBW, supplied to the input of the antenna Required if neither C.8.a.1 nor C.8.b.1 is provided		+	+	+					C.8.b.3.a	
C.8.b.3.b	the mean power density, in dB(W/Hz), supplied to the input of the antenna Required if neither C.8.a.2 nor C.8.b.2 is provided		+	+	+					C.8.b.3.b	
C.8.b.3.c	the necessary bandwidth for active sensors Required only for active sensors operating in the Earth exploration-satellite service (active) in the frequency bands 9 200-9 300 MHz and 9 900-10 400 MHz			+	+					C.8.b.3.c	
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]				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]				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]				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]				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	

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C.8.d.2	if the contiguous satellite bandwidth is different from the bandwidth of the assigned frequency band (C.3.a), 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		**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 objective of the link under clear-sky conditions or the carrier-to-noise ratio, in dB, required to meet the short-term performance objective of the link, inclusive of necessary margins If not provided, the reason for absence under C.8.e.2		+	+	+	+[1]				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]				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**				C.8.g.1	
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**				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**				C.8.g.3	
C.8.h	the maximum power density per Hz supplied to the input of the antenna, in dB(W/Hz), averaged over the necessary bandwidth						**X**	**X**	**X**	C.8.h	
C.8.i	If power control is used, the maximum range of power control, in dB							+		C.8.i	
C.8.j	**Not used**									C.8.j	
C.9	**INFORMATION ON MODULATION CHARACTERISTICS** *For all space applications except active or passive sensors*									**C.9**	
C.9.a	**For each carrier, according to the nature of the signal modulating the carrier:**									C.9.a	
C.9.a.1	the type of modulation In the case of a non-geostationary space station required only for Nos. **9.11A**, **9.12** or **9.12A**		**O**	**C**	+		**X**	**X**		C.9.a.1	
C.9.a.2	**For a carrier frequency modulated by a frequency-division multichannel telephony baseband (FDM/FM) or by a signal that can be represented by a multichannel telephony baseband:**									C.9.a.2	
C.9.a.2.a	the lowest frequency of the baseband		**O**	**C**	**C**					C.9.a.2.a	
C.9.a.2.b	the highest frequency of the baseband		**O**	**C**	**C**					C.9.a.2.b	
C.9.a.2.c	the r.m.s. frequency deviation of the pre-emphasized signal for a test tone as a function of baseband frequency		**O**	**C**	**C**					C.9.a.2.c	
C.9.a.3	**For a carrier frequency modulated by a television signal:**									C.9.a.3	
C.9.a.3.a	the peak-to-peak frequency deviation of the pre-emphasized signal		**O**	**C**	**C**		**X**	**X**		C.9.a.3.a	

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C.9.a.3.b	the pre-emphasis characteristic		**O**	**C**	**C**		**X**	**X**		C.9.a.3.b	
C.9.a.3.c	if applicable, the characteristics of the multiplexing of the video signal with the sound signal(s) or other signals		**O**	**C**	**C**		**+**	**+**		C.9.a.3.c	
C.9.a.4	**For a carrier phase-shift modulated by a digital signal:**									C.9.a.4	
C.9.a.4.a	the bit rate		**O**	**C**	**C**					C.9.a.4.a	
C.9.a.4.b	the number of phases		**O**	**C**	**C**					C.9.a.4.b	
C.9.a.5	**For an amplitude modulated carrier (including single sideband):**									C.9.a.5	
C.9.a.5.a	the nature of the modulating signal, as precisely as possible		**O**	**C**	**C**					C.9.a.5.a	
C.9.a.5.b	the kind of amplitude modulation used		**O**	**C**	**C**					C.9.a.5.b	
C.9.a.6	**For a frequency modulated carrier:**									C.9.a.6	
C.9.a.6.a	the peak-to-peak frequency deviation, in MHz, of the energy dispersal waveform		**O**	**C**	**C**		**X**	**X**		C.9.a.6.a	
C.9.a.6.b	the sweep frequency, in kHz, of the energy dispersal waveform		**O**	**C**	**C**		**X**	**X**		C.9.a.6.b	
C.9.a.6.c	the energy dispersal waveform		**O**	**C**	**C**		**X**	**X**		C.9.a.6.c	
C.9.a.7	if other forms of modulation than frequency modulation are being used, the type of energy dispersal		**O**	**C**	**C**		**+**	**+**		C.9.a.7	
C.9.a.8	for all other types of modulation, such particulars as may be useful for an interference study		**O**	**C**	**C**					C.9.a.8	
C.9.a.9	the TV standard		**O**	**C**	**C**		**X**	**X**		C.9.a.9	
C.9.b	**For analogue carriers:**									C.9.b	
C.9.b.1	the sound-broadcasting characteristics						**X**	**X**		C.9.b.1	
C.9.b.2	the composition of the baseband						**X**	**X**		C.9.b.2	
C.9.c	**For a non-geostationary space station submitted in accordance with Nos. 9.11A, 9.12 or 9.12A:**									C.9.c	
C.9.c.1	the type of multiple access				**X**					C.9.c.1	
C.9.c.2	the spectrum mask				**X**					C.9.c.2	
C.9.d	**For stations operating in a frequency band subject to Nos. 22.5C, 22.5D, 22.5F or 22.5L:**									C.9.d	
C.9.d.1	the type of mask				**X**					C.9.d.1	
C.9.d.2	the pfd mask identification code				**X**					C.9.d.2	
C.9.d.3	the space station's e.i.r.p. mask identification code				**X**					C.9.d.3	
C.9.d.4	the associated earth station's e.i.r.p. mask identification code				**X**					C.9.d.4	
C.10	**TYPE AND IDENTITY OF THE ASSOCIATED STATION(S)** *(the associated station may be another space station, a typical earth station of the network or system or a specific earth station)* *For all space applications except active or passive sensors*									**C.10**	
C.10.a	**For an associated space station:**									C.10.a	
C.10.a.1	the identity of the station		**X**	**X**	**X**					C.10.a.1	
C.10.a.2	if the associated space station is in the geostationary orbit, its nominal longitude		**+**	**+**	**+**					C.10.a.2	
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	
C.10.c	**For a specific associated earth station:**									C.10.c	

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C.10.c.1	the geographical coordinates of the antenna site		**X**	**X**	**X**			**X**		C.10.c.1	
C.10.c.2	the country or geographical area in which the earth station is located, using the symbols from the Preface		**X**	**X**	**X**			**X**		C.10.c.2	
C.10.d	**For an associated earth station (whether specific or typical):**									C.10.d	
C.10.d.1	the class of station, using the symbols from the Preface		**X**	**X**	**X**					C.10.d.1	
C.10.d.2	the nature of service performed, using the symbols from the Preface		**X**	**X**	**X**					C.10.d.2	
C.10.d.3	the isotropic gain, in dBi, of the antenna in the direction of maximum radiation (see No. **1.160**)		**X**	**X**	**X**		**X**	**X**	**X**	C.10.d.3	
C.10.d.4	the beamwidth, in degrees, between the half-power points (described in detail if not symmetrical)		**O**	**X**	**X**		**X**	**X**	**X**	C.10.d.4	
C.10.d.5.a	either the measured co-polar radiation pattern of the antenna or the co-polar reference radiation pattern		**X**	**X**	**X**		**X**	**X**	**X**	C.10.d.5.a	
C.10.d.5.b	either the measured cross-polar radiation pattern of the antenna or the cross-polar reference radiation pattern						**X**	**X**		C.10.d.5.b	
C.10.d.6	if the associated station is a receiving earth station, the lowest total receiving system noise temperature, in kelvins, referred to the output of the receiving antenna of the earth station under clear-sky conditions		+	+	+				+	C.10.d.6	
C.10.d.7	the antenna diameter, in metres In cases other than Appendix **30A**, required only for fixed-satellite service networks or systems operating in the frequency bands 13.75-14 GHz, 14.5-14.75 GHz (in countries listed in Resolution **163 (WRC-15)** not for feeder links for the broadcasting-satellite service), 14.5-14.8 GHz (in countries listed in Resolution **164 (WRC-15)** not for feeder links for the broadcasting-satellite service), 24.65-25.25 GHz (Region 1), 24.65-24.75 GHz (Region 3) and 51.4-52.4 GHz and for maritime mobile-satellite service networks or systems operating in the frequency band 14-14.5 GHz			+	+			**X**		C.10.d.7	
C.10.d.8	the equivalent antenna diameter (i.e. the diameter, in metres, of a parabolic antenna with the same off-axis performance as the receiving associated earth station antenna)						**X**			C.10.d.8	
C.10.d.9	antenna dimension aligned with the geostationary arc (D_{GSO}), in metres (see the most recent version of Recommendation ITU-R S.1855) Except for Appendix **30** or **30A**			**O**					**O**	C.10.d.9	
C.10.d.10	the minimum elevation angle at which any associated Appendix **30B** A-ESIM can transmit to geostationary satellite Required only for the notification of aeronautical earth stations in motion submitted in accordance with Resolution **COM5/2 (WRC-23)** Not required for a submission under Appendix **30B**								+	C.10.d.10	
C.10.d.11	the aircraft fuselage attenuation mask associated with the Appendix **30B** A-ESIM and based on ITU-R Recommendations. If none provided, the fuselage attenuation mask in Table 4 of Annex 4 to Resolution **COM5/2 (WRC-23)** Required only for the notification of aeronautical earth stations in motion submitted in accordance with Resolution **COM5/2 (WRC-23)** Not required for a submission under Appendix **30B**								+	C.10.d.11	

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C.11	**SERVICE AREA (S)** *For all space applications except active or passive sensors*									**C.11**	
C.11.a	the service area or areas of the satellite beam on the Earth, when the associated transmitting or receiving stations are earth stations For a space station submitted in accordance with Appendix **30**, **30A** or **30B**, the service area identified by a set of a maximum of 100 test points and by a service area contour on the surface of the Earth or defined by a minimum elevation angle *Note* – When an assignment converted from an allotment is reinstated in the Appendix **30B** Plan, the notifying administration may choose a maximum of 20 test points within its national territory for the reinstated allotment		**X**	**X**	**X**		**X**	**X**	**X**	C.11.a	
C.11.b	the appropriate information required to calculate the affected region (as defined in Recommendation ITU-R M.1187-1) Required only for a non-geostationary space station in the mobile-satellite service submitted in accordance with No. **9.11A** in frequency bands between 1 and 3 GHz				+					C.11.b	
C.12	**REQUIRED PROTECTION RATIO**									**C.12**	
C.12.a	if the aggregate carrier-to-interference ratio is less than 21 dB, the minimum acceptable aggregate carrier-to-interference ratio The carrier-to-interference ratio is to be expressed in terms of the power averaged over the necessary bandwidth of the modulated wanted and interfering signals, assuming both the desired carrier and interfering signals have equivalent bandwidths and modulation types Not required for Appendix **30B** ESIM								+	C.12.a	
C.13	**CHARACTERISTICS OF OBSERVATIONS FOR RADIO ASTRONOMY STATIONS**									**C.13**	
C.13.a	the class of observations to be taken on the frequency band shown under C.3.b – Class A observations are those in which the sensitivity of the equipment is not a primary factor – Class B observations are those of such a nature that they can be made only with advanced low-noise receivers using the best techniques									C.13.a	**X**
C.13.b	the type of radio astronomy station in the frequency band shown under C.3.b – Single-dish, “S”, telescope used for spectral-line or continuum observations using single-dishes or closely connected arrays – Very long baseline interferometry (VLBI), “V”, station used only for VLBI observations									C.13.b	**X**
C.13.c	the minimum elevation angle θ_{min} at which the radio astronomy station conducts single-dish or VLBI observations in the frequency band									C.13.c	**X**
C.14	**Not used**									**C.14**	
C.15	**DESCRIPTION OF THE GROUP(S) REQUIRED IN THE CASE OF NON-SIMULTANEOUS EMISSIONS**									**C.15**	
C.15.a	if part of an exclusive operation group, the group identification code					+	+	+		C.15.a	
C.16	**DESCRIPTION OF ACTIVE AND PASSIVE SENSOR SYSTEMS**									**C.16**	
C.16.a	**For active sensors:**									C.16.a	
C.16.a.1	the pulse length, in μs		**X**	**X**	**X**					C.16.a.1	
C.16.a.2	the pulse repetition frequency, in kHz		**X**	**X**	**X**					C.16.a.2	
C.16.b	**For passive sensors:**									C.16.b	
C.16.b.1	the sensitivity threshold, in kelvins		**X**	**X**	**X**					C.16.b.1	

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TABLE D

OVERALL LINK CHARACTERISTICS (Rev.WRC-23)

Items in Appendix	*D – OVERALL LINK CHARACTERISTICS*	Advance publication of a geostationary-satellite network	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) or for an Appendix 30B ESIM in accordance with Resolution COM5/2 (WRC-23)	Items in Appendix	Radio astronomy
	For non-planned services, this data may be provided by administrations that so desire but only when simple frequency-changing transponders are used on the space station onboard a geostationary satellite										
D.1	**CONNECTION BETWEEN EARTH-TO-SPACE AND SPACE-TO-EARTH FREQUENCIES IN THE NETWORK**									**D.1**	
D.1.a	the connection between uplink and downlink frequency assignments for each intended combination of receiving and transmitting beams In the case of Appendix **30** or **30A**, required only for Region 2 In the case of Appendix **30B**, required only for submission of both Earth-to-space and space-to-Earth links			**O**			+	+	+	D.1.a	
D.2	**TRANSMISSION GAINS AND ASSOCIATED EQUIVALENT SATELLITE LINK NOISE TEMPERATURES**									**D.2**	
D.2.a	**For each entry under D.1.a:**									D.2.a	
D.2.a.1	the lowest equivalent satellite link noise temperature These values shall be indicated for the nominal value of the angle of elevation			**O**						D.2.a.1	
D.2.a.2	the associated transmission gain of the lowest equivalent satellite link noise temperature These values shall be indicated for the nominal value of the angle of elevation The transmission gain is evaluated from the output of the receiving antenna of the space station to the output of the receiving antenna of the earth station			**O**						D.2.a.2	
D.2.b.1	the values of associated equivalent satellite link noise temperature that correspond to the highest ratio of transmission gain to equivalent satellite link noise temperature			**O**						D.2.b.1	
D.2.b.2	the values of transmission gain that correspond to the highest ratio of transmission gain to equivalent satellite link noise temperature			**O**						D.2.b.2	

Agenda item 9.2

APPENDIX 5 (REV.WRC-19)

Identification of administrations with which coordination is to be effected or agreement sought under the provisions of Article 9

MOD

1 For the purpose of effecting coordination under Article **9**, except in the case under No. **9.21**, and for identifying the administrations with which coordination is to be effected, the frequency assignments to be taken into account are those in the same frequency band as the planned assignment, pertaining to the same service or to another service to which the frequency band is allocated with equal rights or a higher category[1] of allocation, which might affect or be affected, as appropriate, and which are: (WRC-15)

a) in conformity with No. **11.31**[2]; and

b) either recorded in the Master International Frequency Register (Master Register) with a favourable finding with respect to No. **11.32**; or

c) recorded in the Master Register with an unfavourable finding with respect to No. **11.32** and a favourable finding with respect to No. **11.32A** or No. **11.33**, as appropriate; or

cbis) recorded in the Master Register under No. **11.41**; or (WRC-03)

d) coordinated under the provisions of Article **9**; or

e) included in the coordination procedure with effect from the date of receipt by the Radiocommunication Bureau, in accordance with No. **9.34**, of those characteristics specified in Appendix **4** as mandatory or required, or from the date of dispatch, in accordance with No. **9.29**, of the appropriate information listed in Appendix **4**; or (WRC-23)

f) where appropriate, in conformity with a world or regional allotment or assignment plan and the associated provisions;

g) for terrestrial radiocommunication stations or earth stations operating in the opposite direction of transmission[3] and, in addition, operating in accordance with these Regulations, or to be so operated prior to the date of bringing the earth station assignment into service, or within the next three years from the date of dispatch of coordination data under No. **9.29**, whichever is the longer, or from the date of the publication referred to in No. **9.38**, as appropriate. (WRC-2000)

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[1] The coordination under Nos. **9.11A** to **9.19** applies only to assignments in frequency bands allocated with equal rights. (WRC-15)

[2] For the purpose of effecting coordination, an assignment for which the process of obtaining agreement under No. **9.21** has been initiated is considered to be in conformity with No. **11.31** with respect to No. **9.21**.

[3] The associated space network characteristics must have been communicated to the Bureau under No. **9.30** or under § 4.1.3/4.2.6 of Article 4 of Appendix **30** or § 4.1.3/4.2.6 of Article 4 of Appendix **30A**. (WRC-2000)

Agenda item 1.19

MOD

TABLE 5-1 (Rev.WRC-23)

Technical conditions for coordination
(see Article **9**)

...

Reference of Article 9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **9.7** GSO/GSO (*cont.*)		2*bis*) 13.4-13.65 GHz (Region 1)	i) Bandwidth overlap, and ii) any network in the space research service (SRS) or any network in the FSS and any associated space operation functions (see No. **1.23**) with a space station within an orbital arc of ±6° of the nominal orbital position of a proposed network in the FSS or SRS		
		3) 17.7-19.7 GHz, (Region 3), 17.3-19.7 GHz (Regions 1 and 2) and 27.5-29.5 GHz	i) Bandwidth overlap, and ii) any network in the FSS and any associated space operation functions (see No. **1.23**) with a space station within an orbital arc of ±8° of the nominal orbital position of a proposed network in the FSS		
		3*bis*) 19.7-20.2 GHz and 29.5-30 GHz	i) Bandwidth overlap, and ii) any network in the FSS or in the mobile-satellite service (MSS) and any associated space operation functions (see No. **1.23**) with a space station within an orbital arc of ±8° of the nominal orbital position of a proposed network in the FSS or in the MSS.		

Agenda item 9.2

MOD

TABLE 5-1 (Rev.WRC-23)

Technical conditions for coordination
(see Article **9**)

TABLE 5-1 (*continued*) (REV.WRC-23)

Reference of Article 9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **9.11** GSO, non-GSO/ terrestrial	A space station in the BSS in any band shared on an equal primary basis with terrestrial services and where the BSS is not subject to a Plan, in respect of terrestrial services	1 452-1 492 MHz 2 310-2 360 MHz (No. **5.393**) 2 535-2 655 MHz (No. **5.418**) 17.7-17.8 GHz (Region 2) 74-76 GHz	Bandwidths overlap: The detailed conditions for the application of No. **9.11** in the bands 2 630-2 655 MHz and 2 605-2 630 MHz are provided in Resolution **539 (Rev.WRC-19)** for non-GSO BSS (sound) systems pursuant to No. **5.418**, and in No. **5.418** for GSO BSS (sound) networks pursuant to those provisions. The detailed conditions for the application of No. **9.11** in the frequency band 1 452-1 492 MHz are provided in Resolution **761 (Rev.WRC-19)** for Regions 1 and 3. The coordination thresholds for the application of No. **9.11** in the frequency band 17.7-17.8 GHz correspond to the pfd limits specified in Table **21-4** for the FSS in the same frequency band.	Check by using the assigned frequencies and bandwidths	
…					

Agenda item 1.7

ANNEX 1 (REV.WRC-19)

1 Coordination thresholds for sharing between MSS (space-to-Earth) and terrestrial services in the same frequency bands and between non-GSO MSS feeder links (space-to-Earth) and terrestrial services in the same frequency bands and between RDSS (space-to-Earth) and terrestrial services in the same frequency bands (WRC-12)

MOD

1.1 Below 1 GHz*

1.1.1 In the frequency bands 137-138 MHz and 400.15-401 MHz, coordination of a space station of the MSS (space-to-Earth) with respect to terrestrial services (except aeronautical mobile (OR) service networks operated by the administrations listed in Nos. **5.204** and **5.206** as of 1 November 1996) is required only if the pfd produced by this space station exceeds −125 dB(W/(m^2 · 4 kHz)) at the Earth's surface.

1.1.2 In the frequency band 137-138 MHz, coordination of a space station of the MSS (space-to-Earth) with respect to the aeronautical mobile (OR) service is required only if the pfd produced by this space station at the Earth's surface exceeds:

– −125 dB(W/(m^2 · 4 kHz)) for networks for which complete Appendix **3**** coordination information has been received by the Bureau prior to 1 November 1996;

– −140 dB(W/(m^2 · 4 kHz)) for networks for which complete Appendix **4/S4/3**** coordination information has been received by the Bureau after 1 November 1996 for the administrations referred to in § 1.1.1 above.

1.1.3 In the frequency band 137-138 MHz, coordination is also required for a space station on a replacement satellite of a MSS network for which complete Appendix **3**** coordination information has been received by the Bureau prior to 1 November 1996 and the pfd exceeds −125 dB(W/(m^2 · 4 kHz)) at the Earth's surface for the administrations referred to in § 1.1.1 above.

1.1.4 In the frequency band 132-137 MHz, coordination of a space station of the aeronautical mobile-satellite (R) service (space-to-Earth) with respect to the aeronautical mobile (OR) service is required only if the pfd produced by this space station exceeds −140 dB(W/(m^2 · 4 kHz)) on the territory of countries listed in No. **5.201** or No. **5.202**.

1.1.5 In the frequency band 117.975-137 MHz, coordination of a space station of the aeronautical mobile-satellite (R) service (space-to-Earth) with respect to the aeronautical mobile (R) service is required only if the pfd produced by this space station exceeds −150 dB(W/(m^2 · 4 kHz)) at the Earth's surface over the territory of a country.

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* These provisions apply only to the MSS.

** *Note by the Secretariat*: Edition of 1990, revised in 1994.

Agenda item 9.2

APPENDIX 7 (REV.WRC-19)

Methods for the determination of the coordination area around an earth station in frequency bands between 100 MHz and 105 GHz

MOD

1 Introduction

This Appendix addresses the determination of the coordination area (see No. **1.171**) around a transmitting or receiving earth station that is sharing spectrum in frequency bands between 100 MHz and 105 GHz with terrestrial radiocommunication services or with earth stations operating in the opposite direction of transmission.

The coordination area represents the area surrounding an earth station sharing the same frequency band with terrestrial stations, or the area surrounding a transmitting earth station that is sharing the same bidirectionally allocated frequency band with receiving earth stations, within which the permissible level of interference may be exceeded and hence coordination is required. The coordination area is determined on the basis of known characteristics for the coordinating earth station and on conservative assumptions for the propagation path and for the system parameters for the unknown terrestrial stations (see Tables 7 and 8), or the unknown receiving earth stations (see Table 9), that are sharing the same frequency band.

Throughout this Appendix, the word “unknown”, when applied to terrestrial stations or earth stations, refers to such stations whose specific operational parameters and potential location within the coordination area are unknown.

Agenda item 1.13

ANNEX 7

System parameters and predetermined coordination distances for determination of the coordination area around an earth station

3 Horizon antenna gain for a receiving earth station with respect to a transmitting earth station

MOD

TABLE 7b (Rev.WRC-23)

Parameters required for the determination of coordination distance for a transmitting earth station

Transmitting space radiocommunication service designation		**Fixed-satellite, mobile-satellite**	**Aeronautical mobile-satellite (R) service**	**Aeronautical mobile-satellite (R) service**	**Fixed-satellite**	**Fixed-satellite**	**Fixed-satellite**	**Fixed-satellite**		**Earth exploration-satellite, space operation, space research**		**Fixed-satellite, mobile-satellite, meteorological-satellite**		**Fixed-satellite**		**Fixed-satellite**		**Fixed-satellite**	**Space research**		**Fixed-satellite** [3]	**Fixed-satellite**	**Fixed-satellite** [3]
Frequency bands (GHz)		2.655-2.690	5.030-5.091	5.030-5.091	5.091-5.150	5.091-5.150	5.725-5.850	5.725-7.075		7.100-7.250 [5]		7.900-8.400		10.7-11.7		12.5-14.8		13.75-14.3	14.8-15.35		15.43-15.65	17.7-18.4	19.3-19.7
Receiving terrestrial service designations		Fixed, mobile	Aeronautical radio-navigation	Aeronautical mobile (R)	Aeronautical radio-navigation	Aeronautical mobile (R)	Radiolocation	Fixed, mobile		Fixed, mobile		Fixed, mobile		Fixed, mobile		Fixed, mobile		Radiolocation radionavigation (land only)	Fixed, mobile		Aeronautical radionavigation	Fixed, mobile	Fixed, mobile
Method to be used		§ 2.1	§ 2.1, § 2.2	§ 2.1, § 2.2			§ 2.1	§ 2.1		§ 2.1, § 2.2		§ 2.1		§ 2.1		§ 2.1, § 2.2		§ 2.1	§ 2.1, § 2.2			§ 2.1, § 2.2	§ 2.2
Modulation at terrestrial station [1]		A						A	N	A	N	A	N	A	N	A	N	–	A	N		N	N
Terrestrial station interference parameters and criteria	p_0 (%)	0.01						0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0,01	0,005		0.005	0.005
	n	2						2	2	2	2	2	2	2	2	2	2	1	2	2		2	2
	p (%)	0.005						0.005	0.0025	0.005	0.0025	0.005	0.0025	0.005	0.0025	0.005	0.0025	0.01	0,005	0,0025		0.0025	0.0025
	N_L (dB)	0						0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
	M_s (dB)	26 [2]						33	37	33	37	33	37	33	40	33	40	1	33	40		25	25
	W (dB)	0						0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
Terrestrial station parameters	G_x (dBi) [4]	49 [2]	6	10	6	6		46	46	46	46	46	46	50	50	52	52	36	52	52		48	48
	T_e (K)	500 [2]						750	750	750	750	750	750	1 500	1 100	1 500	1 100	2 636	1 500	1 100		1 100	1 100
Reference bandwidth	B (Hz)	4×10^3	150×10^3	37.5×10^3	150×10^3	10^6		4×10^3	10^6	4×10^3	10^6	4×10^3	10^6	4×10^3	10^6	4×10^3	10^6	10^7	4×10^3	10^6		10^6	10^6
Permissible interference power	$P_r(p)$ (dBW) in B	−140	−160	−157	−160	−143		−131	−103	−131	−103	−131	−103	−128	−98	−128	−98	−131	−128	−98		−113	−113

[1] A: analogue modulation; N: digital modulation.

[2] The parameters for the terrestrial station associated with transhorizon systems have been used. Line-of-sight radio-relay parameters associated with the frequency band 5 725-7 075 MHz may also be used to determine a supplementary contour with the exception that G_x = 37 dBi.

[3] Feeder links of non-geostationary satellite systems in the mobile-satellite service.

[4] Feeder losses are not included.

[5] Actual frequency bands are 7 190-7 250 MHz for the Earth exploration-satellite service, 7 100-7 155 MHz and 7 190-7 235 MHz for the space operation service and 7 145-7 235 MHz for the space research service.

MOD

TABLE 8c (Rev.WRC-23)

Parameters required for the determination of coordination distance for a receiving earth station **Receiving space radiocommunication service designation**			**Fixed-satellite**		**Fixed-satellite, radio-determination satellite**	**Fixed-satellite**	**Fixed-satellite**		**Meteoro-logical-satellite** [7, 8]	**Meteoro-logical-satellite** [9]	**Earth exploration-satellite** [7]	**Earth exploration-satellite** [9]	**Space research** [10]		**Fixed-satellite**		**Broadcasting-satellite**		**Space research**	**Broadcasting-satellite**	**Fixed-satellite** [7]
													Deep space								
Frequency bands (GHz)			4.500-4.800		5.150-5.216	6.700-7.075	7.250-7.750		7.450-7.550	7.750-7.900	8.025-8.400	8.025-8.400	8.400-8.450	8.450-8.500	10.7-12.75 13.4-13.65 [7]		12.5-12.75 [12]		14.8-15.35	17.7-17.8	17.7-18.8 19.3-19.7
Transmitting terrestrial service designations			Fixed, mobile		Aeronautical radionavigation	Fixed, mobile	Fixed, mobile		Fixed, mobile	Fixed, mobile	Fixed, mobile	Fixed, mobile	Fixed, mobile		Fixed, mobile		Fixed, mobile		Fixed, mobile	Fixed	Fixed, mobile
Method to be used			§ 2.1		§ 2.1	§ 2.2	§ 2.1		§ 2.1, § 2.2	§ 2.2	§ 2.1	§ 2.2	§ 2.2		§ 2.1, § 2.2		§ 1.4.5		§ 2.1, § 2.2	§ 1.4.5	§ 2.1
Modulation at earth station [1]			A	N		N	A	N	N	N	N	N	N	N	A	N	A	N	N		N
Earth station interference parameters and criteria	p_0 (%)		0.03	0.005		0.005	0.03	0.005	0.002	0.001	0.083	0.011	0.001	0.1	0.03	0.003	0.03	0.003	0.1		0.003
	n		3	3		3	3	3	2	2	2	2	1	2	2	2	1	1	2		2
	p (%)		0.01	0.0017		0.0017	0.01	0.0017	0.001	0.0005	0.0415	0.0055	0.001	0.05	0.015	0.0015	0.03	0.003	0.05		0.0015
	N_L (dB)		1	1		1	1	1	–	–	1	0	0	0	1	1	1	1	0		1
	M_s (dB)		7	2		2	7	2	–	–	2	4.7	0.5	1	7	4	7	4	1		6
	W (dB)		4	0		0	4	0	–	–	0	0	0	0	4	0	4	0	0		0
Terrestrial station parameters	E (dBW) in B [2]	A	92 [3]	92 [3]		55	55	55	55	55	55	55	25 [5]	25 [5]	40	40	55	55	32		35
		N	42 [4]	42 [4]		42	42	42	42	42	42	42	−18	−18	43	43	42	42	40	40	40
	P_t (dBW) in B	A	40 [3]	40 [3]		13	13	13	13	13	13	13	−17 [5]	−17 [5]	−5	−5	10	10	−5		−10
		N	0	0		0	0	0	0	0	0	0	−60	−60	−2	−2	−3	−3	−5	−7	−5
	G_x (dBi)		52 [3, 4]	52 [3, 4]		42	42	42	42	42	42	42	42	42	45	45	45	45	35	47	45
Reference bandwidth [6]	B (Hz)		10^6	10^6		10^6	10^6	10^6	10^7	10^7	10^6	10^6	1	1	10^6	10^6	27×10^6	27×10^6	10^6		10^6
Permissible interference power	$P_r(p)$ (dBW) in B					−151.2			−125	−125	−154 [11]	−142	−220	−216			−131	−131	−156		

Notes to Table 8c:

Parameters required for the determination of coordination distance for a receiving earth station **Receiving space radiocommunication service designation**	**Fixed-satellite**	**Fixed-satellite, radio-determination satellite**	**Fixed-satellite**	**Fixed-satellite**	**Meteoro-logical-satellite** [7, 8]	**Meteoro-logical-satellite** [9]	**Earth exploration-satellite** [7]	**Earth exploration-satellite** [9]	**Space research** [10]	**Fixed-satellite**	**Broadcasting-satellite**	**Space research**	**Broadcasting-satellite**	**Fixed-satellite** [7]

1 A: analogue modulation; N: digital modulation.

2 E is defined as the equivalent isotropically radiated power of the interfering terrestrial station in the reference bandwidth.

3 In this band, the parameters for the terrestrial stations associated with transhorizon systems have been used. If an administration believes that transhorizon systems do not need to be considered, the line-of-sight radio-relay parameters associated with the frequency band 3.4-4.2 GHz may be used to determine the coordination area.

4 Digital systems assumed to be non-transhorizon. Therefore $G_x = 42.0$ dBi. For digital transhorizon systems, parameters for analogue transhorizon systems above have been used.

5 These values are estimated for 1 Hz bandwidth and are 30 dB below the total power assumed for emission.

6 In certain systems in the fixed-satellite service it may be desirable to choose a greater reference bandwidth B. However, a greater bandwidth will result in smaller coordination distances and a later decision to reduce the reference bandwidth may require recoordination of the earth station.

7 Geostationary-satellite systems.

8 Non-geostationary satellites in the meteorological-satellite service notified in accordance with No. **5.461A** may use the same coordination parameters.

9 Non-geostationary satellite systems.

10 Space research earth stations in the frequency band 8.4-8.5 GHz operate with non-geostationary satellites.

11 For large earth stations: $P_r(p) = (G - 180)$ dBW

For small earth stations: $P_r(20\%) = 2\,(G - 26) - 140$ dBW for $26 < G \leq 29$ dBi

$P_r(20\%) = G - 163$ dBW for $G > 29$ dBi

$P_r(p)\% = G - 163$ dBW for $G \leq 26$ dBi

12 Applies to the broadcasting-satellite service in unplanned bands in Region 3.

Agenda item 1.11

MOD

APPENDIX 14 (REV.WRC-23)

Phonetic alphabet and figure code

(See Articles **32** and **57**) (WRC-23)

APPENDIX 15 (REV.WRC-19)

Frequencies for distress and safety communications for the Global Maritime Distress and Safety System

MOD

TABLE 15-1 (WRC-23)

Frequencies below 30 MHz

Frequency (kHz)	Description of usage	Notes
490	MSI	The frequency 490 kHz is used exclusively for maritime safety information (MSI). (WRC-03)
500	MSI	The frequency 500 kHz is used exclusively by the international NAVDAT system (see Resolution **COM4/1 (WRC-23)**).
518	MSI	The frequency 518 kHz is used exclusively by the international NAVTEX system.
*2 182	RTP-COM	The frequency 2 182 kHz uses class of emission J3E. See also No. **52.190**.
*2 187.5	DSC	
3 023	AERO-SAR	The aeronautical carrier (reference) frequencies 3 023 kHz and 5 680 kHz may be used for intercommunication between mobile stations engaged in coordinated search and rescue operations, and for communication between these stations and participating land stations, in accordance with the provisions of Appendix **27** (see Nos. **5.111** and **5.115**).
*4 125	RTP-COM	See also No. **52.221**. The carrier frequency 4 125 kHz may be used by aircraft stations to communicate with stations of the maritime mobile service for distress and safety purposes, including search and rescue (see No. **30.11**).
*4 207.5	DSC	
4 209.5	MSI	The frequency 4 209.5 kHz is exclusively used for NAVTEX-type transmissions (see Resolution **339 (Rev.WRC-07)**).
4 210	MSI-HF	By means of narrow-band direct-printing telegraphy.
4 226	MSI	The frequency 4 226 kHz is exclusively used for the international NAVDAT system (see Resolution **COM4/1 (WRC-23)**).
5 680	AERO-SAR	See note under 3 023 kHz above.
*6 215	RTP-COM	See also No. **52.221**.

Frequency (kHz)	Description of usage	Notes
*6 312	DSC	

TABLE 15-1 (*end*) (WRC-23)

Frequency (kHz)	Description of usage	Notes
6 314	MSI-HF	By means of narrow-band direct-printing telegraphy.
6 337.5	MSI-HF	By means of the NAVDAT system.
*8 291	RTP-COM	
*8 414.5	DSC	
8 416.5	MSI-HF	By means of narrow-band direct-printing telegraphy.
8 443	MSI-HF	By means of the NAVDAT system.
*12 290	RTP-COM	
*12 577	DSC	
12 579	MSI-HF	By means of narrow-band direct-printing telegraphy.
12 663.5	MSI-HF	By means of the NAVDAT system.
*16 420	RTP-COM	
*16 804.5	DSC	
16 806.5	MSI-HF	By means of narrow-band direct-printing telegraphy.
16 909.5	MSI-HF	By means of the NAVDAT system.
19 680.5	MSI-HF	By means of narrow-band direct-printing telegraphy.
22 376	MSI-HF	By means of narrow-band direct-printing telegraphy.
22 450.5	MSI-HF	By means of the NAVDAT system.
26 100.5	MSI-HF	By means of narrow-band direct-printing telegraphy.

Legend:

AERO-SAR These aeronautical carrier (reference) frequencies may be used for distress and safety purposes by mobile stations engaged in coordinated search and rescue operations.

DSC These frequencies are used exclusively for distress and safety calls using digital selective calling in accordance with No. **32.5** (see Nos. **33.8** and **33.32**). (WRC-07)

MSI In the maritime mobile service, these frequencies are used exclusively for the transmission of maritime safety information (MSI) (including meteorological and navigational warnings and urgent information) by coast stations to ships, by means of narrow-band direct-printing telegraphy or the NAVDAT system. (WRC-23)

MSI-HF In the maritime mobile service, these frequencies are used exclusively for the transmission of high seas MSI by coast stations to ships, by means of narrow-band direct-printing telegraphy or the NAVDAT system. (WRC-23)

RTP-COM These carrier frequencies are used for distress and safety communications (traffic) by radiotelephony.

* Except as provided in these Regulations, any emission capable of causing harmful interference to distress, alarm, urgency or safety communications on the frequencies denoted by an asterisk (*) is prohibited. Any emission causing harmful interference to distress and safety communications on any of the discrete frequencies identified in this Appendix is prohibited. (WRC-07)

MOD

TABLE 15-2 (*end*) (WRC-23)

Frequency (MHz)	Description of usage	Notes
...	...	...
1 614.4225-1 618.725 or 1 616.3-1 620.38 MHz (Earth-to-space) (see *resolves* 5 of Resolution **COM4/5 (WRC-23)**)	SAT-COM	In addition to its availability for routine non-safety purposes, the frequency band 1 614.4225-1 618.725 MHz or 1 616.3-1 620.38 MHz (Earth-to-space) (see *resolves* 5 of Resolution **COM4/5 (WRC-23)**) is used for distress and safety purposes in the Earth-to-space direction in the maritime mobile-satellite service. GMDSS distress, urgency and safety communications have priority in this band over non-safety communication within the same satellite network (see No. **5.368**).
...	...	...
2 483.59-2 499.91	SAT-COM	In addition to its availability for routine non-safety purposes, the frequency band 2 483.59-2 499.91 MHz is used for distress and safety purposes in the space-to-Earth direction in the maritime mobile-satellite service. GMDSS distress, urgency and safety communications have priority in this band over non-safety communication within the same satellite network (see No. **5.368**).
...	...	...
Note: For the frequency bands 1 614.4225-1 618.725 MHz or 1 616.3-1 620.38 MHz (Earth-to-space) (see *resolves* 5 of Resolution **COM4/5 (WRC-23)**) and 2 483.59-2 499.91 MHz (space-to-Earth) when used for GMDSS, Resolution **COM4/5 (WRC-23)** applies.		

...

MOD

TABLE 15-2 (*end*) (WRC-23)

Frequencies above 30 MHz (VHF/UHF)

Frequency (MHz)	Description of usage	Notes
…		
1 645.5-1 646.5	SAT-COM	See No. **5.375**. (WRC-23)
…		

APPENDIX 17 (REV.WRC-19)

Frequencies and channelling arrangements in the high-frequency bands for the maritime mobile service

MOD

PART A – Table of subdivided bands (WRC-23)

In the Table, where appropriate[1], the assignable frequencies in a given band for each usage are:

– indicated by the lowest and highest frequency, in heavy type, assigned in that band;

– regularly spaced, the number of assignable frequencies (*f.*) and the spacing in kHz being indicated in italics.

Table of frequencies (kHz) to be used in the band between 4 000 kHz and 27 500 kHz allocated exclusively to the maritime mobile service (*end*)

Band (MHz)	**4**	**6**	**8**	**12**	**16**	**18/19**	**22**	**25/26**
Limits (kHz)	4 221	6 332.5	8 438	12 658.5	16 904.5	19 705	22 445.5	26 122.5
Frequencies assignable for wide-band systems, facsimile, special and data transmission systems and direct-printing telegraphy systems *m) p) s) pp) ppp)*								
…								

...

j) For the automatic connection system (ACS), the assigned frequencies 4 177.5 kHz, 6 268 kHz, 8 376.5 kHz, 12 520 kHz and 16 695 kHz shall be used by ship and coast stations. (WRC-23)

...

p) These sub-bands are designated for digitally modulated emissions in the maritime mobile service (e.g. as described in the most recent version of Recommendation ITU-R M.1798). The provisions of No. **15.8** apply. (WRC-23)

pp) The frequency bands 4 221-4 231 kHz, 6 332.5-6 342.5 kHz, 8 438-8 448 kHz, 12 658.5-12 668.5 kHz, 16 904.5-16 914.5 kHz and 22 445.5-22 455.5 kHz may also be used by the NAVDAT system, on condition that the use of NAVDAT system transmitting stations is limited to coast stations operating in accordance with the most recent version of Recommendation ITU-R M.2058. (WRC-19)

ppp) The frequency 4 226 kHz is an exclusive frequency for the international NAVDAT system and the frequencies 6 337.5 kHz, 8 443 kHz, 12 663.5 kHz, 16 909.5 kHz and 22 450.5 kHz are the frequencies for the transmission of MSI by means of the national NAVDAT system (see Articles **31**, **33** and **52**). (WRC-23)

PART B – Channelling arrangements (WRC-15)

MOD

Section II – Narrow-band direct-printing telegraphy (paired frequencies)

---

1 Within the non-shaded boxes.

Table of frequencies for two-frequency operation by coast stations (kHz)

Channel No.	4 MHz band		6 MHz band		8 MHz band	
	Transmit	Receive	Transmit	Receive	Transmit	Receive
1	4 210.5	4 172.5	6 314.5	6 263		
2	4 211	4 173	6 315	6 263.5	8 417	8 377
3	4 211.5	4 173.5	6 315.5	6 264	8 417.5	8 377.5
4	4 212	4 174	6 316	6 264.5	8 418	8 378
5	4 212.5	4 174.5	6 316.5	6 265	8 418.5	8 378.5
6	4 213	4 175	6 317	6 265.5	8 419	8 379
7	4 213.5	4 175.5	6 317.5	6 266	8 419.5	8 379.5
8	4 214	4 176	6 318	6 266.5	8 420	8 380
9	4 214.5	4 176.5	6 318.5	6 267	8 420.5	8 380.5
10	4 215	4 177	6 319	6 267.5	8 421	8 381
11					8 421.5	8 381.5
12	4 215.5	4 178	6 319.5	6 268.5	8 422	8 382
13	4 216	4 178.5	6 320	6 269	8 422.5	8 382.5
14			6 320.5	6 269.5	8 423	8 383
15					8 423.5	8 383.5

Table of frequencies for two-frequency operation by coast stations (kHz)

Channel No.	12 MHz band		16 MHz band		18/19 MHz band	
	Transmit	Receive	Transmit	Receive	Transmit	Receive
1	12 579.5	12 477	16 807	16 683.5		
2	12 580	12 477.5	16 807.5	16 684		
3	12 580.5	12 478	16 808	16 684.5		
4	12 581	12 478.5	16 808.5	16 685		
5	12 581.5	12 479	16 809	16 685.5		
6	12 582	12 479.5	16 809.5	16 686		
7	12 582.5	12 480	16 810	16 686.5	19 684	18 873.5
8	12 583	12 480.5	16 810.5	16 687	19 684.5	18 874
9	12 583.5	12 481	16 811	16 687.5	19 685	18 874.5
10	12 584	12 481.5	16 811.5	16 688	19 685.5	18 875
11	12 584.5	12 482	16 812	16 688.5	19 686	18 875.5
12	12 585	12 482.5	16 812.5	16 689	19 686.5	18 876
13	12 585.5	12 483	16 813	16 689.5	19 687	18 876.5
14	12 586	12 483.5	16 813.5	16 690	19 687.5	18 877
15	12 586.5	12 484	16 814	16 690.5	19 688	18 877.5
16	12 587	12 484.5	16 814.5	16 691	19 688.5	18 878
17	12 587.5	12 485	16 815	16 691.5	19 689	18 878.5
18	12 588	12 485.5	16 815.5	16 692	19 689.5	18 879
19	12 588.5	12 486	16 816	16 692.5	19 690	18 879.5
20	12 589	12 486.5	16 816.5	16 693	19 690.5	18 880
21	12 589.5	12 487	16 817	16 693.5		
22	12 590	12 487.5	16 817.5	16 694		
23	12 590.5	12 488	16 818	16 694.5		
24	12 591	12 488.5				
25	12 591.5	12 489	16 818.5	16 695.5		
26	12 592	12 489.5	16 819	16 696		
27	12 592.5	12 490	16 819.5	16 696.5		
28	12 593	12 490.5	16 820	16 697		
29	12 593.5	12 491	16 820.5	16 697.5		
30	12 594	12 491.5	16 821	16 698		

Channel No.	12 MHz band		16 MHz band		18/19 MHz band	
	Transmit	Receive	Transmit	Receive	Transmit	Receive
31	12 594.5	12 492	16 821.5	16 698.5		
32	12 595	12 492.5				
33	12 595.5	12 493				
34	12 596	12 493.5				
35	12 596.5	12 494				
36	12 597	12 494.5				
37	12 597.5	12 495				
38	12 598	12 495.5				
39	12 598.5	12 496				
40	12 599	12 496.5				
41	12 599.5	12 497				
42	12 600	12 497.5				
43	12 600.5	12 498				
44	12 601	12 498.5				
45	12 601.5	12 499				

Table of frequencies for two-frequency operation by coast stations (kHz)

Channel No.	12 MHz band (*end*)	
	Transmit	Receive
46	12 602	12 499.5
47	12 602.5	12 500
48	12 603	12 500.5
49	12 603.5	12 501
50	12 604	12 501.5
51	12 604.5	12 502
52	12 605	12 502.5
53	12 605.5	12 503
54	12 606	12 503.5
55	12 606.5	12 504
56	12 607	12 504.5
57	12 607.5	12 505
58	12 608	12 505.5
59	12 608.5	12 506
60	12 609	12 506.5
61	12 609.5	12 507
62	12 610	12 507.5
63	12 610.5	12 508
64	12 611	12 508.5
65	12 611.5	12 509
66	12 612	12 509.5
67	12 612.5	12 510
68	12 613	12 510.5
69	12 613.5	12 511
70	12 614	12 511.5
71	12 614.5	12 512
72	12 615	12 512.5
73	12 615.5	12 513
74	12 616	12 513.5
75	12 616.5	12 514
76	12 617	12 514.5
77	12 617.5	12 515
78	12 618	12 515.5
79	12 618.5	12 516
80	12 619	12 516.5

Channel No.	12 MHz band (*end*)	
	Transmit	Receive
81	12 619.5	12 517
82	12 620	12 517.5
83	12 620.5	12 518
84	12 621	12 518.5
85	12 621.5	12 519
86	12 622	12 519.5
87		
88	12 622.5	12 520.5
89	12 623	12 521
90	12 623.5	12 521.5
91	12 624	12 522
92	12 624.5	12 522.5

Agenda item 1.9

APPENDIX 27 (REV.WRC-19)*

Frequency allotment Plan for the aeronautical mobile (R) service and related information

PART I – General provisions

Section II – Technical and operational principles used for the establishment of the Plan of allotment of frequencies in the aeronautical mobile (R) service

A – Channel characteristics and utilization

2 Frequencies allotted

ADD

27/18A Individual contiguous or non-contiguous channels complying with the provisions of the Plan[3] contained in this Appendix may be aggregated to provide wideband communication without changing the Plan of individual channels.

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* *Note by the Secretariat*: This edition of Appendix **27** incorporates editorial amendments to the Appendix **27** Aer2 as adopted by the WARC-Aer2.

The references in Appendix **27** now conform to the new numbering scheme of the Radio Regulations. In addition, the text of Appendix **27** contains updated definitions of the relevant aeronautical areas conforming with the new geographical situation reflecting the political changes since 1979. It also contains updated references to the classes of emissions in accordance with Article **2**. (WRC-03)

ADD

[3] **27**/18A.1 In particular the provisions related to protection (Part I, Section II B), power limits (Nos. **27**/60 and **27**/61), class of emission (No. **27**/58), out-of-band spectrum mask (No. **27**/74), assigned frequency (No. **27**/75), and channel spacing (No. **27**/11).

C – Classes of emission and power

1 Classes of emission

MOD

27/57 **1.1 Telephony – amplitude modulation:**

– double sideband	A3E*
– single sideband, full carrier	H3E*
– single sideband, suppressed carrier	J2E, J3E, J7E, J9E

MOD

1.2 Telegraphy and data transmission

MOD

27/58 **1.2.1 Amplitude modulation:**

– telegraphy without the use of a modulating audio frequency (by on-off keying)	A1A, A1B**
– telegraphy by the on-off keying of an amplitude modulating audio frequency or audio frequencies or by the on-off keying of the modulated emission and including selective calling, single sideband, full carrier	H2B
– multichannel voice frequency telegraphy, single sideband, suppressed carrier	J7A
– telegraphy or data transmissions using any other single sideband, suppressed carrier modulation, under the condition that the reference frequency of the transmission concerned corresponds to the list of	

* A3E and H3E to be used only on 3 023 kHz and 5 680 kHz.

** A1A, A1B and F1B are permitted provided they do not cause harmful interference to the classes of emission H2B, J2B, J2D, J2E, J3E, J7A, J7B, J7D, J7E, J9B, J9D and J9E. In addition, A1A, A1B and F1B emissions shall be in accordance with the provisions in Nos. **27**/70 to **27**/74 and care should be taken to place these emissions at or near the centre of the channel. However, a modulating audio frequency is permitted with single sideband transmitters, where the carrier is suppressed in accordance with No. **27**/69.

carrier (reference) frequencies (No. **27**/18) and its occupied bandwidth does not exceed the upper limit of J3E emissions (No. **27**/12), i.e. 2 800 Hz for each individual channel J2B, J2D, J7B, J7D, J9B, J9D

2 Power

MOD

27/60 2.1 Unless otherwise specified in Part II of this Appendix, the peak envelope powers supplied to the antenna transmission line shall not exceed the maximum values indicated in the Table below; the corresponding peak effective radiated powers being assumed to be equal to two-thirds of these values.

Class of emission	Stations	Maximum peak envelope power
H2B, J2B, J2D, J2E, J3E, J7A, J7B, J7D, J7E, J9B, J9D, J9E, A3E*, H3E*	Aeronautical stations Aircraft stations	6 kW 400 W (100% modulation)**
Other emissions such as A1A, A1B, F1B	Aeronautical stations Aircraft stations	1.5 kW 100 W

* A3E and H3E to be used only on 3 023 kHz and 5 680 kHz.

** "100% modulation" implies that during measurement or calculation, the modulation depth should be adjusted to produce the maximum peak envelope power.

Agenda item 7(H)

APPENDIX 30 (REV.WRC-19)*

Provisions for all services and associated Plans and List[1] for the broadcasting-satellite service in the frequency bands 11.7-12.2 GHz (in Region 3), 11.7-12.5 GHz (in Region 1) and 12.2-12.7 GHz (in Region 2) (WRC-03)

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* 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. See also Annex 7 for the orbital limitations. (WRC-2000)

[1] The Regions 1 and 3 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.

Note by the Secretariat: Reference to an Article with the number in roman is referring to an Article in this Appendix.

ARTICLE 4 (REV.WRC-19)

Procedures for modifications to the Region 2 Plan or for additional uses in Regions 1 and 3[3]

4.1 Provisions applicable to Regions 1 and 3

MOD

4.1.10d If no decision is communicated to the Bureau within 30 days after the date of dispatch of the reminder under § 4.1.10b and the identification is for:

– an assignment in the Regions 1 and 3 Plan, it shall be deemed that the administration which has not given a decision has no objection to the proposed assignment and an agreement under § 4.1.13*bis* is considered as concluded between the administration for the affected assignment in the Regions 1 and 3 Plan and the notifying administration for the proposed assignment; or

– an assignment not in the Regions 1 and 3 Plan, it shall be deemed that the administration which has not given a decision has agreed to the proposed assignment. (WRC-23)

ADD

4.1.13*bis* When an agreement under this provision is concluded with the administration of an affected assignment in the Regions 1 and 3 Plan, the notifying administration for the proposed assignment shall provide a firm, objective, measurable and enforceable commitment to respect the power flux-density limit shown in section 1*a)* of Annex 1 to Appendix **30** at any point within the territory, situated inside the −3 dB contour of the associated beam area, of the administration whose assignment was the basis of the disagreement at the date on which the frequency assignment in the Regions 1 and 3 Plan is to be brought into use, as communicated under § 5.1.6*bis* or within 12 months of the date of dispatch of the telefax sent under § 5.1.6*bis*, whichever comes later. (WRC-23)

ADD

4.1.13*ter* Upon the conclusion of agreements under § 4.1.13*bis*, when entering the assignment in the List, the Bureau shall indicate those administrations whose assignments in the Regions 1 and 3 Plan were the basis of the agreement. (WRC-23)

ADD

4.1.30 When an assignment is entered in the List referred to in § 4.1.13*ter*, that assignment shall not be taken into account in updating the reference situation of those assignments in the Regions 1 and 3 Plan with which an agreement under § 4.1.13*bis* was concluded. (WRC-23)

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[3] The provisions of Resolution **49 (Rev.WRC-15)** apply. (WRC-15)

ADD

4.1.31 If the Bureau is informed that a commitment under § 4.1.13*bis* is not being respected by an assignment in the List, the Bureau shall immediately consult the administration responsible for the assignment, requesting immediate respect for the conditions specified in § 4.1.13*bis*. (WRC-23)

ADD

4.1.32 If, in spite of the application of § 4.1.31, the conditions specified in § 4.1.13*bis* are still not respected by an assignment in the List, the Bureau shall submit the case, together with additional supporting materials from administrations, to the subsequent meeting of the Radio Regulations Board for review and the necessary actions. (WRC-23)

MOD

ARTICLE 5 (REV.WRC-23)

Notification, examination and recording in the Master International Frequency Register of frequency assignments to space stations in the broadcasting-satellite service[MOD 18] (WRC-07)

5.1 Notification

ADD

5.1.6*bis* Upon receipt of a complete notice, the Bureau shall immediately send a telefax to administrations which have applied § 4.1.13*bis* with regard to this notice, if any. This telefax shall inform the administrations concerned of the notification under § 5.1.1 of this notice and the date on which the frequency assignment which is the subject of the agreement under § 4.1.13*bis* is planned to be brought into use. (WRC-23)

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[18] If the payments are not received in accordance with the provisions of Council Decision 482, as amended, on the implementation of cost recovery for satellite network filings, the Bureau shall cancel the publication specified in § 5.1.6 and the corresponding entries in the Master Register under § 5.2.2, 5.2.2.1, 5.2.2.2 or 5.2.6, as appropriate, and the corresponding entries included in the Plan on and after 3 June 2000 or in the List, as appropriate, after informing the administration concerned. The Bureau shall inform all administrations of such action. The Bureau shall send a reminder to the notifying administration not later than two months prior to the deadline for the payment in accordance with the above-mentioned Council Decision 482 unless the payment has already been received. (WRC-23)

Agenda item 7(D3)

5.2 Examination and recording

MOD

5.2.10 Wherever the use of a frequency assignment to a space station recorded in the Master Register and emanating from the Regions 1 and 3 List is suspended for a period exceeding six months, the notifying administration shall inform the Bureau of the date on which such use was suspended. When the recorded assignment is brought back into use, the notifying administration shall so inform the Bureau, as soon as possible. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC. The date on which the recorded assignment is brought back into use[20*bis*, 20*ter*] shall be no later than three years from the date on which the use of the frequency assignment was suspended, provided that the notifying administration informs the Bureau of the suspension within six months from the date on which the use was suspended. If the notifying administration informs the Bureau of the suspension more than six months after the date on which the use of the frequency assignment was suspended, this three-year time period shall be reduced. In this case, the amount by which the three-year period shall be reduced shall be equal to the amount of time that has elapsed between the end of the six-month period and the date that the Bureau is informed of the suspension. If the notifying administration informs the Bureau of the suspension more than 21 months after the date on which the use of the frequency assignment was suspended, the frequency assignment shall be cancelled. (WRC-23)

ARTICLE 11 (REV.WRC-19)

Plan for the broadcasting-satellite service in the frequency bands 11.7-12.2 GHz in Region 3 and 11.7-12.5 GHz in Region 1

MOD

11.1 COLUMN HEADINGS OF THE PLAN

Col. 6 *Space station transmitting antenna pattern code.*

20*bis* The date of bringing-back-into-use of a frequency assignment to a space station in the geostationary-satellite orbit shall be the commencement of the 90-day period defined below. A frequency assignment to a space station in the geostationary-satellite orbit shall be considered as having been brought back into use when a space station in the geostationary-satellite orbit with the capability of transmitting or receiving that frequency assignment has been deployed and maintained at the notified orbital position for a continuous period of 90 days. The notifying administration shall inform the Bureau within 30 days from the end of the 90-day period. Resolution **40 (Rev.WRC-19)** shall apply. (WRC-19)

20*ter* If the notifying administration has informed the Bureau of the date of commencement of the 90-day bringing-back-into-use period, but, as of 15 days after the end of the 90-day bringing-back-into-use period, has not yet informed the Bureau of the completion of the bringing-back-into-use period in accordance with footnote 20*bis*, the Bureau shall promptly send the notifying administration a reminder of its obligation to inform the Bureau of the completion of the bringing-back-into-use period under footnote 20*bis*. (WRC-23)

...	...
R123SS	Figure 10 and § 3.13.3 in Annex 5
...	...

ADD

10 Affected administrations and corresponding networks/beams are included in the relevant AP30/P Special Section.

MOD

TABLE 2 (WRC-23)

Affected administrations and corresponding networks/beams identified based on Note 5 in § 11.2 of Article 11

Beam name	Channels	Ref. Table 1	Affected administrations*	Affected networks/beams*
ARS34000	40	c	CHN, G, J, KOR, MLA, THA, UAE, USA	AM-SAT A4, ASIASAT-AKX, ASIASAT-CKX, ASIASAT-EKX, EMARSAT-1G, JCSAT-3A, JCSAT-3B, KOREASAT-1, MEASAT-1, MEASAT-91.5E, N-SAT-110E, N-SAT-128, SJC-1, THAICOM-A2B, THAICOM-G1K
BEL01800	26, 28, 30, 32, 34, 36, 38, 40	c	PAK	PAKSAT-1
BFA10700	22, 24	c	E	HISPASAT-1, HISPASAT-2C3 KU
CYP08600	1, 3, 5, 7, 9, 11, 13	c	USA	INTELSAT7 359E, INTELSAT8 359E
FSM00000	1, 3, 5, 7, 9, 11, 13	c	USA	INTELSAT7 157E
GMB30200	1, 5, 9, 13, 17	c	USA	USASAT-26A
GNB30400	22, 24	c	E	HISPASAT-1, HISPASAT-2C3 KU
GRC10500	2, 4, 6, 8, 10, 12	c	USA	INTELSAT7 359E, INTELSAT8 359E, INTELSAT10 359E
GUI19200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	c	USA	USASAT-26A
IRL21100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	c	USA	USASAT-26A
ISL04900	27	a	GUY	GUY00302
ISL04900	29, 39	a	JMC	JMC00005
ISL04900	31, 33, 35, 37	a	GUY, JMC	GUY00302, JMC00005
ISL04900	23	c	B, USA	B-SAT I, USASAT-14L
KIR__100	1, 3, 5, 7, 9, 11, 13	c	USA	INTELSAT7 177E, USASAT-14K
KIR__100	17	c	USA	USASAT-14K
MNG24800	31, 35	c	CHN, THA	APSTAR-4, THAICOM-A2B, THAICOM-G1K
NGR11500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	c	USA	USASAT-26A
NOR12000	1, 3, 5, 7, 9, 11, 13	c	USA	INTELSAT7 359E, INTELSAT8 359E, INTELSAT10 359E
POR__100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	c	USA	USASAT-26A
RUS-4	28, 29, 33, 37	c	KOR	KOREASAT-1, KOREASAT-2
RUS-4	31, 35, 39	c	G	AM-SAT A4
SEN22200	23	c	USA	USASAT-26A
TGO22600	1, 3, 5, 7, 9, 11	c	USA	INTELSAT8 330.5E
TGO22600	13	c	E, USA	HISPASAT-1, HISPASAT-2C3 KU, INTELSAT8 330.5E
TGO22600	15, 17, 19	c	E	HISPASAT-1, HISPASAT-2C3 KU
TJK06900	26, 28, 30, 32, 34, 36, 38, 40	c	PAK	PAKSAT-1
TKM06800	26, 28, 30, 32, 34, 36, 38, 40	c	UAE	EMARSAT-1G
TON21500	2, 6, 10, 14, 18	c	USA	USASAT-14K

* Administrations and corresponding networks/beams whose assignment(s) may receive interference from the beam shown in the left-hand column.

MOD

TABLE 3 (WRC-23)

Affecting administrations and corresponding networks/beams identified based on Notes 6 and 7 in § 11.2 of Article 11

Beam name	Channels	Note	Affecting administrations*	Affecting networks/beams*
AND34100	2, 6, 10, 12, 14, 16, 18, 20	7	USA	USASAT-26A
BFA10700	22, 24	7	E	HISPASAT-1, HISPASAT-2C3 KU
CYP08600	1, 3, 5, 7, 9, 11, 13	7	USA	INTELSAT7 359E
DNK090XR	29	6	JMC	JMC00005
DNK090XR	33	6	GUY, JMC	GUY00302, JMC00005
DNK091XR	31, 35	6	GUY, JMC	GUY00302, JMC00005
FJI19300	1, 3, 5, 7, 9, 11, 13	7	HOL	INTELSAT7 183E
GMB30200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	7	USA	USASAT-26A
GNB30400	22, 24	7	E	HISPASAT-1, HISPASAT-2C3 KU
GRC10500	2, 4, 6, 8, 10, 12	7	USA	INTELSAT7 359E
GUI19200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	7	USA	USASAT-26A
IRL21100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	7	USA	USASAT-26A
ISL04900	27	6	GUY	GUY00302
ISL04900	29, 39	6	JMC	JMC00005
ISL04900	31, 33, 35, 37	6	GUY, JMC	GUY00302, JMC00005
KIR__100	1, 3, 5, 7, 9, 11, 13	7	USA	INTELSAT7 177E
MNG24800	27	7	J	SUPERBIRD-C
MNG24800	29, 31, 33, 35, 37, 39	7	J, THA	THAICOM-A2B, SUPERBIRD-C
MTN__100	22, 24, 26	7	USA	USASAT-26A
NGR11500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	7	USA	USASAT-26A
NOR12000	1, 3, 5, 7, 9, 11, 13	7	USA	INTELSAT7 359E
POR__100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	7	USA	USASAT-26A
RUS-4	25	7	J	JCSAT-1R, SUPERBIRD-C
RUS-4	28, 29	7	J, KOR	SUPERBIRD-C, KOREASAT-1, KOREASAT-2
RUS-4	31, 33, 35, 37, 39	7	J, KOR	SUPERBIRD-C, KOREASAT-1, KOREASAT-2
SEN22200	23, 25	7	USA	USASAT-26A
SMO05700	1, 3, 5, 7, 9, 11, 13	7	HOL	INTELSAT7 183E
SMR31100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	7	USA	USASAT-26A
SRL25900	27	6	GUY	GUY00302
SRL25900	29, 39	6	JMC	JMC00005
SRL25900	31, 33, 35, 37	6	GUY, JMC	GUY00302, JMC00005
TGO22600	13	7	E	HISPASAT-2C3 KU
TGO22600	15, 17, 19	7	E	HISPASAT-1, HISPASAT-2C3 KU

* Administrations and corresponding networks/beams whose assignment(s) may cause interference to the beam shown in the left-hand column.

MOD

TABLE 6A (WRC-23)

Basic characteristics of the Regions 1 and 3 Plan (sorted by administration)

1	2	3	4		5			6	7	8		9		10		11	12	13	14	15	16
Admin. symbol	Beam identification	Orbital position	Boresight		Space station antenna characteristics			Space station antenna code	Shaped beam	Space station antenna gain		Earth station antenna		Polarization		e.i.r.p.	Designation of emission	Identity of the space station	Group code	Status	Remarks
			Long.	Lat.	Major axis	Minor axis	Orien-tation			Co-polar	Cross-polar	Code	Gain	Type	Angle						
...	...	...	...	...				...		...		...	...	...		...	...	...	...	...	
AFS	AFS_SASAT3	−8.20	24.08	−28.16	2.77	1.31	37.04	R123SS		38.85		MODRES	35.50	CL		58.9	27M0G7W			P	
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			P	
ALB	ALB_SAT	−33.60	19.87	41.11	0.65	0.60	130.56	R123SS		48.54		MODRES	35.50	CR		59.3	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	
ARS	ARS_BSS	7.90	44.04	23.34	3.63	1.84	137.74	R123SS		36.20		MODRES	35.50	CL		58.9	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...		...	...	...
AZE	AZERSAT-BSS-10E	10.00	47.20	40.35	0.79	0.60	152.23	R123SS		47.69		MODRES	35.50	CR		59.1	27M0G7W			P	10
BDI	BDI_SAT	−26.80	29.79	−3.19	0.60	0.60	0.00	R123SS		48.88		MODRES	35.50	CL		59.2	27M0G7W			P	
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	...
BEN	BEN_SAT	−30.60	2.25	9.47	1.30	0.60	94.63	R123SS		45.53		MODRES	35.50	CL		58.8	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	...
BIH	BIH_SAT	−26.50	17.10	43.85	0.73	0.60	143.98	R123SS		48.03		MODRES	35.50	CL		59.2	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	
BOT	BOT_001	−26.60	23.16	−22.38	1.80	0.96	59.49	R123SS		42.07		MODRES	35.50	CL		59.1	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	
COD	COD_SAT1	−23.50	21.95	−4.43	3.53	2.20	83.44	R123SS		35.55		MODRES	35.50	CR		59.0	27M0G7W			P	10
COG	COG_SAT	−37.30	14.76	−0.74	1.77	0.68	74.77	R123SS		43.64		MODRES	35.50	CR		59.1	27M0G7W			P	
COM	COM_BSS	−3.70	43.73	−11.88	0.60	0.60	0.00	R123SS		48.88		MODRES	35.50	LE	0	59.0	27M0G7W			P	
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	
CVA	CVA_BSS	−33.60	12.47	41.90	0.60	0.60	0.00	R123SS		48.88		MODRES	35.50	CL		59.3	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	...
DJI	DJI_SAT	−17.46	42.58	11.72	0.60	0.60	0.00	R123SS		48.88		MODRES	35.50	CL		59.3	27M0G7W			P	10
...	...	...	...	...				...		...		...	...	...		...	...			...	
GAB	GAB_37.3W	−37.30	11.63	−0.69	1.22	0.71	82.94	R123SS		45.07		MODRES	35.50	CR		59.0	27M0G7W			P	
GEO	GEO_BSS	−4.10	43.22	42.30	0.96	0.60	153.15	R123SS		46.84		MODRES	35.50	LE	0	59.2	27M0G7W			P	
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	
IRQ	IRQ_SAT	−9.60	43.48	33.16	1.76	0.64	135.09	R123SS		43.93		MODRES	35.50	CR		59.2	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	...
KEN	KEN_SAT_001	−9.20	37.82	1.02	1.98	1.02	97.23	R123SS		41.39		MODRES	35.50	CL		59.0	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	
LSO	LSO_SAT	−16.00	28.25	−29.57	0.60	0.60	0.00	R123SS		48.88		MODRES	35.50	CL		59.1	27M0G7W			P	
...	...	...	...	...				...		...		...	...	...		...	...			...	
MAU	MAU_300	68.40	59.06	−15.94	2.70	1.78	135.44	R123SS		37.63		MODRES	35.50	CL		58.5	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	
MDA	MDA_SAT	−16.30	27.63	46.93	0.69	0.60	141.49	R123SS		48.28		MODRES	35.50	CR		59.3	27M0G7W			P	10

1	2	3	4		5			6	7	8		9		10		11	12	13	14	15	16
Admin. symbol	Beam identification	Orbital position	Boresight		Space station antenna characteristics			Space station antenna code	Shaped beam	Space station antenna gain		Earth station antenna		Polarization		e.i.r.p.	Designation of emission	Identity of the space station	Group code	Status	Remarks
			Long.	Lat.	Major axis	Minor axis	Orien-tation			Co-polar	Cross-polar	Code	Gain	Type	Angle						
MDG	MDG_SAT	69.50	46.55	−18.07	2.47	1.36	90.92	R123SS		39.18		MODRES	35.50	LE	90	58.7	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	
MKD	MKD_BSS	−16.70	21.79	41.62	0.60	0.60	0.00	R123SS		48.88		MODRES	35.50	CL		59.1	27M0G7W			P	10
...	...	...	...	...				...		...		...	...	...		...	...			...	
MLI	MLI_SAT_100	−42.00	-4.84	17.52	2.61	2.04	115.30	R123SS		37.18		MODRES	35.50	CL		58.9	27M0G7W			P	
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	
MOZ	MOZ_SAT	−8.20	34.22	−17.64	3.37	1.20	62.10	R123SS		38.38		MODRES	35.50	CR		59.0	27M0G7W			P	
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	
MWI	MWI_SAT	−23.50	34.03	−13.26	1.37	0.60	83.29	R123SS		45.30		MODRES	35.50	CL		59.2	27M0G7W			P	
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	...
NIG	NIG11903	−42.00	7.68	9.84	2.02	1.28	93.89	R123SS		40.32		MODRES	35.50	CR		59.1	27M0G7W			P	
NMB	NMB_SAT	−34.00	17.14	−21.04	2.55	1.27	65.23	R123SS		39.34		MODRES	35.50	CL		59.1	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...		...	...	...
POL	POL-BSS-4.2W	−4.20	19.59	51.86	1.42	0.65	160.11	R123SS		44.80		MODRES	35.50	LE	0	59.2	27M0G7W			P	10
...	...	...	...	...				...		...		...	...	...		...	...			...	...
ROU	ROU_SAT	−23.40	25.03	45.59	1.13	0.60	149.23	R123SS		46.13		MODRES	35.50	CR		59.3	27M0G7W			P	10
RRW	BSS-RRW	−9.20	29.78	−2.10	0.60	0.60	0.00	R123SS		48.88		MODRES	35.50	CR		58.8	27M0G7W			P	
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...	...	...	...	
SDN	SUDANBSS	−16.00	28.52	15.33	2.86	1.86	101.59	R123SS		37.19		MODRES	35.50	CR		59.0	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	...
SOM	SOM001	−4.40	44.56	6.57	2.92	1.06	80.43	R123SS		39.54		MODRES	35.50	LE	0	59.0	27M0G7W			P	
SRB	SRB_BSS	−26.70	20.57	44.07	0.90	0.60	143.40	R123SS		47.12		MODRES	35.50	CR		59.3	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	...
SSD	SSUD_SAT	−23.90	30.25	8.06	1.73	1.18	110.06	R123SS		41.35		MODRES	35.50	CL		59.1	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	
SWZ	SWZ_SAT	−23.90	31.51	−26.57	0.60	0.60	0.00	R123SS		48.88		MODRES	35.50	CR		59.3	27M0G7W			P	
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...		...	...	
TCD	TOUMAI	−34.00	17.20	15.50	3.10	1.15	104.19	R123SS		38.93		MODRES	35.50	CR		59.1	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	...
TUN	TUN_BSS	−37.30	9.01	33.79	1.31	0.60	121.24	R123SS		45.49		MODRES	35.50	CL		59.2	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...		...	...	...
TZA	TANSAT1	−16.00	34.43	−5.95	2.13	1.13	96.91	R123SS		40.63		MODRES	35.50	CL		59.1	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	
UGA	UGASAT	−26.60	31.94	1.15	1.25	0.60	83.71	R123SS		45.70		MODRES	35.50	CR		59.2	27M0G7W			P	10
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	
ZMB	ZMB_2020	−23.90	27.29	−13.08	2.01	1.03	58.48	R123SS		41.29		MODRES	35.50	CR		59.1	27M0G7W			P	10
ZWE	ZWE_2020	−16.00	29.59	−18.92	1.32	1.05	60.86	R123SS		43.03		MODRES	35.50	CR		59.0	27M0G7W			P	

Agenda item 9.2

MOD

TABLE 6A (WRC-23)

Basic characteristics of the Regions 1 and 3 Plan (sorted by administration)

1	2	3	4		5			6	7	8		9		10		11	12	13	14	15	16
Admin. symbol	**Beam identification**	**Orbital position**	**Boresight**		**Space station antenna characteristics**			**Space station antenna code**	**Shaped beam**	**Space station antenna gain**		**Earth station antenna**		**Polarization**		**e.i.r.p.**	**Designation of emission**	**Identity of the space station**	**Group code**	**Status**	**Remarks**
			Long.	**Lat.**	**Major axis**	**Minor axis**	**Orien-tation**			**Co-polar**	**Cross-polar**	**Code**	**Gain**	**Type**	**Angle**						
...	...	...	...	...				...		...		...	...	...		...	...			...	
BUL	BUL02000	1.9	21.00	44.70					E001	33.8	−2	MODRES	35.50	LE	****	47.5	33M0G7W			P	
...	...	...	...	...	...	...	...	...		...		...	...	...		...	...			...	

**** Channels 1,3,5,7, 17: 0; channels 2, 4, 6, 8, 18: 90.

MOD

TABLE 6B

Minimum equivalent protection margin of assignments in the Regions 1 and 3 Plan (sorted by orbital position)

1	2	3	4	5																																			
Orbital Position	**Admin. symbol**	**Beam Identifica-tion**	**Polar-ization type**	**Channel number**																																							
				1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
				Minimum EPM																																							
...	...	...	...	...		...		...		...		...		...		...		...		...		...		...		...																	
−25.20	TUN	TUN15000****	CR																					−1.0		−0.8		−0.8		−0.8		−0.8		−0.8		−0.8		−0.8		−0.8		−0.8	
...	...	...	...																																	...				...			
−19.20	BEN	BEN23300****	CL	3.1		2.6		2.6		2.6		2.6		2.6		2.6		2.6		2.6		2.6																					
−19.20	COD	COD__100****	CR		4.7		4.7		4.7		4.7		4.7		4.7		4.7		4.7		4.7		5.9																				
−19.20	MLI	MLI__100****	CR	5.6		4.6		4.6		4.6		4.6		4.6		4.6		4.6		4.6		4.6																					
−19.20	NIG	NIG11900****	CR																						3.5		3.5		3.5		3.5		3.5		3.5		3.5		3.5		3.5		4.1
...	...	...	...																					...		...		...		...		...		...		...		...		...		...	
−18.80	NMB	NMB02500****	CL																					8.6		9.6		9.6		9.6		9.6		9.6		9.6		9.6		9.6		9.6	
...	...	...	...		...		...		...		...		...		...		...		...		...		...																				
−13.20	COG	COG23500****	CL	0.8		0.7		0.7		0.7		0.7		0.7		0.7		0.7		0.7		0.7																					

1	2	3	4	5																																							
Orbital Position	**Admin. symbol**	**Beam Identifica-tion**	**Polar-ization type**	**Channel number**																																							
				1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
				Minimum EPM																																							
−13.20	GAB	GAB26000****	CR	0.5		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0																					
...	...	...	...																					...		...		...		...		...		...		...		...		...		...	
−7.00	SRB	SRB14800****	CR																						−1.2		−1.1		−0.6		−0.9		−0.6		−0.9		−0.6		−0.9		−0.6		−0.5
−7.00	SDN	SDN__100****	CR																					5.4		8.0		8.0		8.0		8.0		8.0		8.0		8.0		8.0		8.0	

* This assignment shall only be used by the Administrations of Croatia, Hungary, Slovakia and the Czech Rep. on the basis of equal access subject to mutual agreement between them.

...	...	...	...		...		...		...		...		...		...		...		...		...		...																				
−1.20	CVA	CVA08300****	CR	2.2		0.5		0.9		0.9		0.9		0.9																													
−1.20	CVA	CVA08500****	CR																						−0.8																		
...	...	...	...	...		...		...		...		...		...		...		...		...		...																					
−1.00	MOZ	MOZ30700****	CL		2.8		3.8		2.8		3.8		2.8		3.8		2.8		3.8		2.8		3.6																				
−0.80	BOT	BOT29700****	CL																						1.5		0.9		1.5		0.9		1.5		0.9		1.5		0.9		1.5		2.2
−0.80	KEN	KEN24900****	CL																						3.8		2.8		3.9		2.8		3.9		2.8		3.9		2.8		3.9		3.3
...	...	...	...																						...		...		...		...		...		...		...		...		...		...
−0.80	ZMB	ZMB31400****	CR																					2.8		3.2		4.3		3.2		4.3		3.2		4.3		3.2		4.3		3.2	
−0.80	ZWE	ZWE13500****	CR	5.5		2.6		2.6		2.6		2.6		2.6		2.6		2.6		2.6		2.6																					
4.80	AFS	AFS02100****	CL																					4.5		5.6		5.6		5.6		5.2		5.2		5.2		5.2		5.2		5.2	
4.80	LSO	LSO30500****	CR	3.9		2.9		2.9		2.9		2.9		2.9		3.1		3.1		3.1		2.9																					
4.80	MWI	MWI30800****	CR		3.2		3.8		3.3		3.9		3.3		3.9		3.9		3.9		3.8		3.4																				
4.80	SWZ	SWZ31300****	CL	4.5		3.2		3.2		3.2		3.2		3.2		3.4		3.4		3.4		3.2																					
...	...	...	...																					...		...		...		...		...		...		...		...		...		...	
11.00	BDI	BDI27000****	CL																						3.0		3.0		3.0		3.0		3.0		3.0		3.0		3.0		3.0		5.6
...	...	...	...		...		...		...		...		...		...		...		...		...		...																				
11.00	RRW	RRW31000****	CL		10.2		10.2		10.2		10.2		10.2		10.2		10.2		10.2		10.2		5.7																				
...	...	...	...																						...		...		...		...		...		...		...		...		...		...
11.00	TZA	TZA22500****	CR																					2.6		3.6		3.6		3.6		3.6		3.6		3.6		3.6		3.6		3.6	
...	...	...	...	...		...		...		...		...		...		...		...		...		...																					
16.80	DJI	DJI09900****	CL		8.2		8.2		8.1		8.1		8.1		8.1		8.1		8.1		8.1		6.7																				
17.00	ARS	ARS__100****	CL																						−0.4		−0.4		−0.4		−0.4		−0.4		−0.4		−0.4		−0.4		−0.4		0.0
...	...	...	...																																								...
17.00	TCD	TCD14300****	CR	9.8		8.8		8.8		8.8		8.8		8.8		8.8		8.8		8.8		8.8																					
17.00	UGA	UGA05100****	CL																					3.6		4.0		4.0		4.0		4.0		4.0		4.0		4.0		4.0		4.0	

** See Note 1 of § 11.2.

...	...	...	...																						...		...		...		...		...		...		...		...		...		...
22.80	MKD	MKD14800****	CR																					3.6		3.3		3.3		3.3		3.3		3.3		3.3		3.2		3.3		3.3	
...	...	...	...																						...		...		...		...		...		...		...		...		...		...
23.20	AZE	AZE06400****	CL																					0.6		−0.1		−0.1		−0.1		−0.1		−0.1		−0.1		−0.1		−0.1		−0.1	
23.20	GEO	GEO06400****	CR	5.3		4.1		4.1		4.1		4.1		4.1		4.1		4.1		4.1		4.1																					
...	...	...	...	...		...		...		...		...		...		...		...		...		...																					

1	2	3	4	5																																							
Orbital Position	Admin. symbol	Beam Identification	Polarization type	Channel number																																							
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
				Minimum EPM																																							
29.00	COM	COM20700****	CR																					11.2		9.5		9.5		9.5		9.5		9.5		9.5		9.5		9.5		9.6	
29.00	MAU	MAU__100****	CL																						11.0		11.0		11.0		11.0		11.0		11.0		11.0		11.1		11.1		12.7
29.00	MDG	MDG23600****	CL	14.0		13.6		13.5		13.4		13.4		13.3		13.3		13.2		13.2		13.2																					
...	...	...	...		...		...		...		...		...		...		...		...		...		...																				
37.80	SOM	SOM31200****	CR																						3.3		3.3		11.7		10.2		11.7		10.2		11.7		10.2		11.7		10.4
...	...	...	...																						...		...		...		...		...		...		...		...		...		...

** See Note 1 of § 11.2.

50.00	IRQ	IRQ25600****	CL	4.2		3.6		3.6		3.6		3.6		3.6		3.6		3.6		3.6		3.6**																					
...	...	...	...		...		...		...		...		...		...		...		...		...		...																				
50.00	MDA	MDA06300****	CR																						0.7		0.7		1.4		1.4		1.4		1.4		1.4		1.4		1.4		1.4
...	...	...	...	...		...		...		...		...		...		...		...		...		...		...		...																	
50.00	POL	POL13200****	CL																						2.4		2.7		3.1		3.1		3.1		3.1		3.1		3.1		3.1		3.2
50.00	ROU	ROU13600****	CR	4.9		3.9		3.9		3.9		3.9		3.9		3.9		3.9		3.9		3.9																					
...	...	...	...																						...		...		...		...		...		...		...		...		...		...
56.00	BIH	BIH14800****	CL	5.9		5.9		5.9		5.9		5.9		5.9		5.9		5.9		5.9		5.9																					
...	...	...	...																									...		...		...		...		...		...		...		...	
62.00	ALB	ALB29600****	CL																						8.6		10.9		33.5		33.5		33.5		33.5		33.5		33.5		33.5		34.4
...	...	...	...	...		...		...		...		...		...		...		...		...		...		...		...																	

**** This beam was replaced at WRC-23. The new beam is contained in Table 6A.

MOD

TABLE 6B

Minimum equivalent protection margin of assignments in the Regions 1 and 3 Plan (sorted by orbital position)

1	2	3	4	5																																							
Orbital Position	Admin. symbol	Beam Identification	Polarization type	Channel number																																							
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
				Minimum EPM																																							
...	...	...	...	...		...		...		...		...		...		...		...		...		...		...		...																	
−1.20***	BUL	BUL02000	CL																						1.0		−0.4		1.6		−0.4		1.6		−0.4		1.6		−0.4		1.6		−0.3
...	...	...	...		...		...		...		...		...		...		...		...		...		...																				

1	2	3	4	5																																					
Orbital Position	Admin. symbol	Beam Identification	Polarization type	Channel number																																					
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
				Minimum EPM																																							

*** The current entry is at 1.90° E (WRC-23)

Agenda item 7(H)

APPENDIX 30A (REV.WRC-19)*

Provisions and associated Plans and List[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[2] and 17.3-18.1 GHz in Regions 1 and 3, and 17.3-17.8 GHz in Region 2 (WRC-03)

MOD

ARTICLE 4 (REV.WRC-23)

Procedures for modifications to the Region 2 feeder-link Plan or for additional uses in Regions 1 and 3

4.1 Provisions applicable to Regions 1 and 3

MOD

4.1.10d If no decision is communicated to the Bureau within 30 days after the date of dispatch of the reminder under § 4.1.10b and the identification is for:

– an assignment in the Regions 1 and 3 Plan, it shall be deemed that the administration which has not given a decision has no objection to the proposed assignment and an agreement under § 4.1.13*bis* is considered as concluded between the administration for the affected assignment in the Regions 1 and 3 Plan and the notifying administration for the proposed assignment; or

– an assignment not in the Regions 1 and 3 Plan, it shall be deemed that the administration which has not given a decision has agreed to the proposed assignment. (WRC-23)

---

* 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)

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.

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.

Agenda item 7(F)

ADD

4.1.10e An administration may at any time during or after the above-mentioned four-month period inform the Bureau of its objection to being included in the service area of any assignment, even if this assignment has been entered in the List. The Bureau shall then inform the administration responsible for the assignment and exclude the territory and test points[WW] that are within the territory of the objecting administration from the service area. The Bureau shall update the reference situation without reviewing the previous examinations. (WRC-23)

Agenda item 7(H)

ADD

4.1.13*bis* When an agreement under this provision is concluded with the administration of an affected assignment in the Regions 1 and 3 Plan, the notifying administration shall provide a firm, objective, measurable and enforceable commitment to respect a power flux-density of $-197.0 - GRx^{zz}$ dB(W/(m^2 · Hz)) arriving at the receiving space station of the administration whose assignment was the basis of the disagreement at the date on which the frequency assignment in the Regions 1 and 3 Plan is to be brought into use, communicated under § 5.1.10*bis* or within 12 months of the date of dispatch of the telefax sent under § 5.1.10*bis*, whichever comes later. (WRC-23)

ADD

4.1.13*ter* Upon the conclusion of agreements under § 4.1.13*bis*, when entering the assignment in the List, the Bureau shall indicate those administrations whose assignments in the Regions 1 and 3 Plan were the basis of the agreement. (WRC-23)

Agenda item 7(F)

ADD

4.1.30 An administration, or an administration acting on behalf of a group of named administrations, responsible for a notice with:

– a service area limited to the national territory of an administration or to the national territories of a group of named administrations responsible for that assignment; and

– a coverage area that shall be the smallest area which encompasses the associated service area,

---

[WW] The administration responsible for the assignment may request to relocate the feeder-link test points from the excluded territory to a new location within the remaining part of its service area, provided that the relocation shall not cause more interference. (WRC-23)

[zz] GRx is the relative receive antenna gain of the space station of the affected assignment in the Regions 1 and 3 Plan of the administration with which an agreement under § 4.1.13*bis* was concluded in the direction of the location of the feeder-link earth station of the notifying administration. (WRC-23)

may request the Bureau to be entitled under this Article to apply the procedure described in §§ 4.1.32 to 4.1.33 with respect to an assignment identified as potentially affected under § 4.1.1*b)* of this Appendix, when none of those administrations have a frequency assignment included in the Region 1 and 3 feeder-link List and for which complete Appendix **4** information has been received by the Bureau in accordance with the provisions of § 4.1.3 and published in accordance with § 4.1.5. The administration may seek the assistance of the Bureau in selecting an orbital position. (WRC-23)

ADD

4.1.30*bis* Before applying the procedure described in §§ 4.1.32 to 4.1.33, an administration or a group of named administrations requesting to be entitled under § 4.1.32 is requested to take all practical steps in accordance with the Radio Regulations to reach a coordination agreement with the administrations identified under § 4.1.1*b)* of this Appendix. The Bureau will inform these identified administrations and request them to make the utmost effort to coordinate with the administration applying § 4.1.30. The responsible administration may at any time seek the assistance of the Bureau and its support in the coordination process. (WRC-23)

ADD

4.1.31 If, in spite of the application of § 4.1.30*bis*, there is still continuing disagreement between the administration, or the group of named administrations, applying § 4.1.30 and the administrations identified under § 4.1.1*b)* of this Appendix, administrations may seek the assistance of the Bureau, which shall take into account the actual operational parameters of the affected networks under § 4.1.1.*b)* as provided by the administration, to the extent possible, in its compatibility analysis. (WRC-23)

ADD

4.1.31*bis* If, in spite of the application of § 4.1.31, there is still continuing disagreement, the Bureau shall, upon receipt of a request from the administration, or the group of named administrations, applying § 4.1.30, submit the case, together with additional supporting materials from administrations, to the subsequent meeting of the Radio Regulations Board for review and the necessary actions. If the case relates to an assignment having global coverage with limited service area in the Earth-to-space direction, the necessary actions of the Board shall also include consideration of whether to instruct the Bureau to apply the procedure described in §§ 4.1.32 to 4.1.33 with respect to the administrations identified under § 4.1.1*b)* at the time of the examination, under § 4.1.12, of the frequency assignments of the administration applying § 4.1.30. (WRC-23)

ADD

4.1.32 For examination of a proposed new or modified assignment to the feeder-link List subject to § 4.1.30, and following instruction from the Radio Regulations Board under § 4.1.31*bis* against an assignment identified under § 4.1.1*b)* of this Appendix, the Bureau will generate coverage diagrams that shall be the smallest area which encompasses the associated service area of

the satellite network[36], using the Bureau's relevant software applications and following the procedure below:

Individual minimum ellipses will be created for each country/territory included in the service area of the incumbent network contained in Part A or the initial Part B, as appropriate:

– if the −10 dB contours of individual minimum ellipses overlap with each other, the beam contains only one coverage area formed by the contours stemming from the elliptical coverage generated by BR that encompasses these countries/territories;

– if the −10 dB contours of individual minimum ellipses do not overlap with each other, the beam consists of multiple spots stemming from the non-overlapping ellipses, and each spot is formed by the contours stemming from the minimum ellipses generated for countries/territories as described in the bullet above. (WRC-23)

ADD

4.1.33 When an assignment subject to § 4.1.30 is entered in the List, the Bureau shall not update the reference situation for the latter assignment referred to in § 4.1.30 if the latter assignment is still affected based on its submitted feeder-link coverage area. (WRC-23)

Agenda item 7(H)

ADD

4.1.34 When an assignment is entered in the List referred to in § 4.1.13*ter*, that assignment shall not be taken into account in updating the reference situation for those assignments in the Regions 1 and 3 Plan with which an agreement under § 4.1.13*bis* has been concluded. (WRC-23)

ADD

4.1.35 If the Bureau is informed that a commitment under § 4.1.13*bis* is not being respected by an assignment in the List, the Bureau shall immediately consult the administration responsible for the assignment, requesting immediate respect for the conditions specified in § 4.1.13*bis*. (WRC-23)

ADD

4.1.36 If, in spite of the application of § 4.1.35, the conditions specified in § 4.1.13*bis* are still not respected by an assignment in the List, the Bureau shall submit the case, together with additional supporting materials from administrations, to the subsequent meeting of the Radio Regulations Board for review and the necessary actions. (WRC-23)

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[36] For satellite networks whose assignments were received by the Bureau under § 4.1.12 of this Appendix on or before 1 January 2025, the Bureau will use the coverage diagram contained in the List. In addition, administrations responsible for such satellite networks shall notify the Bureau when all the assignments associated with such networks are used by a space station launched after 1 January 2028. In such cases, the coverage area will be established as defined in § 4.1.32.

MOD

ARTICLE 5 (REV.WRC--23)

Coordination, notification, examination and recording in the Master International Frequency Register of frequency assignments to feeder-link transmitting earth stations and receiving space stations in the fixed-satellite service[21, 22] (WRC-19)

5.1 Coordination and notification

ADD

5.1.10*bis* Upon receipt of a complete notice, the Bureau shall immediately send a telefax to administrations which have applied § 4.1.13*bis* with regard to this notice, if any. This telefax shall inform the administrations concerned of the notification under § 5.1.1 of this notice and the date on which the frequency assignment which is the subject of the agreement under § 4.1.13*bis* is planned to be brought into use. (WRC-23)

Agenda item 7(D3)

5.2 Examination and recording

MOD

5.2.10 Wherever the use of a frequency assignment to a space station recorded in the Master Register and emanating from the Regions 1 and 3 List is suspended for a period exceeding six months, the notifying administration shall inform the Bureau of the date on which such use was suspended. When the recorded assignment is brought back into use, the notifying administration shall so inform the Bureau, as soon as possible. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC. The date on which the recorded assignment is brought back into

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[21] Notification of assignments to transmitting feeder-link earth stations included in the Region 2 feeder-link Plan after 2 June 2000, or included in the feeder-link List, following successful application of Article 4, shall be effected applying the provisions of Article **11** following completion of the procedure of Article **9**. (WRC-03)

[22] If the payments are not received in accordance with the provisions of Council Decision 482, as amended, on the implementation of cost recovery for satellite network filings, the Bureau shall cancel the publication specified in § 5.1.10 and the corresponding entries in the Master Register under § 5.2.2, § 5.2.2.1, § 5.2.2.2 or § 5.2.6, as appropriate, and the corresponding entries included in the Plan on and after 3 June 2000 or in the List, as appropriate, after informing the administration concerned. The Bureau shall inform all administrations of such action. The Bureau shall send a reminder to the notifying administration not later than two months prior to the deadline for the payment in accordance with the above-mentioned Council Decision 482 unless the payment has already been received. (WRC-19)

use[24*bis*, 24*ter*] shall be no later than three years from the date on which the use of the frequency assignment was suspended, provided that the notifying administration informs the Bureau of the suspension within six months from the date on which the use was suspended. If the notifying administration informs the Bureau of the suspension more than six months after the date on which the use of the frequency assignment was suspended, this three-year time period shall be reduced. In this case, the amount by which the three-year period shall be reduced shall be equal to the amount of time that has elapsed between the end of the six-month period and the date that the Bureau is informed of the suspension. If the notifying administration informs the Bureau of the suspension more than 21 months after the date on which the use of the frequency assignment was suspended, the frequency assignment shall be cancelled. (WRC-23)

Agenda item 1.19

MOD

ARTICLE 7 (REV.WRC-23)

Coordination, notification and recording in the Master International Frequency Register of frequency assignments to stations in the fixed-satellite service (space-to-Earth) in Regions 1 and 2 in the frequency band 17.3-18.1 GHz and in Region 3 in the frequency band 17.7-18.1 GHz, to stations in the fixed-satellite service (Earth-to-space) in Region 2 in the frequency bands 14.5-14.8 GHz and 17.8-18.1 GHz, to stations in the fixed-satellite service (Earth-to-space) in countries listed in Resolution 163 (WRC-15) in the frequency band 14.5-14.75 GHz and in countries listed in Resolution 164 (WRC-15) in the frequency band 14.5-14.8 GHz where those stations are not for feeder links for the broadcasting-satellite service, and to stations in the broadcasting-satellite service in Region 2 in the frequency band 17.3-17.8 GHz when frequency assignments to feeder links for broadcasting-satellite stations in the frequency bands 14.5-14.8 GHz and 17.3-18.1 GHz in Regions 1 and 3 or in the frequency band 17.3-17.8 GHz in Region 2 are involved[28] (Rev.WRC-23)

[24*bis*] The date of bringing back into use of a frequency assignment to a space station in the geostationary-satellite orbit shall be the commencement of the 90-day period defined below. A frequency assignment to a space station in the geostationary-satellite orbit shall be considered as having been brought back into use when a space station in the geostationary-satellite orbit with the capability of transmitting or receiving that frequency assignment has been deployed and maintained at the notified orbital position for a continuous period of 90 days. The notifying administration shall inform the Bureau within 30 days from the end of the 90-day period. Resolution **40 (Rev.WRC-19)** shall apply. (WRC-19)

[24*ter*] If the notifying administration has informed the Bureau of the date of commencement of the 90-day bringing-back-into-use period, but, as of 15 days after the end of the 90-day bringing-back-into-use period, has not yet informed the Bureau of the completion of the bringing-back-into-use period in accordance with footnote 24*bis*, the Bureau shall promptly send the notifying administration a reminder of its obligation to inform the Bureau of the completion of the bringing-back-into-use period under footnote 24*bis*. (WRC-23)

Section I – Coordination of transmitting space or earth stations in the fixed-satellite service or transmitting space stations in the broadcasting-satellite service with assignments to broadcasting-satellite service feeder links

MOD

7.1 The provisions of No. **9.7** and the associated provisions under Articles **9** and **11** are applicable to transmitting space stations in the fixed-satellite service in Regions 1 and 2 in the frequency band 17.3-18.1 GHz, to transmitting space stations in the fixed-satellite service in Region 3 in the frequency band 17.7-18.1 GHz, to transmitting earth stations in the fixed-satellite service in Region 2 in the frequency bands 14.5-14.8 GHz and 17.8-18.1 GHz, to transmitting earth stations in the fixed-satellite service in countries listed in Resolution **163 (WRC-15)** in the frequency band 14.5-14.75 GHz and in countries listed in Resolution **164 (WRC-15)** in the frequency band 14.5-14.8 GHz where those stations are not for feeder links for the broadcasting-satellite service, and to transmitting space stations in the broadcasting-satellite service in Region 2 in the frequency band 17.3-17.8 GHz. (WRC-23)

ARTICLE 9A (REV.WRC-19)

Plan for feeder links for the broadcasting-satellite service in the fixed-satellite service in the frequency bands 14.5-14.8 GHz and 17.3-18.1 GHz in Regions 1 and 3

MOD

9A.1 COLUMN HEADINGS OF THE PLAN

...

Col. 6 S*pace station receiving antenna pattern code*.

...

...	...
R123SS	Figure 7 and § 4.6.3 in Annex 3
...	...

...

9A.2 TEXT FOR NOTES IN THE REMARKS COLUMN OF THE REGIONS 1 AND 3 FEEDER-LINK PLAN (WRC-19)

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29 (SUP – WRC-19)

ADD

11 Affected administrations and corresponding networks are included in the relevant AP30A/P Special Section.

MOD

TABLE 3A1 (WRC-23)

Basic characteristics of the Regions 1 and 3 feeder-link Plan in the frequency band 14.5-14.8 GHz (sorted by administration)

1	2	3	4		5			6	7	8		9		10		11	12	13	14	15	16	17
Admin. symbol	Beam identification	Orbital position	Boresight		Space station antenna characteristics			Space station antenna code	Shaped beam	Space station antenna gain		Earth station antenna		Polarization		e.i.r.p.	Power control	Designation of emission	Identity of the space station	Group code	Status	Remarks
			Long.	Lat.	Major axis	Minor axis	Orien-tation			Co-polar	Cross-polar	Code	Gain	Type	Angle							
CHN	CHN19001	122.00	114.17	23.32	0.91	0.60	2.88	MODRSS		47.08		MODTES	57.00	CL		84.0		27M0G7W		4C	P	
CHN	CHN19002	122.00	114.17	23.32	0.91	0.60	2.88	MODRSS		47.08		MODTES	57.00	CR		84.0		27M0G7W		4C	P	
CME	CME30001	–13.00	12.70	6.20	2.54	1.68	87.00	MODRSS		38.15		MODTES	57.00	CL		84.0		27M0G7W		4I	P	
CME	CME30002	–13.00	12.70	6.20	2.54	1.68	87.00	MODRSS		38.15		MODTES	57.00	CR		84.0		27M0G7W		4I	P	
ETH	ETH09201	36.00	40.49	9.20	2.83	2.26	174.44	MODRSS		36.40		MODTES	57.00	CL		82.0		27M0G7W		4P	P	
ETH	ETH09202	36.00	40.49	9.20	2.83	2.26	174.44	MODRSS		36.40		MODTES	57.00	CR		82.0		27M0G7W		4P	P	
GHA	GHA10801	–25.00	–1.20	7.90	1.48	1.06	102.00	MODRSS		42.49		MODTES	57.00	CR		83.0		27M0G7W		4F	P	
GHA	GHA10802	–25.00	–1.20	7.90	1.48	1.06	102.00	MODRSS		42.49		MODTES	57.00	CL		83.0		27M0G7W		4F	P	
IND	INDA_101	55.80	76.16	14.72				CB_RSS_INDA		45.66		MODTES	57.00	CR		82.0		27M0G7W		4U	P	
IND	INDA_102	55.80	76.16	14.72				CB_RSS_INDA		45.66		MODTES	57.00	CL		82.0		27M0G7W		4U	P	
IRN	IRN10901	34.00	54.20	32.40	3.82	1.82	149.00	MODRSS		36.03		MODTES	57.00	CR		82.0		27M0G7W		4S	P	
IRN	IRN10902	34.00	54.20	32.40	3.82	1.82	149.00	MODRSS		36.03		MODTES	57.00	CL		82.0		27M0G7W		4S	P	
KOR	KO11201D	116.00	127.50	36.00	1.24	1.02	168.00	R13RSS		43.40		R13TES	57.30	CL		82.0		27M0G7W	KOREASAT-1	03	PE	
KOR	KOR11201	116.00	127.50	36.00	1.24	1.02	168.00	R13RSS		43.40		R13TES	57.30	CL		82.0		27M0G7W	KOREASAT-1	03	PE	
NPL	NPL12201	50.00	83.70	28.30	1.72	0.60	163.00	MODRSS		44.31		MODTES	57.00	CR		82.0		27M0G7W		4N	P	
NPL	NPL12202	50.00	83.70	28.30	1.72	0.60	163.00	MODRSS		44.31		MODTES	57.00	CL		82.0		27M0G7W		4N	P	
PAK	PAK12701	38.20	69.60	29.50	2.30	2.16	14.00	MODRSS		37.49		MODTES	57.00	CR		82.0		27M0G7W		4R	P	
PAK	PAK12702	38.20	69.60	29.50	2.30	2.16	14.00	MODRSS		37.49		MODTES	57.00	CL		82.0		27M0G7W		4R	P	
PNG	PNG13101	134.00	148.07	–6.65	3.13	2.30	168.32	MODRSS		38.87		MODTES	57.00	CR		89.0		27M0G7W		4B	P	
PNG	PNG13102	134.00	148.07	–6.65	3.13	2.30	168.32	MODRSS		38.87		MODTES	57.00	CL		89.0		27M0G7W		4B	P	
SEN	SEN22201	–37.00	–14.40	13.80	1.46	1.04	139.00	MODRSS		42.63		MODTES	57.00	CL		82.0		27M0G7W		4D	P	
SEN	SEN22202	–37.00	–14.40	13.80	1.46	1.04	139.00	MODRSS		42.63		MODTES	57.00	CR		82.0		27M0G7W		4D	P	
SEY	SEY00001	42.50	51.86	–7.23	2.43	1.04	27.51	MODRSS		40.44		MODTES	57.00	CL		84.0		27M0G7W		4T	P	
SEY	SEY00002	42.50	51.86	–7.23	2.43	1.04	27.51	MODRSS		40.44		MODTES	57.00	CR		84.0		27M0G7W		4T	P	
TGO	TGO22601	–30.00	0.68	8.57	1.13	0.60	108.43	MODRSS		46.14		MODTES	57.00	CL		82.0		27M0G7W		4E	P	

1	2	3	4		5			6	7	8		9		10		11	12	13	14	15	16	17
Admin. symbol	Beam identification	Orbital position	Boresight		Space station antenna characteristics			Space station antenna code	Shaped beam	Space station antenna gain		Earth station antenna		Polarization		e.i.r.p.	Power control	Designation of emission	Identity of the space station	Group code	Status	Remarks
			Long.	Lat.	Major axis	Minor axis	Orien-tation			Co-polar	Cross-polar	Code	Gain	Type	Angle							
TGO	TGO22602	–30.00	0.68	8.57	1.13	0.60	108.43	MODRSS		46.14		MODTES	57.00	CR		82.0		27M0G7W		4E	P	
USA	USAC_101	140.00	177.50	16.35				CB_RSS_USAC		44.06		MODTES	57.00	CL		87.0		27M0G7W		4A	P	
USA	USAC_102	140.00	177.50	16.35				CB_RSS_USAC		44.06		MODTES	57.00	CR		87.0		27M0G7W		4A	P	
YEM	YEM__101	11.00	48.29	14.53				CB_RSS_YEMA		47.78		MODTES	57.00	CR		82.0		27M0G7W		4O	P	
YEM	YEM__102	11.00	48.29	14.53				CB_RSS_YEMA		47.78		MODTES	57.00	CL		82.0		27M0G7W		4O	P	

MOD

TABLE 3A2 (WRC-23)

Basic characteristics of the Regions 1 and 3 feeder-link Plan in the frequency band 17.3-18.1 GHz (sorted by administration)

1	2	3	4		5			6	7	8		9		10		11	12	13	14	15	16	17
Admin. symbol	Beam identification	Orbital position	Boresight		Space station antenna characteristics			Space station antenna code	Shaped beam	Space station antenna gain		Earth station antenna		Polarization		e.i.r.p.	Power control	Designation of emission	Identity of the space station	Group code	Status	Remarks
			Long.	Lat.	Major axis	Minor axis	Orien-tation			Co-polar	Cross-polar	Code	Gain	Type	Angle							
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
AFS	AFS_SASAT3	−8.20	24.11	−28.06	2.70	1.36	36.92	R123SS		38.80		MODTES	57.00	CL		86.0		27M0G7W			P	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
ALB	ALB_SAT	−33.60	19.87	41.11	0.65	0.60	130.56	R123SS		48.54		MODTES	57.00	CL		86.0		27M0G7W			P	11
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
ARS	ARS_BSS	7.90	44.04	23.34	3.63	1.84	137.74	R123SS		36.20		MODTES	57.00	CR		86.0		27M0G7W			P	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
AZE	AZERSAT-BSS-10E	10.00	46.95	39.93	0.84	0.60	145.64	R123SS		47.42		MODTES	57.00	CR		86.0		27M0G7W			P	
BDI	BDI_SAT	−26.80	29.79	−3.19	0.60	0.60	0.00	R123SS		48.88		MODTES	57.00	CR		86.0		27M0G7W			P	11
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
BEN	BEN_SAT	−30.60	2.25	9.47	1.30	0.60	94.63	R123SS		45.53		MODTES	57.00	CR		86.0		27M0G7W			P	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
BIH	BIH_SAT	−26.50	17.10	43.85	0.73	0.60	143.98	R123SS		48.03		MODTES	57.00	CR		86.0		27M0G7W			P	11
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
BOT	BOT_001	−26.60	23.16	−22.38	1.80	0.96	59.49	R123SS		42.07		MODTES	57.00	CR		86.0		27M0G7W			P	11

1	2	3	4		5			6	7	8		9		10		11	12	13	14	15	16	17
Admin. symbol	Beam identification	Orbital position	Boresight		Space station antenna characteristics			Space station antenna code	Shaped beam	Space station antenna gain		Earth station antenna		Polarization		e.i.r.p.	Power control	Designation of emission	Identity of the space station	Group code	Status	Remarks
			Long.	Lat.	Major axis	Minor axis	Orien-tation			Co-polar	Cross-polar	Code	Gain	Type	Angle							
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
COD	COD_SAT1	−23.50	22.28	−4.21	3.37	2.32	84.81	R123SS		35.52		MODTES	57.00	CL		86.0		27M0G7W			P	
COG	COG_SAT	−37.30	14.66	−0.76	1.82	0.72	74.62	R123SS		43.27		MODTES	57.00	CR		86.0		27M0G7W			P	11
COM	COM_BSS	−3.70	43.73	−11.88	0.60	0.60	0.00	R123SS		48.88		MODTES	57.00	LE	90	86.0		27M0G7W			P	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
CVA	CVA_BSS	−33.60	12.47	41.90	0.60	0.60	0.00	R123SS		48.88		MODTES	57.00	CL		86.0		27M0G7W			P	11
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
DJI	DJI_SAT	−17.46	42.58	11.72	0.60	0.60	0.00	R123SS		48.88		MODTES	57.00	CR		86.0		27M0G7W			P	11
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
GAB	GAB_37.3W	−37.30	11.63	−0.69	1.22	0.71	82.94	R123SS		45.07		MODTES	57.00	CL		86.0		27M0G7W			P	11
GEO	GEO_BSS	−4.10	43.22	42.30	0.96	0.60	153.15	R123SS		46.84		MODTES	57.00	LE	90	86.0		27M0G7W			P	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
IRQ	IRQ_SAT	-9.60	43.48	33.16	1.76	0.64	135.09	R123SS		43.93		MODTES	57.00	CL		86.0		27M0G7W			P	11
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
KEN	KEN_SAT_001	−9.20	37.82	1.02	1.98	1.02	97.23	R123SS		41.39		MODTES	57.00	CL		86.0		27M0G7W			P	11
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
LSO	LSO_SAT	−16.00	28.25	−29.57	0.60	0.60	0.00	R123SS		48.88		MODTES	57.00	CL		86.0		27M0G7W			P	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
MAU	MAU_300	68.40	59.06	−15.94	2.70	1.78	135.44	R123SS		37.63		MODTES	57.00	CL		86.0		27M0G7W			P	11
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
MDA	MDA_SAT	−16.30	27.63	46.93	0.69	0.60	141.49	R123SS		48.28		MODTES	57.00	CL		86.0		27M0G7W			P	11
MDG	MDG_SAT	69.50	46.55	−18.07	2.47	1.36	90.92	R123SS		39.18		MODTES	57.00	LE	0	86.0		27M0G7W			P	11
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
MKD	MKD_BSS	−16.70	21.79	41.62	0.60	0.60	0.00	R123SS		48.88		MODTES	57.00	CR		86.0		27M0G7W			P	11
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
MLI	MLI_SAT_100	−42.00	−4.84	17.52	2.61	2.04	115.30	R123SS		37.18		MODTES	57.00	CR		86.0		27M0G7W			P	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
MOZ	MOZ_SAT	-8.20	34.22	-17.64	3.37	1.20	62.10	R123SS		38.38		MODTES	57.00	CL		86.0		27M0G7W			P	
MWI	MWI_SAT	−23.50	34.03	−13.26	1.37	0.60	83.29	R123SS		45.30		MODTES	57.00	CR		86.0		27M0G7W			P	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
NIG	NIG11903	−42.00	7.68	9.84	2.02	1.28	93.89	R123SS		40.32		MODTES	57.00	CL		86.0		27M0G7W			P	11
NMB	NMB_SAT	−34.00	17.47	−21.14	2.53	1.29	65.23	R123SS		39.31		MODTES	57.00	CR		86.0		27M0G7W			P	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
POL	POL-BSS-4.2W	−4.20	19.52	51.88	1.43	0.65	160.25	R123SS		44.76		MODTES	57.00	LE	90	86.0		27M0G7W			P	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
ROU	ROU_SAT	−23.40	25.03	45.59	1.13	0.60	149.23	R123SS		46.13		MODTES	57.00	CL		86.0		27M0G7W			P	
RRW	BSS-RRW	−9.20	29.78	−2.10	0.60	0.60	0.00	R123SS		48.88		MODTES	57.00	CR		86.0		27M0G7W			P	

1	2	3	4		5			6	7	8		9		10		11	12	13	14	15	16	17
Admin. symbol	Beam identification	Orbital position	Boresight		Space station antenna characteristics			Space station antenna code	Shaped beam	Space station antenna gain		Earth station antenna		Polarization		e.i.r.p.	Power control	Designation of emission	Identity of the space station	Group code	Status	Remarks
			Long.	Lat.	Major axis	Minor axis	Orien-tation			Co-polar	Cross-polar	Code	Gain	Type	Angle							
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
SDN	SUDANBSS	-16.00	28.52	15.33	2.86	1.86	101.59	R123SS		37.19		MODTES	57.00	CL		86.0		27M0G7W			P	
SOM	SOM001	-4.40	44.56	6.57	2.92	1.06	80.43	R123SS		39.54		MODTES	57.00	LE	90	86.0		27M0G7W			P	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
SRB	SRB_BSS	−26.70	20.57	44.07	0.90	0.60	143.40	R123SS		47.12		MODTES	57.00	CL		86.0		27M0G7W			P	11
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
SSD	SSUD_SAT	-23.90	30.25	8.06	1.73	1.18	110.06	R123SS		41.35		MODTES	57.00	CR		86.0		27M0G7W			P	11
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
SWZ	SWZ_SAT	−23.90	31.51	−26.57	0.60	0.60	0.00	R123SS		48.88		MODTES	57.00	CR		86.0		27M0G7W			P	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
TCD	TOUMAI	−34.00	17.20	15.50	3.10	1.15	104.19	R123SS		38.93		MODTES	57.00	CL		86.0		27M0G7W			P	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
TUN	TUN_BSS	−37.30	9.01	33.79	1.31	0.60	121.24	R123SS		45.49		MODTES	57.00	CR		86.0		27M0G7W			P	11
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
TZA	TANSAT1	−16.00	34.43	−5.95	2.13	1.13	96.91	R123SS		40.63		MODTES	57.00	CR		86.0		27M0G7W			P	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
UGA	UGASAT	−26.60	31.94	1.15	1.25	0.60	83.71	R123SS		45.70		MODTES	57.00	CL		86.0		27M0G7W			P	11
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
ZMB	ZMB_2020	−23.90	27.29	−13.08	2.01	1.03	58.48	R123SS		41.29		MODTES	57.00	CL		86.0		27M0G7W			P	
ZWE	ZWE_2020	−16.00	29.59	−18.92	1.32	1.05	60.86	R123SS		43.03		MODTES	57.00	CR		86.0		27M0G7W			P	

Agenda item 9.2

MOD

TABLE 3A2 (WRC-23)

Basic characteristics of the Regions 1 and 3 feeder-link Plan in the frequency band 17.3-18.1 GHz (sorted by administration)

1	2	3	4		5			6	7	8		9		10		11	12	13	14	15	16	17
Admin. symbol	Beam identification	Orbital position	Boresight		Space station antenna characteristics			Space station antenna code	Shaped beam	Space station antenna gain		Earth station antenna		Polarization		e.i.r.p.	Power control	Designation of emission	Identity of the space station	Group code	Status	Remarks
			Long.	Lat.	Major axis	Minor axis	Orien-tation			Co-polar	Cross-polar	Code	Gain	Type	Angle							
...	...	...	...	...	...	...	...	...		...		...	...	...		...		...		...	...	
BUL	BUL02000	1.90	19.00	45.50					E001	36.5	0	MODTES	57.00	LE	*	75.8		33M0G7W			P	
...	...	...	...	...	...	...	...	...		...		...	...	...		...		...			...	

* Channels 1,3,5,7,17: 0; channels 2, 4, 6, 8, 18: 90.

MOD

TABLE 3B1

Minimum equivalent protection margin in the Regions 1 and 3 feeder-link Plan in the frequency band 14.5-14.8 GHz (sorted by orbital position)

1	2	3	4	5												
Orbital position	Admin. symbol	Beam Identification	Polarization type	Channel number												
				2	3	4	5	6	7	8	9	10	11	12	13	14
				Minimum equivalent protection margin												
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
−19.20	NIG	NIG11901*	CR				6.4		4.2		4.2		4.2		4.2	
−19.20	NIG	NIG11902*	CL					4.2		4.2		4.2		4.2		6.4
−18.80	NMB	NMB02501*	CL				6.9		4.5		4.5		4.5		4.5	
−18.80	NMB	NMB02502*	CR					4.5		4.5		4.5		4.5		6.9
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
−7.00	SDN	SDN__101*	CL				27.1		26.1		26.1		26.1		26.1	
−7.00	SDN	SDN__102*	CR					26.1		26.1		26.1		26.1		27.1
−1.00	MOZ	MOZ30701*	CL				16.6		15.7		15.7		15.7		15.7	
−1.00	MOZ	MOZ30702*	CR					15.7		15.7		15.7		15.7		16.6
4.80	AFS	AFS02101*	CL				11.9		11.0		11.0		11.0		11.0	
4.80	AFS	AFS02102*	CR					11.0		11.0		11.0		11.0		11.9
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37.80	SOM	SOM31201*	CL				0.0		−0.3		−0.3		−0.3		−0.3	
37.80	SOM	SOM31202*	CR					−0.3		−0.3		−0.3		−0.3		1.6
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
50.00	IRQ	IRQ25601*	CL				−0.1		−0.1		−0.1		−0.1		−0.1	
50.00	IRQ	IRQ25602*	CR					−0.1		−0.1		−0.1		−0.1		2.4
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

* This beam was replaced at WRC-23. The new beam is contained in Table 3A2.

MOD

TABLE 3B2

Minimum equivalent protection margin in the Regions 1 and 3 feeder-link Plan in the frequency band 17.3-18.1 GHz (sorted by orbital position)

1	2	3	4	5																																							
Orbital Position	Admin. symbol	Beam Identification	Polarization type	Channel number																																							
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
				Minimum equivalent protection margin																																								
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
−25.20	TUN	TUN15000***	CR																				−0.4		−0.4		−0.4		−0.4		−0.4		−0.4		−0.4		−0.4		−0.4		−0.4		−0.2
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
−19.20	BEN	BEN23300***	CL																			4.4		9.4		9.4		9.4		9.4		9.4		9.4		9.4		9.4		9.4		
−19.20	COD	COD__100***	CL	4.5		2.1		2.1		2.1		2.1		2.1		2.1		2.1		2.1		2.1																					
−19.20	MLI	MLI__100***	CR		4.2		4.2		4.2		4.2		4.2		4.2		4.2		4.2		4.2		2.4																					
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
−13.20	COG	COG23500***	CR																				9.8		9.8		9.8		9.8		9.8		9.8		9.8		9.8		9.8		9.8		11.7
−13.20	GAB	GAB26000***	CL	4.9		1.7		1.7		1.7		1.7		1.7		1.7		1.7		1.7		1.7																					

* This assignment shall only be used by the administrations of Croatia, Hungary, Slovakia and the Czech Rep. on the basis of equal access subject to mutual agreement between them.

...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
−7.00	SRB	SRB14800***	CL																				1.5		1.5		1.5		1.5		1.5		1.5		1.5		1.5		1.5		1.5		2.0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
−1.20	CVA	CVA08300***	CR		1.7		2.3		1.7		2.3		1.7		2.3																													
−1.20	CVA	CVA08500***	CR														1.7																												
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
−0.80	BOT	BOT29700***	CL																			3.2		−0.4		0.8		−0.4		0.8		−0.4		0.8		−0.4		0.8		−0.4		
−0.80	KEN	KEN24900***	CR		1.4		2.4		1.4		2.5		1.4		2.5		1.4		3.3		1.9		5.3																					
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
−0.80	ZMB	ZMB31400***	CR																				0.2		−1.0		0.2		−1.0		0.2		−1.0		0.2		−1.0		0.2		0.7
−0.80	ZWE	ZWE13500***	CL	8.6		7.6		7.6		7.6		7.6		7.6		7.6		7.8		7.9		7.9																					
4.80	LSO	LSO30500***	CL		6.3		6.2		6.3		6.2		6.3		6.2		6.1		6.1		5.8		8.0																					
4.80	MWI	MWI30800***	CR																					10.6		11.1		11.1		11.1		6.9		6.9		6.9		6.9		6.9		5.4	
4.80	SWZ	SWZ31300***	CR	6.9		3.9		3.9		3.9		3.9		3.9		3.8		3.8		3.8		3.4																					
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

* This assignment shall only be used by the administrations of Croatia, Hungary, Slovakia and the Czech Rep. on the basis of equal access subject to mutual agreement between them.

1	2	3	4	5																																							
Orbital Position	Admin. symbol	Beam Identification	Polarization type	Channel number																																								
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
				Minimum equivalent protection margin																																								
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11.00	BDI	BDI27000***	CL	3.2		0.4		0.4		0.4		0.4		0.4		0.4		0.4		0.4		0.4																						
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11.00	RRW	RRW31000***	CR		0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2		2.6																						
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11.00	TZA	TZA22500***	CR																					0.1		0.1		0.1		0.1		0.1		0.1		0.1		0.1		0.1		2.0
16.80	DJI	DJI09900***	CL	8.7		6.0		6.0		6.0		6.0		6.0		6.0		6.0		6.0		6.0																						
17.00	ARS	ARS00375***	CL																					4.3		4.3		4.3		4.3		4.3		4.3		4.3		4.3		4.3		6.8
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17.00	TCD	TCD14300***	CR	4.3		4.0		4.0		4.0		4.0		4.0		4.0		4.0		4.0		4.1																						
17.00	UGA	UGA05100***	CR																					11.5		10.7		10.7		10.7		10.7		10.7		10.7		10.7		10.7		10.7	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22.80	MKD	MKD14800***	CL		8.7		8.7		8.7		8.7		8.7		8.7		8.7		8.7		8.7		10.6																						
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23.20	AZE	AZE06400***	CL																					4.7		2.5		2.5		2.5		2.5		2.5		2.5		2.5		2.5		2.5	
23.20	GEO	GEO06400***	CL	8.1		6.0		6.0		6.0		6.0		6.0		6.0		6.0		6.0		6.0																						
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29.00	COM	COM20700***	CR																					12.9		9.9		9.9		9.9		9.9		9.9		9.9		9.9		9.9		9.9	
29.00	MAU	MAU__100***	CL																						2.6		2.6		2.6		2.6		2.6		2.6		2.6		2.6		2.6		5.6
29.00	MDG	MDG23600***	CL	28.0		27.5		27.5		27.5		27.5		27.5		27.5		27.5		27.5		27.9																						
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
50.00	MDA	MDA06300	CR																					3.2		0.8		1.0		1.0		0.7		0.5		0.5		0.5		0.5		0.5	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
50.00	POL	POL13200***	CR	5.9		4.5		4.5		4.5		4.5		4.5		4.5		4.5		4.5		4.5																						
50.00	ROU	ROU13600***	CL																						0.4		0.5		0.7		−0.1		−0.9		−0.9		−0.9		−0.9		−0.9		2.0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
56.00	BIH	BIH14800***	CR	13.0		12.6		12.6		12.6		12.6		12.6		12.3		12.3		12.3		12.3																						
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
62.00	ALB	ALB29600***	CL																					12.8		14.1		46.6		46.5		46.3		46.3		46.3		46.3		46.3		47.4
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

*** This beam was replaced at WRC-23. The new beam is contained in Table 3A2.

MOD

TABLE 3B2

Minimum equivalent protection margin in the Regions 1 and 3 feeder-link Plan in the frequency band 17.3-18.1 GHz (sorted by orbital position)

1	2	3	4	5																																								
Orbital Position	Admin. symbol	Beam Identification	Polarization type	Channel number																																								
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
				Minimum equivalent protection margin																																									
...	...	...	...	...		...		...		...		...		...		...		...		...		...		...		...																	
−1.20*	BUL	BUL02000	CL	3.5		1.6		1.6		1.6		1.6		1.6		1.6		3.2		5.6		5.5																						
...	...	...	...		...		...		...		...		...		...																												

* The current entry is at 1.90° E (WRC-23)

Agenda item 2

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[36] (Rev.WRC-03)

3 Basic technical characteristics for Regions 1 and 3

MOD

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. (WRC-23)

Agenda item 7(E)

APPENDIX 30B (REV.WRC-19)

Provisions and associated Plan for the fixed-satellite service in the frequency bands 4 500-4 800 MHz, 6 725-7 025 MHz, 10.70-10.95 GHz, 11.20-11.45 GHz and 12.75-13.25 GHz

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[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)

MOD

ARTICLE 6 (REV.WRC-23)

Procedures for the conversion of an allotment into an assignment, for the introduction of an additional system or for the modification of an assignment in the List[1, 2, 2*bis*, 2*ter*] (WRC-23)

Agenda item 7(I)

ADD

6.4*bis* When the examination of a notice received under § 6.1 to convert an allotment into an assignment leads to a favourable finding with respect to § 6.3, the Bureau shall immediately send a telefax to administrations which have applied § 6.15*quat* with respect to the allotment covered in this notice. This telefax shall inform these administrations of the reception of this notice under § 6.1. (WRC-23)

Agenda item 7(H)

MOD

6.15 If no decision is communicated to the Bureau within 30 days after the date of dispatch of the reminder under § 6.14 and the identification is for:

a) an allotment in the Plan, it shall be deemed that the administration which has not given a decision has no objection to the proposed assignment until this administration plans to bring into use its allotment in the Plan, and an agreement under § 6.15*quat* is considered as concluded between the administration for the affected allotment in the Plan and the notifying administration for the proposed assignment; or

b) an assignment, it shall be deemed that the administration which has not given a decision has agreed to the proposed assignment. (WRC-23)

---

[1] If the payments are not received in accordance with the provisions of Council Decision 482, as amended, on the implementation of cost recovery for satellite network filings, the Bureau shall cancel the publication specified in § 6.7 and/or § 6.23 and the corresponding entries in the List under § 6.23 and/or § 6.25, as appropriate, and reinstate any allotments back into the Plan after informing the administration concerned. The Bureau shall inform all administrations of such action and that the network specified in the publication in question no longer has to be taken into consideration by the Bureau and other administrations. The Bureau shall send a reminder to the notifying administration not later than two months prior to the deadline for the payment in accordance with the above-mentioned Council Decision 482, unless the payment has already been received.

[2] Resolution **49 (Rev.WRC-23)** applies. (WRC-23)

[2*bis*] Resolution **170 (Rev.WRC-23)** applies. (WRC-23)

[2*ter*] In respect of proposed allotments by new Member States of the Union under Article 7 of this Appendix, Annex 7 to this Appendix shall apply. (WRC-23)

Agenda item 7(I)

ADD

6.15*quat* The notifying administration shall provide a firm, objective, measurable and enforceable commitment to respect the power flux-density limits shown in section 2.2 of Annex 4 to Appendix **30B** with respect to the allotment that was identified as affected under § 6.5 and for which no decision has been communicated to the Bureau, in accordance with § 6.15, from the date on which the frequency assignment is to be brought into use, communicated under § 8.10*bis* or within 12 months of the date of dispatch of the telefax sent under § 8.10*bis*, whichever comes later. In the space-to-Earth direction, the power flux-density limits shall be respected at any point within the territory, situated inside the −3 dB contour of the associated beam area, of the administration responsible for the allotment. The agreement of an administration identified as being affected under § 6.5 with respect to its allotment and having stated its disagreement may also be obtained in accordance with this paragraph. Resolution **COM5/9 (WRC-23)** applies. (WRC-23)

ADD

6.15*quin* When entering in the List an assignment subject to § 6.15*quat*, the Bureau shall indicate those administrations whose allotments were the basis of the application of § 6.15*quat*. (WRC-23)

Agenda item 7(F)

MOD

6.16 An administration may at any time during or after the above-mentioned four-month period inform the Bureau about its objection to being included in the service area of any assignment, even if this assignment has been entered in the List. The Bureau shall then inform the administration responsible for the assignment and exclude the territory and test points[MOD 6*bis*] that are within the territory of the objecting administration from the service area. The Bureau shall update the reference situation without reviewing the previous examinations. (WRC-23)

Agenda item 7(I)

ADD

6.27*bis* When entered in the List in accordance with § 6.15*quin*, the assignment shall not be taken into account in updating the reference situation for those allotments which were the basis for the application of § 6.15*quat*. (WRC-23)

6*bis* The administration responsible for the assignment may request to relocate the test points from the excluded territory to a new location within the remaining part of its service area. The relocation of uplink test points shall not cause more interference. (WRC-23)

ADD

6.29*bis* Should the Bureau be informed that the notifying administration for an assignment in the List to which § 6.15*quat* applies is not complying with its commitment, the Bureau shall immediately consult this administration and request immediate compliance with the commitment. (WRC-23)

ADD

6.29*ter* If, in spite of the application of § 6.29*bis*, the notifying administration for an assignment in the List subject to § 6.15*quat* is still not complying with its commitment, the Bureau shall send the case to the Radio Regulations Board, together with relevant information, for the necessary actions, as appropriate. (WRC-23)

Agenda item 9.3

ADD

6.31*ter* Notwithstanding § 6.31, the regulatory time-limit to bring into use an assignment to a space station of a satellite network that has been converted from an allotment without any modification, or with modification within the envelope of the characteristics[9] of an allotment in the Plan, may be extended upon request from the notifying administration. (WRC-23)

MOD

6.32 Thirty days prior to the date of bringing into use under § 6.31, § 6.31*bis* or § 6.31*ter*, the Bureau shall dispatch a reminder telegram or fax to the notifying administration which has not brought its assignment into use, bringing the matter to its attention. (WRC-23)

MOD

6.33

When:

i) an assignment is no longer required; *or*

ii) an assignment recorded in the List and brought into use has been suspended for a period exceeding the suspension period resulting from the application of § 8.17 below and ending after the expiry date specified in § 6.31; *or* (WRC-15)

---

[9] When an administration converts an allotment into an assignment with characteristics different from those in the Plan, the Bureau shall perform calculations to determine if the proposed new characteristics increase the interference level caused to other allotments and assignments. The increase in interference due to characteristics different from those of the allotment in question in the Plan will be checked by comparing the *C*/*I* ratios for these other allotments and assignments, which result from the use of the proposed new characteristics of the assignment in question, on the one hand, and those obtained using the characteristics of the allotment in question in the Plan, on the other hand. This *C*/*I* calculation is performed under the same technical assumptions and conditions. (WRC-23)

iii) an assignment recorded in the List has not been brought into use within the eight-year period following the receipt by the Bureau of the relevant complete information under § 6.1 (or within the extended period in the event of an extension under § 6.31*bis* or § 6.31*ter*), with the exception of assignments submitted by new Member States where §§ 6.35 and 7.7 apply,

the Bureau shall:

a) publish in a Special Section of its BR IFIC the cancellation of the related Special Sections and the assignments recorded in the Appendix **30B** List;

b) if the cancelled assignment is the result of a conversion of an allotment without modification, reinstate the allotment in the Appendix **30B** Plan;

c) if the cancelled assignment is the result of the conversion of an allotment with modifications, reinstate the allotment with the same orbital location and technical parameters of the cancelled assignment except for its service area, which shall be the national territory of the administration whose allotment is being reinstated; *and*

d) update the reference situation for the allotments of the Plan and the assignments of the List. (WRC-23)

Agenda item 7(F)

ADD

6.37 An administration, or an administration acting on behalf of a group of named administrations, responsible for a notice with:

– a service area limited to the national territory of an administration or to the national territories of a group of named administrations, as appropriate; and

– a coverage area that shall be the smallest area which encompasses the associated service area

may request the Bureau to be entitled under this Article to apply the procedure described in §§ 6.39 to 6.40 when none of those administrations have a frequency assignment included in the List for which complete Appendix **4** information has been received by the Bureau in accordance with the provisions of § 6.1 and published in accordance with § 6.7. The administration may seek the assistance of the Bureau in selecting an orbital position. (WRC-23)

ADD

6.37*bis* Before applying the procedure described in §§ 6.39 to 6.40, an administration, or a group of named administrations, requesting to be entitled under § 6.39 is requested to take all practical steps in accordance with the Radio Regulations to reach a coordination agreement with the administrations identified under § 6.5. The Bureau will inform the administrations identified under § 6.5 and request them to make the utmost effort to coordinate with the administration applying § 6.37. The responsible administration may at any time seek the assistance of the Bureau and its support in the coordination process. (WRC-23)

ADD

6.38 If, in spite of the application of § 6.37*bis*, there is still continuing disagreement between the administration, or the group of named administrations, applying § 6.37 and the administrations identified under § 6.5, administrations may seek the assistance of the Bureau, which shall take into account the actual operational parameters of the affected networks under § 6.5, as provided by the administration, to the extent possible, in its compatibility analysis. (WRC-23)

ADD

6.38*bis* If, in spite of the application of § 6.38, there is still continuing disagreement, the Bureau shall, upon receipt of a request from the administration or the group of named administrations applying § 6.37, submit the case, together with additional supporting materials from administrations, to the subsequent meeting of the Radio Regulations Board for review and the necessary actions. If the case relates to an assignment having global coverage with a limited service area in the Earth-to-space direction, the necessary actions of the Board shall also include consideration of whether to instruct the Bureau to apply the procedure described in §§ 6.39 to 6.40 with respect to the administrations identified under § 6.5 at the time of the examination, under § 6.17, of the frequency assignments of the administration applying § 6.37. The same course of action shall apply when the frequency assignments identified under § 6.5*c)* above are entered in the List after the entry in the List of the frequency assignments in question. (WRC-23)

ADD

6.39 For examination of a proposed new or modified assignment to the List that is subject to § 6.37, and following instruction from the Radio Regulations Board under § 6.38*bis* against an assignment for an additional system and not subject to Resolution **170 (Rev.WRC-23)** or a conversion of an allotment into an assignment with modification outside the envelope of the allotment and not subject to Resolution **170 (Rev.WRC-23)**, the Bureau will generate coverage diagrams that shall be the smallest area which encompasses the associated service area of the satellite network[36], using the Bureau's relevant software applications and following the procedure below:

Individual minimum ellipses will be created for each country/territory included in the service area of the incumbent network contained in the Part A or the initial Part B, as appropriate:

– if the −10 dB contours of individual minimum ellipses overlap with each other, the beam contains only one coverage area formed by the contours stemming from the elliptical coverage generated by the Bureau that encompasses these countries/territories;

– if the −10 dB contours of individual minimum ellipses do not overlap with each other, the beam consists of multiple spots stemming from the non-overlapping ellipses and each spot is formed by the contours stemming from minimum ellipses generated for countries/territories as described in the bullet above. (WRC-23)

---

[36] For satellite networks whose assignments were received by the Bureau under § 6.17 on or before 1 January 2025, the Bureau will use the coverage diagram contained in the List. In addition, administrations responsible for such satellite networks shall notify the Bureau when all the assignments associated with such networks are used by a space station launched after 1 January 2028. In such cases, the coverage area will be established as defined in § 6.39.

ADD

6.40 When an assignment subject to § 6.37 is entered in the List, the Bureau shall not update the reference situation for the latter assignment referred to in § 6.37 if the latter assignment is still affected, based on its submitted uplink coverage area. (WRC-23)

Agenda item 7(E)

ARTICLE 7 (REV.WRC-15)

Procedure for the addition of a new allotment to the Plan for a new Member State of the Union

MOD

7.3 Upon receipt of the complete information (mentioned in § 7.2 above), the Bureau shall expeditiously and ahead of submissions for which the examination under § 6.5 has not yet started, identify appropriate technical characteristics and associated orbital locations for a prospective national allotment based on Annex 1 to Appendix **30B**. The Bureau shall send this information to the requesting administration.

MOD

7.4*bis* If a selection for an allotment under § 7.4 has not been received by the Bureau within the specified time-limit referred to in § 7.4 above, the Bureau shall resume examination of submissions under § 6.5, or subsequent submission under Article 7, as appropriate, and inform the requesting administration that its request will be processed under § 7.5 when the Bureau is informed about the selected orbit location.

MOD

7.5 Upon receipt of a request under § 7.4, the Bureau shall process the request ahead of submissions for which the examination under § 6.5 has not yet started and, using Annexes 3 and 7, examine it with respect to its conformity with:

a) the Table of Frequency Allocations and the other provisions[10] of the Radio Regulations, except those provisions relating to conformity with the fixed-satellite service Plan which are the subject of the following subparagraph;

b) allotments in the Plan;

c) assignments which appear in the List;

d) assignments for which the Bureau has previously received complete information and which have been examined, or are at the stage of examination under § 6.5.

---

[10] The “other provisions” shall be identified and included in the Rules of Procedure.

MOD

7.7 In the event that the Bureau's findings under § 7.5 are unfavourable, the proposed allotment of the Member State shall be treated as a submission under § 6.1 and shall be treated by the Bureau ahead of any other submissions received under Article 6, except for submissions which were already under examination under § 6.5 by the Bureau at the time of completion of the examination of the request of the new Member State under § 7.5. The measures and technical criteria specified in Annex 7 shall be used during technical examinations at the various stages of the Article 6 procedure.

ADD

7.8 During the Article 6 procedure for the proposed allotment of the new Member State of the Union, the additional provisions contained in §§ 8 and 9 of Attachment 1 to Resolution **170 (Rev.WRC-23)** shall apply.

Agenda item 9.3

ARTICLE 8 (WRC-15)

Procedure for notification and recording in the Master Register of assignments in the planned bands for the fixed-satellite service[11, 12] (WRC-19)

ADD

8.2*bis* § 8.2 shall not apply to assignments converted from an allotment without any modification or with modification within the envelope of the characteristics of an allotment in the Plan, where § 6.31*ter* applies. (WRC-23)

Agenda item 7(I)

ADD

8.10*bis* When the examination with respect to § 8.9 leads to a favourable finding, the Bureau shall immediately send a telefax to administrations which applied § 6.15*quat* with respect to the allotment covered in this notice, if any. This telefax shall inform these administrations of the

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[11] If the payments are not received in accordance with the provisions of Council Decision 482, as amended, on the implementation of cost recovery for satellite network filings, the Bureau shall cancel the publication specified in §§ 8.5 and 8.12 and the corresponding entries in the Master Register under § 8.11 or § 8.16*bis*, as appropriate, after informing the administration concerned. The Bureau shall inform all administrations of such action and that any resubmitted notice shall be considered to be a new notice. The Bureau shall send a reminder to the notifying administration not later than two months prior to the deadline for the payment in accordance with the above-mentioned Council Decision 482, unless the payment has already been received. (WRC-19)

[12] Resolution **49 (Rev.WRC-15)** applies. (WRC-15)

notification under § 8.1 and the date on which the frequency assignment stemming from the conversion of an allotment and with respect to which § 6.15*quat* has been applied is planned to be brought into use. (WRC-23)

ADD

8.10*ter* Upon receipt of the telefax referred to in § 8.10*bis*, the administration which applied § 6.15*quat* with respect to the allotment covered in this notice shall reply to the Bureau, with a copy to the administration responsible for the allotment, confirming its commitment to respect the power flux-density limits in § 6.15*quat* with respect to the allotment from the date on which the frequency assignment is to be brought into use, or within 12 months of the date of dispatch of telefax sent under §8.10bis, whichever comes later, and shall submit in accordance with § 8.13 the updated characteristics of the frequency assignment with respect to which § 6.15*quat* has been applied. (WRC-23)

Agenda item 9.3

MOD

8.16 All frequency assignments notified in advance of their being brought into use shall be entered provisionally in the Master Register. Any frequency assignment provisionally recorded under this provision shall be brought into use no later than the end of the period provided for in § 6.31, § 6.31*bis* or § 6.31*ter* in the event of an extension under these provisions. Unless the Bureau has been informed by the notifying administration of the bringing into use of the assignment, it shall, no later than 15 days before the end of the regulatory period established under § 6.31, § 6.31*bis* or § 6.31*ter*, send a reminder requesting confirmation that the assignment has been brought into use within the regulatory period. If the Bureau does not receive that confirmation within 30 days following the period provided under § 6.31, § 6.31*bis* or § 6.31*ter* in the event of an extension under these provisions, it shall cancel the entry in the Master Register. In the event that an extension was requested under § 6.31*bis* but the Bureau determines that the conditions for an extension under § 6.31*bis* are not met, the Bureau shall inform the administration of its findings and cancel the entry in the Master Register. (WRC-23)

Agenda item 7(D3)

MOD

8.17 Wherever the use of a recorded frequency assignment to a space station is suspended for a period exceeding six months, the notifying administration shall inform the Bureau of the date on which such use was suspended. When the recorded assignment is brought back into use, the notifying administration shall so inform the Bureau, as soon as possible. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC. The date on which the assignment is

brought back into use[14*ter*, 14*quater*] shall be no later than three years from the date on which the use of the frequency assignment was suspended, provided that the notifying administration informs the Bureau of the suspension within six months from the date on which the use was suspended. If the notifying administration informs the Bureau of the suspension more than six months after the date on which the use of the frequency assignment was suspended, this three-year time period shall be reduced. In this case, the amount by which the three-year period shall be reduced shall be equal to the amount of time that has elapsed between the end of the six-month period and the date that the Bureau is informed of the suspension. If the notifying administration informs the Bureau of the suspension more than 21 months after the date on which the use of the frequency assignment was suspended, the frequency assignment shall be cancelled from the Master Register and the Bureau shall apply the provisions of § 6.33. (WRC-23)

Agenda item 7(E)

ARTICLE 10 (REV.WRC-19)

Plan for the fixed-satellite service in the frequency bands 4 500-4 800 MHz, 6 725-7 025 MHz, 10.70-10.95 GHz, 11.20-11.45 GHz and 12.75-13.25 GHz

ADD

7 The conditions for conversion of this allotment into an assignment and the consequential bringing into use of the converted assignment are included in the notes in the relevant AP30B/P Special Section. (WRC-23)

MOD

4 500-4 800 MHz, 6 725-7 025 MHz

1	2	3	4	5	6	7	8	9	10
…									
BHR00000	13.60	50.60	26.10	1.60	1.60	90.00	−9.6	−41.9	

14*ter* The date of bringing back into use of a frequency assignment to a space station in the geostationary-satellite orbit shall be the date of the commencement of the 90-day period defined below. A frequency assignment to a space station in the geostationary-satellite orbit shall be considered as having been brought back into use when a space station in the geostationary-satellite orbit with the capability of transmitting or receiving that frequency assignment has been deployed and maintained at the notified orbital position for a continuous period of 90 days. The notifying administration shall inform the Bureau within 30 days from the end of the 90-day period. Resolution **40 (Rev.WRC-19)** shall apply. (WRC-19)

14*quater* If the notifying administration has informed the Bureau of the date of commencement of the 90-day bringing-back-into-use period, but, as of 15 days after the end of the 90-day bringing-back-into-use period, has not yet informed the Bureau of the completion of the bringing-back-into-use period in accordance with footnote 14*ter*, the Bureau shall promptly send the notifying administration a reminder of its obligation to inform the Bureau of the completion of the bringing-back-into-use period under footnote 14*ter*. (WRC-23)

1	2	3	4	5	6	7	8	9	10
BIH00000	46.00	18.07	44.19	1.60	1.60	90.00	−5.1	−38.3	7
BLR00000	64.40	27.01	53.60	1.60	1.60	0.00	−9.4	−41.3	
…									
GDL00002	−115.90	−61.80	16.40	1.60	1.60	90.00	−9.6	−40.3	*/MB13
GEO00000	78.00	43.29	42.21	1.60	1.60	90.00	−9.6	−42.4	7
GHA00000	15.90	−1.30	7.70	1.60	1.60	90.00	−9.6	−39.7	
…									
HOL00000	−5.00	5.40	52.40	1.60	1.60	90.00	−9.6	−41.4	*/MB5
HRV00000	63.00	17.60	44.10	1.60	1.60	90.00	−9.6	−42.0	7
HTI00000	−92.00	−73.00	18.80	1.60	1.60	90.00	−9.6	−41.7	
…									
MCO00000	52.00						−15.6	−28.7	3, 6
MDA00000	75.10	28.34	46.96	1.60	1.60	90.00	−9.6	−42.4	7
MDG00000	16.90	46.60	−18.70	2.60	1.60	66.00	−7.5	−38.6	
…									
MHL00000	−159.00	175.30	8.70	2.30	1.60	94.00	−8.6	−38.8	*/MB2
MKD00000	−16.70	21.80	41.62	1.60	1.60	90.00	0.1	−33.1	7
MLA00000	78.50	108.20	4.70	3.20	1.60	0.00	−6.3	−38.5	
…									
SPM00000	−8.00								1
SRB00000	−26.70	20.57	44.07	1.60	1.60	90.00	−9.6	−41.9	7
SRL00000	−51.80	−11.90	8.50	1.60	1.60	90.00	−9.6	−41.4	
SSD00000	−23.90	30.25	8.06	1.73	1.60	110.06	−9.6	−39.7	7
STP00000	30.25	7.00	1.00	1.60	1.60	90.00	−9.6	−41.7	
…	−77.00	−55.60	3.90	1.60	1.60	90.00	−9.6	−40.7	
SVK00000	−19.82	17.30	49.60	1.60	1.60	90.00	−9.6	−40.0	
SVN00000	43.04	18.70	44.40	1.60	1.60	90.00	−10.0	−40.5	
SWZ00000	30.10	31.30	−26.40	1.60	1.60	90.00	−9.6	−42.0	
…									
XCQ00000	−159.00	173.40	4.60	10.20	2.40	175.00	4.5	−35.6	*/MB2
YEM00001	27.00	44.20	15.10	1.60	1.60	90.00	−9.6	−41.4	
…									

Agenda item 9.2

MOD

4 500-4 800 MHz, 6 725-7 025 MHz

1	2	3	4	5	6	7	8	9	10
…									
B 00011	−65.00	−62.60	−6.00				−2.5	−38.7	3
B 00022	−56.50	−45.40	−6.30				−1.9	−38.6	3
…									
CAN0EASTM	−107.50	−76.60	50.10	5.00	1.70	154.00	−7.0	−38.4	
…									
ROU00000	30.45								1
…									

MOD

4 500-4 800 MHz, 6 725-7 025 MHz

1	2	3	4	5	6	7	8	9	10
...	...	...	...	...	...	...	...	...	
MNE	−36.6	19.22	42.65	1.6	1.6	0	−9.6	−42.3	
...	...	...	...	...	...	...	...	...	

Agenda item 7(E)

MOD

10.70-10.95 GHz, 11.20-11.45 GHz, 12.75-13.25 GHz

1	2	3	4	5	6	7	8	9	10
…									
BHR00000	13.60	50.60	26.10	0.80	0.80	90.00	−10.2	−32.2	
BIH00000	46.00	18.07	44.19	0.80	0.80	90.00	−5.7	−27.5	7
BLR00000	64.40	27.01	53.60	1.14	0.80	25.74	−3.0	−30.0	
…									
GDL00002	−115.90	−61.80	16.40	0.80	0.80	90.00	−4.6	−22.7	*/MB13
GEO00000	78.00	43.29	42.21	0.80	0.80	90.00	−10.2	−31.1	7
GHA00000	15.90	−1.30	7.70	1.50	1.10	90.00	−1.0	−23.0	
…									
HOL00000	−5.00	5.40	52.40	0.80	0.80	90.00	−10.2	−30.8	*/MB5
HRV00000	63.00	17.60	44.10	0.84	0.80	39.13	−3.8	−23.4	7
HTI00000	−92.00	−73.00	18.80	0.80	0.80	90.00	−7.1	−26.9	
…									
MCO00000	52.00								1
MDA00000	75.10	28.34	46.96	0.80	0.80	90.00	−10.2	−31.5	7
MDG00000	16.90	46.60	−18.70	2.60	1.00	66.00	1.6	−22.5	
…									
MHL00000	−159.00	175.30	8.70	2.30	1.40	94.00	2.7	−22.6	*/MB2
MKD00000	−16.70	21.80	41.62	0.80	0.80	90.00	6.9	−15.9	7
MLA00000	78.50	108.20	4.70	3.20	1.40	0.00	4.1	−22.3	
…									
SPM00000	−8.00								1
SRB00000	−26.70	20.57	44.07	0.90	0.80	143.42	−9.6	−29.7	7
SRL00000	−51.80	−11.90	8.50	0.80	0.80	90.00	−6.9	−25.4	
SSD00000	−23.90	30.25	8.06	1.73	1.18	110.06	−3.8	−26.6	7
STP00000	30.25	7.00	1.00	0.80	0.80	90.00	−7.1	−27.0	
…									
SVK00000	−19.82	17.30	49.60	1.30	1.00	166.00	−5.1	−27.4	
SVN00000	43.04	18.70	44.40	1.10	1.00	161.00	−7.1	−27.3	
SWZ00000	30.10	31.30	−26.40	0.80	0.80	90.00	−10.2	−30.9	
…									
XCQ00000	−159.00	173.40	4.60	10.20	2.40	175.00	16.0	−16.0	*/MB2
YEM00001	27.00	44.20	15.10	1.00	1.00	103.00	−9.8	−30.1	

1	2	3	4	5	6	7	8	9	10
…									

Agenda item 9.2

MOD

10.70-10.95 GHz, 11.20-11.45 GHz, 12.75-13.25 GHz

1	2	3	4	5	6	7	8	9	10
…									
B 00011	−65.00	−62.60	−6.00				9.8	−22.4	3
B 00022	−56.50	−45.40	−6.30				0.8	−22.4	3
…									
CAN0EASTM	−107.50	−76.60	50.10	5.00	1.70	154.00	6.2	−25.1	
…									
ROU00000	30.45								1
…									

MOD

10.70-10.95 GHz, 11.20-11.45 GHz, 12.75-13.25 GHz

1	2	3	4	5	6	7	8	9	10
...	...	...	...	...	...	...	...	...	
MNE	−36.6	19.22	42.65	0.8	0.8	0	−10.2	−30.8	
...	...	...	...	...	...	...	...	...	

Agenda item 7(D1)

ANNEX 4 (REV.WRC-19)

Criteria for determining whether an allotment or an assignment is considered to be affected[15*bis*]

[15*bis*] For frequency assignments recorded in the List and brought into use before 23 November 2019, the criteria of § 2.2 of this Annex are not applicable. (WRC-19)

MOD

APPENDIX 1 TO ANNEX 4 (REV.WRC-23)

Method for determination of the overall single-entry and aggregate carrier-to-interference value averaged over the necessary bandwidth of the modulated carrier

Agenda item 9.2

MOD

1 Single-entry *C/I*

The overall single-entry $(C/I)_t$ at a given downlink test point due to a single interfering allotment or assignment is given by:

$$\left(C/I\right)_t = -10\log_{10}\left[10^{-\frac{(C/I)_{u_{min}}}{10}} + 10^{-\frac{(C/I)_d}{10}}\right] \quad \text{dB}$$

where:

$(C/I)_{u_{min}}$: lowest uplink *C/I* value among all uplink test points

$(C/I)_d$: downlink *C/I* value at the test point under consideration.

Agenda item 7(D1)

MOD

2 Aggregate *C/I*

The aggregate $(C/I)_{agg}$ at a given downlink test point is given by:

$$(C/I)_{agg} = -10\log_{10}\left(\sum_{j}^{n} 10^{-\frac{(C/I)_{t_j}}{10}}\right) \quad \text{dB}$$

$$j = 1, 2, 3 \ldots n,$$

where:

$(C/I)_{tj}$: overall carrier-to-interference ratio due to interference from the jth allotment or assignment calculated using the method for overall single-entry $(C/I)_t$ as provided in § 1 of Appendix 1 to this Annex; and

n: total number of interfering allotments or assignments for which the orbital separation with the desired satellite is less than or equal to 7° in the case of the 6/4 GHz band and less than or equal to 6° in the case of the 13/10-11 GHz band.

Agenda item 7(E)

ADD

ANNEX 7 (WRC-23)

Measures in order to facilitate the addition of a new allotment to the Plan for a new Member State of the Union[23]

1 Methods and criteria contained in Appendices 1 and 2 to Attachment 1 to Resolution **170 (Rev.WRC-23)** shall apply.

2 For examination of submission under § 6.17 of Article 6:

2.1 If an allotment is still identified as being affected by the proposed new allotment, and the orbital position together with the associated technical parameters of the proposed new allotment are not those identified by the Bureau under § 7.4 of Article 7, and the notifying administration insists, the proposed new allotment shall be entered in the List by the Bureau provided that the administration responsible for the affected allotment does not object to the condition that an agreement shall be reached with that responsible administration before the assignment stemming from the conversion of the future allotment is brought into use under Article 8 of Appendix **30B**. In this case, in updating the reference situation of that affected allotment, the proposed new allotment shall not be taken into account.

2.2 If an assignment is still identified as being affected by the proposed new allotment, and the notifying administration insists, the proposed new allotment shall be entered in the List by the Bureau subject to the conditions that, should harmful interference be caused by an assignment stemming from the conversion of the future allotment to any assignment which was the basis of the disagreement, the notifying administration of the converted allotment shall, upon receipt of advice thereof, immediately eliminate this harmful interference. In this case, in updating the reference situation of that affected assignment, the proposed new allotment shall not be taken into account.

3 The notifying administration of a satellite network for which the Bureau has previously received complete information and which has been examined, or is at the stage of examination under § 6.5 before a proposed new allotment, shall make the utmost effort to avoid degradation of the reference situation of the proposed new allotment and to overcome difficulty in coordination with the new Member State which is requesting the new allotment, recognizing that some of these identified satellite networks could be in the final stages of implementation. The notifying administration may request the assistance of the Bureau.

4 The Bureau shall apply the same course of action of footnote 7*bis* to § 6.21*c)* of Article 6 to review the coordination status of the proposed new allotment when any remaining affected networks are entered in the List after the proposed new allotment was entered in the List and/or the Plan.

---

[23] These measures are also applicable to the allotments BIH00000, GEO00000, HRV00000, MDA00000, MKD00000, SRB00000 and SSD00000, as appropriate.

5 Should the power density of the proposed new allotment be limited to a single minimum value meeting the carrier-to-noise (*C*/*N*) objectives and an overall aggregate carrier-to-interference value of 21 dB, as indicated in Annex 1 to Appendix **30B**, the following additional measures shall be applied by the Bureau and administrations:

a) An assignment shall not be considered as being affected by the Bureau if either single-entry carrier-to-interference ($(C/I)_d$ and $(C/I)_u$) or overall aggregate carrier-to-interference ($(C/I)_{agg}$) is met. In updating the reference situation of any Article 6 satellite networks identified as affected based on the criteria of Resolution **170 (Rev.WRC-23)**, the proposed new allotment shall not be taken into account when this new allotment is entered in the List and/or the Plan.

b) For a proposed new allotment received after 15 December 2023:

– paragraphs *a)* above and *d)* below shall not be applicable by the Bureau for the identification of assignments entered in the List on or before the date of receipt of the proposed new allotment under examination;

– paragraph *c)* below shall not be applicable by the Bureau in respect of assignments entered in the List before 1 January 2017.

c) Only test points are considered by the Bureau in its technical and regulatory examination of a proposed new allotment.

d) The administration responsible for an affected assignment shall accept interference produced by the proposed new allotment under examination within the −3 dB antenna gain contour of the minimum ellipse of the proposed new allotment.

e) For examination of submissions under § 6.17 of Article 6, if an allotment is still identified as being affected and the orbital position together with the associated technical parameters of the proposed new allotment are those identified by the Bureau under § 7.4 of Article 7, if the requesting administration insists, when the Bureau enters the proposed new allotment in the List a remark shall be inserted indicating that an agreement shall be reached with the administration responsible for the affected allotment before the assignment stemming from the conversion of the future allotment is brought into use under Article 8 of Appendix **30B**. In such cases, in updating the reference situation of that affected allotment, the proposed new allotment shall not be taken into account.

Agenda item 4

MOD

RESOLUTION 5 (REV.WRC-23)

Technical cooperation with the developing countries in the study of propagation in tropical and similar areas

The World Radiocommunication Conference (Dubai, 2023),

having noted

that the assistance provided for the developing countries by the Union in the field of telecommunications in cooperation with other United Nations specialized agencies, such as the United Nations Development Programme (UNDP), augurs well for the future,

aware

a) of the fact that the developing countries, particularly those in tropical and similar areas, (including the area referred to as zone C in the Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries (Geneva, 1989 and Geneva, 2006), the Red Sea, East Mediterranean, etc.), require adequate knowledge of radio wave propagation in their territories in order to make rational and economical use of the radio-frequency spectrum;

b) of the importance of propagation in radiocommunications;

c) of the importance of the work of ITU-T and ITU-R Study Groups for the development of telecommunications in general and radiocommunications in particular,

considering

a) the need for the developing countries themselves to study telecommunications in general and propagation in particular in their territories, this being the best means of enabling them to acquire telecommunication techniques and to plan their systems effectively and in conformity with the special conditions in the tropical areas;

b) the scarcity of resources available in these countries,

resolves to instruct the Secretary-General

1 to offer the assistance of the Union to developing countries in the tropical areas which endeavour to carry out national propagation studies in order to improve and develop their radiocommunications;

2 to assist these countries, if necessary with the collaboration of international and regional organizations such as the Asia-Pacific Broadcasting Union (ABU), Arab States Broadcasting Union (ASBU), African Telecommunication Union (ATU) and the African Union of Broadcasting (AUB) which may be concerned, in carrying out national propagation measurement programmes, including collecting appropriate meteorological data, on the basis of ITU-R Recommendations and Questions in order to improve the use of the radio-frequency spectrum;

3 to arrange funds and resources for this purpose from the UNDP or other sources in order to enable the Union to provide the countries concerned with adequate and effective technical assistance for the purpose of this Resolution,

resolves to instruct the Director of the Radiocommunication Bureau

to include this activity in the operational plan, within existing budgetary resources of the Sector,

invites administrations

to submit the results of these propagation measurements to ITU-R for consideration in its studies,

invites the Council

to follow the progress made in carrying out programmes of propagation measurements and the results achieved, and to take any action that it considers necessary.

RESOLUTION 12 (REV.WRC-23)

Assistance and support to Palestine

The World Radiocommunication Conference (Dubai, 2023),

recalling

a) the Charter of the United Nations and the Universal Declaration of Human Rights;

b) the terms of Resolution 67/19 of the United Nations General Assembly (UNGA), which decides "to accord to Palestine" non-member observer State status in the United Nations;

c) UNGA Resolution 72/240, which recognizes the Palestinian people's right to permanent sovereignty over their natural resources, specifically land, water, energy and other natural resources, in the occupied Palestinian territory, including East Jerusalem;

d) Resolution 32 (Kyoto, 1994) of the ITU Plenipotentiary Conference, on technical assistance to Palestine for the development of telecommunications;

e) Resolution 125 (Rev. Bucharest, 2022), Resolution 125 (Rev. Dubai, 2018), Resolution 125 (Rev. Busan, 2014), Resolution 125 (Rev. Guadalajara, 2010), Resolution 125 (Rev. Antalya, 2006) and Resolution 125 (Marrakesh, 2002) of the Plenipotentiary Conference, on assistance and support to Palestine for infrastructure development and capacity building in the telecommunication and information technology sector;

f) Resolution 99 (Rev. Dubai, 2018), Resolution 99 (Rev. Busan, 2014) and Resolution 99 (Rev. Guadalajara, 2010) of the Plenipotentiary Conference, on the status of Palestine in ITU;

g) Resolution 18 (Rev. Kigali, 2022), Resolution 18 (Rev. Buenos Aires, 2017), Resolution 18 (Rev. Dubai, 2014) and Resolution 18 (Rev. Hyderabad, 2010) of the World Telecommunication Development Conference (WTDC), on special technical assistance to Palestine;

h) Resolution 9 (Rev. Kigali, 2022), Resolution 9 (Rev. Buenos Aires, 2017) and Resolution 9 (Rev. Dubai, 2014) of WTDC, which recognize that it is the sovereign right of every State to manage spectrum use within its territories;

i) Nos. 6 and 7 of the ITU Constitution indicating among the purposes of the Union "to promote the extension of the benefits of the new telecommunication technologies to all the world's inhabitants" and "to promote the use of telecommunication services with the objective of facilitating peaceful relations",

considering

a) that the Constitution and ITU Convention are designed to strengthen peace and security in the world for the development of international cooperation and better understanding among the peoples concerned;

b) Resolution 125 (Rev. Bucharest, 2022), which recognizes that ITU's policy of assistance to Palestine for the development of its telecommunication sector has been efficient but has not yet fulfilled its goals due to the prevailing situation,

considering further

a) the need to continue assisting Palestine to manage, similar to ITU administrations, its radio spectrum resources required to advance the economic and social development of Palestine;

b) that the frequency assignments and frequency spectrum management requirements of Palestine must be respected and safeguarded in accordance with the provisions and resolutions of ITU and international law in this regard;

c) the right of Palestine to manage and plan its own spectrum resources in accordance with the Interim Agreement and the provisions of the Radio Regulations and the various resolutions adopted by global and regional radiocommunication assemblies and conferences;

d) The Israeli-Palestinian Interim Agreement signed between the parties,

mindful

of the fundamental principles contained in the Constitution,

noting with concern

the restrictions and difficulties related to the current situation in Palestine, preventing access to telecommunication means, services and applications, which constitute a continuing obstacle for the telecommunication sector in Palestine,

welcomes

1 the recent bilateral agreement elaborated through the JTC by concerned parties on 27 December 2022, for assignment of frequencies which will enable the deployment of IMT-Advanced and IMT-2020 technologies in Palestine,

2 the commitment of concerned parties to advance efforts to facilitate the entry of necessary equipment for the construction and operation of telecommunication networks for use by Palestinian operators;

3 the continued support of ITU, including its Secretary-General, in achieving the goals of this Resolution,

urges Member States

including concerned parties, to make every effort with a view to facilitating the acquisition and deployment of the equipment needed by Palestine for the establishment of their networks,

resolves

1 to continue to provide assistance to Palestine, through the ITU Radiocommunication Sector and in collaboration with the ITU Telecommunication Development Sector, pursuant to the relevant ITU resolutions and decisions, in particular in the areas of capacity building, spectrum management and frequency assignment, with a view to enabling Palestine to manage and exploit its radio spectrum;

2 to enable Palestine to modernize its telecommunication networks, including building and operating 4G and 5G networks, through support and technical assistance;

3 that Palestine should operate its telecommunication networks, including building and operating 4G and 5G networks, through support and technical assistance;

4 to urgently empower Palestine, through assistance provided to it, in order to ensure that Palestine is able to obtain and manage the necessary frequencies for microwave links, which are considered essential to the operation of 4G and 5G services, and identify mechanisms to ensure that Palestine is able to exploit the additional bands needed for new, modern mobile telecommunication networks, such as IMT-2020 in accordance with the Interim Agreement;

5 to enable Palestine to urgently extend, install, own, manage and operate optical fibre broadband telecommunication networks (and optical fibre links) between governorates and major cities to ensure a more robust digital transformation in Palestine in accordance with the Interim Agreement;

6 to support Palestine in obtaining VHF and UHF frequencies for fixed and mobile telecommunication services;

7 to enable Palestine to obtain FM frequencies for the broadcasting service;

8 to instruct the Director of the Radiocommunication Bureau to ensure the implementation of this Resolution,

urges concerned parties

1 to make all possible efforts to achieve the following:

i) facilitation of the import and deployment of equipment for the implementation of the agreement signed on 27 December 2022 with respect to the operation of 4G and 5G services, for the Palestinian operators in accordance with the Interim Agreement;

ii) enabling the establishment of Palestine's own international access networks including satellite earth stations, submarine cables, optical fibre and microwave systems in accordance with the Interim Agreement,

instructs the Director of the Radiocommunication Bureau

1 to take appropriate measures within the mandate of the Radiocommunication Bureau, in cooperation with the respective Sectors, in order to assist in the implementation of this Resolution;

2 to report to the next world radiocommunication conference on progress achieved in the implementation of this Resolution;

3 to ensure support and assistance in the mobilization and development of financial and human resources and capacity building for the radiocommunication sector in Palestine through innovation and financing in various fields;

4 to assist in the delivery of telecommunication networks and Internet services to remote areas (and all health centres in Palestine);

5 to assist in the implementation of projects of the three ITU Bureaux, including the regional initiatives,

instructs the Secretary-General

1 to ensure the implementation of this Resolution and to submit an annual report to the ITU Council on progress made in implementing this Resolution;

2 to coordinate the activities carried out by the three ITU Sectors in accordance with *resolves* above, to ensure that the Union’s action in favour of Palestine is as effective as possible, and to report on the matter to the Council on the progress achieved on these issues;

Agenda item 1.11

MOD

RESOLUTION 18 (REV.WRC-23)

Relating to the procedure for identifying and announcing the position of ships and aircraft of States not parties to an armed conflict

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that ships and aircraft encounter considerable risk in the vicinity of an area of armed conflict;

b) that for the safety of life and property it is desirable for ships and aircraft of States not parties to an armed conflict to be able to identify themselves and announce their position in such circumstances;

c) that radiocommunication offers such ships and aircraft a rapid means of self-identification and providing location information prior to their entering areas of armed conflict and during their passage through the areas;

d) that it is considered desirable to provide a supplementary signal and procedure for use, in accordance with customary practice, in the area of armed conflict by ships and aircraft of States representing themselves as not parties to an armed conflict,

noting

that Recommendations ITU-R M.493 and ITU-R M.1371 may include appropriate signals for the digital selective-calling systems and automatic identification systems in the maritime mobile service,

resolves

1 that the frequencies for urgency signal and messages specified in the Radio Regulations may be used by ships and aircraft of States not parties to an armed conflict for self-identification and establishing communications; the transmission will consist of the urgency or safety signals, as appropriate, described in Article **33** followed by the addition of the single word “NEUTRAL” pronounced as in French “neutral” in radiotelephony; as soon as practicable, communications shall be transferred to an appropriate working frequency;

2 that the use of the signal as described in the preceding paragraph indicates that the message which follows concerns a ship or aircraft of a State not party to an armed conflict. The message shall convey at least the following data:

a) call sign or other recognized means of identification of such ship or aircraft;

b) position of such ship or aircraft;

c) number and type of such ships or aircraft;

d) intended route;

e) estimated time en route and of departure and arrival, as appropriate;

f) any other information, such as flight altitude, radio frequencies guarded, languages and secondary surveillance radar modes and codes;

3 that the provisions of Article **33** relating to urgency and safety transmissions, and medical transports shall apply as appropriate to the use of the urgency and safety signals, respectively, by such ship or aircraft;

4 that the identification and location of ships of a State not party to an armed conflict may be effected by means of appropriate standard maritime radio equipment (for example automatic identification system (AIS) or long-range identification and tracking (LRIT)); the identification and location of aircraft of a State not party to an armed conflict may be effected by the use of the secondary surveillance radar (SSR) system in accordance with procedures to be recommended by the International Civil Aviation Organization (ICAO);

5 that the use of the signals described above would not confer or imply recognition of any rights or duties of a State not party to an armed conflict or a party to the conflict, except as may be recognized by common agreement between the parties to the conflict and a non-party;

6 to encourage parties to a conflict to enter into such agreements,

requests the Secretary-General

to communicate the contents of this Resolution to the International Maritime Organization, the International Civil Aviation Organization, the International Committee of the Red Cross, and the International Federation of Red Cross and Red Crescent Societies for such action as they may consider appropriate.

Agenda item 4

MOD

RESOLUTION 22 (REV.WRC-23)

Measures to limit unauthorized uplink transmissions from earth stations

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that, in accordance with Resolution **958 (WRC-15)**[*, 1] and Resolution ITU-R 64 of the Radiocommunication Assembly, the following issues were studied:

– whether there is a need for possible additional measures in order to limit uplink transmissions of terminals to those terminals authorized in accordance with No. **18.1**;

– possible methods that will assist administrations in managing the unauthorized operation of earth station terminals deployed within their territory, as a tool to guide their national spectrum-management programme;

b) that demand has been increasing for global satellite broadband communication services throughout the world,

recognizing

a) that training and monitoring capabilities, along with ITU Reports and Handbooks, may assist national administrations in inhibiting the unauthorized uplink transmissions of earth stations and can facilitate the location and termination of unauthorized earth station transmissions which do not comply with the provisions of Article **18**;

b) that Article **18** specifies the requirements for licensing the operation of stations within any given territory;

c) that administrations involved in the provision of satellite services, including notifying administrations of satellite networks or systems, are subject to Article **18**;

d) that successful coordination of a satellite network or system does not imply licensing/authorization to provide a service within the territory of a Member State,

noting

a) that the ITU Constitution recognizes the sovereign right of each Member State to regulate its telecommunications;

b) that multiple administrations are involved in the provision of satellite services, including notifying administrations of satellite networks or systems,

resolves

1 that the operation of transmitting earth stations within the territory of an administration shall be carried out only if authorized by that administration;

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[*] *Note by the Secretariat:* This Resolution was abrogated by WRC-19.

[1] Reference to Resolution **958 (WRC-15)** is provided as background information.

2 that the notifying administration for a satellite network or system shall, to the extent practicable, limit the operation of transmitting earth stations on the territory of an administration on which they are located and operated to only those licensed or authorized by that administration;

3 that, when an administration identifies the presence of unauthorized transmitting earth station transmissions in its territories:

i) it should take all appropriate actions at its disposal to the extent of its ability to stop such unauthorized transmissions; and

ii) if the matter is not resolved, this administration may report the details of such unauthorized transmissions, if available, to the notifying administrations of the satellite networks or systems that may be associated with these unauthorized transmissions, and the notifying administrations of these satellite networks or systems shall cooperate with the reporting administration, to the maximum extent possible, in order to resolve the matter in a satisfactory and timely manner,

invites administrations

1 to take all appropriate actions to make publicly and readily available the procedures for licensing/authorizing the operation of earth stations in their territories;

2 that have identified unauthorized operation of earth stations within their territories to provide relevant information to the Radiocommunication Bureau (BR) to report such cases;

3 when requested by BR or another administration, to cooperate to the maximum extent practicable with assistance in identifying unauthorized earth stations, with monitoring or geolocation services,

instructs the Director of the Radiocommunication Bureau

1 upon receipt of information from an administration detecting an unauthorized uplink transmission from its territory, to immediately inform Member States and satellite operating agencies of the matter by appropriate means and work with the administrations involved to resolve the matter;

2 to inform the administrations on the type of assistance ITU can provide on this issue,

instructs the Secretary-General

to stress the importance and ensure the circulation of this Resolution to all Member States.

MOD

RESOLUTION 25 (REV.WRC-23)

Operation of global satellite systems for personal communications

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that, in accordance with No. 6 of its Constitution, one of the purposes of the Union is "to promote the extension of the benefits of the new telecommunication technologies to all the world's inhabitants";

b) that, to this end, the Union is fostering the use of new technologies in telecommunications and is studying questions relating to this use in the Radiocommunication and the Telecommunication Standardization Sectors;

c) that the Telecommunication Development Sector is studying questions aimed at identifying the benefits that developing countries may derive from using new technologies;

d) that, among these new technologies, some constellations of non-geostationary satellites may provide global coverage and facilitate low-cost communications;

e) that the theme "global mobile personal communications by satellite" (GMPCS) was discussed at the first World Telecommunication Policy Forum established by Resolution 2 (Kyoto, 1994) of the Plenipotentiary Conference;

f) that Council Resolution 1116 instructs the Secretary-General to act as depositary of the GMPCS Memorandum of Understanding (MoU) and its Arrangements, to act as the registry for type-approval procedures and terminal types and to authorize the use of the abbreviation "ITU" as part of the GMPCS-MoU mark;

g) Recommendations ITU-R M.1343 and ITU-R M.1480 on the essential technical requirements of GMPCS earth stations that should be used by administrations as a common technical basis facilitating the global circulation and use of such GMPCS terminals in conformity with these Recommendations,

recognizing

a) that the spectrum available to global satellite systems for personal communications is limited;

b) that successful coordination does not in any way imply licensing authorization to provide a service within the territory of a Member State,

considering further

that other countries intending to use these systems should be guaranteed that they will be operated in accordance with the Constitution, the Convention and the Administrative Regulations,

noting

a) that the Constitution recognizes the sovereign right of each State to regulate its telecommunications;

b) that the International Telecommunication Regulations "recognize the right of any Member, subject to national law and should it decide to do so, to require that administrations and private operating agencies, which operate in its territory and provide an international

telecommunication service to the public, be authorized by that Member", and specifies that "within the framework of the present Regulations, the provision and operation of international telecommunication services in each relation is pursuant to mutual agreement between administrations";

c) that Article **18** specifies the authorities for licensing the operation of stations within any given territory;

d) the right of each Member State to decide on its participation in these systems, and the obligations for entities and organizations providing international or national telecommunication services by means of these systems to comply with the legal, financial and regulatory requirements of the administrations in whose territory these services are authorized,

resolves

that administrations licensing global satellite systems and stations intended to provide public personal communications by means of fixed, mobile or transportable terminals shall ensure, when licensing these systems and stations, that they can be operated only from the territory or territories of administrations having authorized such service and stations in compliance with Articles **17** and **18**, in particular No. **18.1**,

requests administrations

1 to continue cooperating with worldwide satellite system operators in improving the established arrangements for the provision of service within their territories and with the Secretary-General in implementing the GMPCS-MoU and its Arrangements;

2 to participate actively in ITU-R studies in developing and improving relevant Recommendations,

reminds operators of such systems

to take account, when contracting agreements on the operation of their systems from the territory of a country, of any potential loss of revenue that the country may suffer from a possible reduction of its international traffic existing at the time such agreements are executed.

Agenda item 8

MOD

RESOLUTION 26 (REV.WRC-23)

Footnotes to the Table of Frequency Allocations in Article 5 of the Radio Regulations

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that footnotes are an integral part of the Table of Frequency Allocations in the Radio Regulations and, as such, form part of an international treaty text;

b) that footnotes to the Table of Frequency Allocations should be clear, concise and easy to understand;

c) that footnotes should relate directly to matters of frequency allocation;

d) that, in order to ensure that footnotes allow modification of the Table of Frequency Allocations without introducing unnecessary complications, principles relating to the use of footnotes are needed;

e) that, currently, footnotes are adopted by competent world radiocommunication conferences (WRCs) and any addition, modification or deletion of a footnote is considered and adopted by the competent conference;

f) that some problems concerning country footnotes may be resolved through the application of a special agreement envisaged by Article **6**;

g) that, in certain cases, administrations are confronted with major difficulties due to inconsistencies or omissions in footnotes;

h) that, in order to keep the footnotes to the Table of Frequency Allocations up to date, there should be clear and effective guidelines for additions, modifications and deletions of footnotes,

noting

a) that some footnotes have been developed and revised under relevant agenda items of WRCs, while footnotes which are not related to those agenda items were considered by previous WRCs, as described in Annex 1 to this Resolution, under the standing agenda item referred to in *further resolves* 2;

b) that, under certain circumstances and on a purely exceptional basis, previous WRCs considered proposals for the addition of country names to existing footnotes which were not related to the case mentioned in *further resolves* 1;

c) that previous conferences also received proposals for the addition of new country footnotes not related to any agenda items, and that these proposals were not accepted;

d) that administrations need sufficient time to examine the potential consequences of changes to footnotes to the Table of Frequency Allocations;

e) the importance of coordination between countries before a WRC to agree on changes related to country footnotes,

resolves

1 that, wherever possible, footnotes to the Table of Frequency Allocations should be confined to altering, limiting or otherwise changing the relevant allocations rather than dealing with the operation of stations, assignment of frequencies or other matters;

2 that the Table of Frequency Allocations should include only those footnotes which have international implications for the use of the radio-frequency spectrum;

3 that new footnotes to the Table of Frequency Allocations should only be adopted in order to:

a) achieve flexibility in the Table of Frequency Allocations;

b) protect the relevant allocations in the body of the Table and in other footnotes in accordance with Section II of Article **5**;

c) introduce either transitional or permanent restrictions on a new service to achieve compatibility; or

d) meet the specific requirements of a country or area when it is impracticable to satisfy such needs otherwise within the Table of Frequency Allocations;

4 that footnotes serving a common purpose should be in a common format, and, where possible, be grouped into a single footnote with appropriate references to the relevant frequency bands,

further resolves

1 that any addition of a new footnote or modification of an existing footnote should be considered by a WRC only when:

a) the agenda of that WRC explicitly includes the frequency band to which the proposed additional or modified footnote relates; or

b) the frequency bands to which the desired additions or modifications of the footnote belong are considered during WRC and WRC decides to make a change in those frequency bands; or

c) the addition or modification of footnotes is specifically included in the agenda of WRC as a result of the consideration of proposals submitted by one or more interested administration(s);

2 that recommended agendas for future WRCs should include a standing agenda item which would allow for the consideration of proposals by administrations for deletion of country footnotes, or country names in footnotes, if no longer required[1];

3 that in cases not covered by *further resolves* 1 and 2, proposals for new footnotes or modification of existing footnotes could exceptionally be considered by a WRC if they concern corrections of obvious omissions, inconsistencies, ambiguities or editorial errors and have been submitted to ITU as stipulated in No. 40 of the General Rules of conferences, assemblies and meetings of the Union,

urges administrations

1 to review footnotes periodically and to propose the deletion of their country footnotes or of their country names from footnotes, as appropriate;

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[1] See also Annex 1 to this Resolution.

2 to take account of *further resolves* above in making proposals to WRCs in relation to footnotes or country names in footnotes;

3 to submit their proposals to a WRC in the cases addressed by *further resolves* 1, under the relevant agenda items of the conference, as appropriate (see Section B of Annex 1 to this Resolution);

4 to submit their proposals under the WRC standing agenda item described in *further resolves* 2 to the second session of the corresponding conference preparatory meeting for information only, if available, to allow for discussion with affected administrations.

ANNEX 1 TO RESOLUTION 26 (REV.WRC-23)

Previous world radiocommunication conferences (WRCs) have recognized that the scope of the WRC standing agenda item described in *further resolves* 2 of this Resolution is only related to requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required. However, previous WRCs have also received proposals on the addition of country names to existing footnotes and on the addition of new country footnotes.

It is recognized that it is not the intention of WRCs to encourage the addition of country names to existing footnotes.

Taking into account the decisions of WRC-12, WRC-15 and WRC-19 on the same subject, it is suggested that future WRCs may apply a similar approach to previous WRCs.

Future WRCs may consider the following guidance derived from the above-mentioned decisions.

A) The work of WRC on proposals submitted under the standing agenda item described in *further resolves* 2 of this Resolution may be based on the following:

i) Under certain circumstances, on a purely exceptional basis and if justified, proposals for the addition of country names to existing footnotes may be considered by WRCs, but their acceptance is subject to the express condition that there are no objections from affected countries.

ii) Should a WRC decide to accept submissions of additional proposals for the addition of country names to existing footnotes based on the proposals received, it may establish a deadline for such further contributions to WRC.

iii) A deadline may also be established for proposals on the deletion of country names, if appropriate, taking into account that administrations require sufficient time to analyse the proposals.

iv) Proposals for the addition of new country footnotes which are not related to agenda items of a WRC or cases described in *further resolves* 1 of this Resolution should not be considered.

B) The proposals on additions of country names to existing footnotes or new country footnotes in the cases addressed by *further resolves* 1 of this Resolution are to be treated under the relevant agenda item of the WRC, as appropriate.

Administrations are urged to submit their proposals under relevant agenda items of the WRC.

Proposals for additions which do not fall within the categories referred to in *further resolves* 1 of this Resolution may be considered under the standing agenda item described in *further resolves* 2 of this Resolution and are subject to the principles mentioned in A) above.

Agenda item 9.2

MOD

RESOLUTION 32 (REV.WRC-23)

Regulatory procedures for frequency assignments to non-geostationary-satellite networks or systems identified as short-duration mission not subject to the application of Section II of Article 9

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that some non-geostationary (non-GSO) satellites with short-duration missions have to date been operating for their entire mission duration without being notified or recorded;

b) that successful and timely development and operation of non-GSO networks or systems with short-duration missions may require regulatory procedures which take account of the short development cycle, short lifetimes and typical missions of such satellites, and therefore the application of certain provisions of Articles **9** and **11** may need to be adapted to take account of the nature of these satellites;

c) that these satellites typically have a short (one to two years) development time and are low cost, often using off-the-shelf components;

d) that the operational lifetime of these satellites generally ranges from several weeks up to not more than three years;

e) that non-GSO satellites with short-duration missions utilize low-Earth orbits;

f) that non-GSO satellites with short-duration missions are being used for a wide variety of applications, including remote sensing, space weather research, upper atmosphere research, astronomy, communications, technology demonstration and education, and therefore may operate under various radiocommunication services;

g) that advances in the field of satellite technology have resulted in non-GSO satellites with short-duration missions becoming a means for developing countries to become involved in space activities,

considering further

a) that the application of provisions of Articles **9** and **11** to frequency assignments to non-GSO networks or systems identified as short-duration mission as prescribed in this Resolution should not adversely or otherwise affect the regulatory treatment of other systems;

b) that the application of any modified regulatory procedure should not change the sharing status with respect to networks and systems not applying the modified regulatory procedure, both terrestrial and space, in frequency bands which may be used by non-GSO systems with short-duration missions,

recognizing

a) that Resolution ITU-R 68 seeks to improve awareness and increase knowledge on existing regulatory procedures for small satellites;

b) that non-GSO networks or systems operating in frequency bands not subject to Section II of Article **9** are, irrespective of the period of validity of their associated frequency assignments, subject to Nos. **9.3** and **9.4**;

c) that non-GSO systems with short-duration missions are not to be used for safety-of-life services,

noting

a) Report ITU-R SA.2312, on characteristics, definitions and spectrum requirements of nanosatellites and picosatellites, as well as systems composed of such satellites;

b) that No. **22.1** states that "Space stations shall be fitted with devices to ensure immediate cessation of their radio emissions by telecommand, whenever such cessation is required under the provisions of these Regulations" (see also Appendix **4** data item A.24.a),

resolves

1 that this Resolution shall apply only to non-GSO networks or systems identified by the notifying administration as effecting short-duration missions and corresponding to the following criteria:

1.1 the network or system shall operate under any space radiocommunication service on frequency assignments that are not subject to the application of Section II of Article **9**;

1.2 the maximum period of operation and validity of frequency assignments of a non-GSO network or system identified as short-duration mission shall not exceed three years from the date of bringing into use of the frequency assignments (see the Annex to this Resolution for the definition of date of bringing into use for such networks or systems), without any possibility of extension, after which the recorded assignments shall be cancelled;

1.3 the total number of satellites in a non-GSO network or system identified as short-duration mission shall not exceed 10 satellites[1];

2 that non-GSO networks or systems corresponding to *resolves* 1 of this Resolution shall comply with the conditions for use of the frequency band that is allocated to the service within which they operate;

3 that non-GSO networks or systems identified as short-duration mission using spectrum allocated to the amateur-satellite service shall operate in accordance with the definition of the amateur-satellite service as contained in Article **25**;

4 that non-GSO networks or systems with short-duration missions shall have the capability to cease transmitting immediately in order to eliminate harmful interference;

5 that, for the purpose of this Resolution, a non-GSO network or system identified as short-duration mission shall have a single launch date associated with the first launch (in the case of systems with multiple launches) and that launch date shall be defined as the date on which the first satellite of the non-GSO network or system with a short-duration mission is placed into its notified orbital plane,

instructs the Director of the Radiocommunication Bureau

1 to expedite the online publication of notices "as received" for such networks or systems, in addition to the normal publication of notices;

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[1] The typical mass of each satellite should not normally exceed 100 kg.

2 to provide the necessary assistance to administrations in the implementation of this Resolution,

invites administrations

1 to avoid heavily used frequency bands when assigning frequencies to a non-GSO network or system with a short-duration mission;

2 to exchange information associated with non-GSO networks or systems identified as short-duration mission and to make every possible effort to resolve interference that may be unacceptable to existing or planned satellite networks or systems, including those with short-duration missions;

3 to provide their comments on the application of No. **9.3**, upon receipt of the International Frequency Information Circular (BR IFIC) containing information published under No. **9.2B**, as soon as possible within a period of four months from the date of publication of the BR IFIC, and to communicate to the notifying administration, with copy to the Radiocommunication Bureau, these comments on the particulars of the potential interference to its existing or planned systems.

ANNEX TO RESOLUTION 32 (REV.WRC-23)

Application of the provisions of Articles 9 and 11 for non-geostationary-satellite networks and systems identified as short-duration mission

1 The general provisions of the Radio Regulations shall apply to non-geostationary-satellite (non-GSO) networks or systems identified as short-duration mission with the following exceptions/additions/amendments.

2 When submitting advance publication information under No. **9.1**, administrations shall submit the orbital characteristics (Appendix **4** data item A.4.b.4) planned at the early development stage of the satellite project.

3 In the application of No. **9.1**, the notification information cannot be communicated to the Radiocommunication Bureau (BR) at the same time, and can only be submitted after the launch of a satellite in the case of a network or of the first satellite in the case of a system with multiple launches.

4 Notices relating to notification for the recording of frequency assignments to non-GSO networks or systems identified as short-duration mission shall be communicated to BR only after the launch of a satellite in the case of a satellite network or of the first satellite in the case of a system requiring multiple launches, and not later than two months after the date of bringing into use. This provision applies instead of No. **11.25** for frequency assignments to non-GSO networks or systems with short-duration missions (see also the Rules of Procedure associated with this Resolution). Irrespective of the date of receipt of the notified characteristics of the non-GSO network or system with a short-duration mission under this Resolution, the maximum period of validity of frequency assignments of the system shall not exceed the time-limit in *resolves* 1.2 of this Resolution. At the expiry date of period of validity, as described in *resolves* 1.2 of this Resolution, BR shall publish a suppression of the related Special Section.

4*bis* Any frequency assignments to non-GSO networks or systems identified as short-duration mission for which the notice referred to in § 4 reaches the Bureau more than two months after the date of bringing into use shall bear a remark in the Master Register to indicate that they are not in conformity with § 4 of the Annex to Resolution **32 (Rev.WRC-23)**.

5 In addition to the application of No. **11.36**, BR shall publish the characteristics of the system together with the findings under No. **11.31** in the International Frequency Information Circular (BR IFIC) and on its website within no more than four months from the date of receipt of complete information under No. **11.28**. When BR is not in a position to comply with the time-limit referred to above, it shall periodically so inform the notifying administration, giving the reasons therefor.

6 In the application of No. **11.44**, the date of bringing into use of a non-GSO network or system identified as short-duration mission shall be defined as the launch date of a satellite in the case of a non-GSO network or of the first satellite in the case of a non-GSO system requiring multiple launches (see *resolves* 5 of this Resolution).

7 Nos. **11.43A**, **11.43B** and **11.49** shall not apply to frequency assignments to non-GSO networks or systems identified as short-duration mission.

Agenda item 7(B)

MOD

RESOLUTION 35 (REV.WRC-23)

A milestone-based approach for the implementation of frequency assignments to space stations in a non-geostationary-satellite system in specific frequency bands and services

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that filings for frequency assignments to non-geostationary-satellite (non-GSO) systems composed of hundreds to thousands of non-GSO satellites have been received by ITU since 2011, in particular in frequency bands allocated to the fixed-satellite service (FSS) or the mobile-satellite service (MSS);

b) that design considerations, availability of launch vehicles to support multiple satellite launches and other factors mean that notifying administrations may require longer than the regulatory period stipulated in No. **11.44** to complete implementation of the non-GSO systems referred to in *considering a)*;

c) that any discrepancies between the deployed number of orbital planes/satellites per orbital plane of a non-GSO system and the Master International Frequency Register (Master Register) have, to date, not significantly impinged upon the efficient use of the orbit/spectrum resource in any frequency band used by non-GSO systems;

d) that the bringing into use and recording in the Master Register of frequency assignments to space stations in non-GSO systems by the end of the seven-year regulatory period referred to in No. **11.44** do not require confirmation by the notifying administration of the deployment of all the satellites associated with these frequency assignments;

e) that ITU Radiocommunication Sector studies on the issue have shown that the adoption of a milestone-based approach will provide a regulatory mechanism to help ensure that the Master Register reasonably reflects the actual deployment of such non-GSO systems in certain frequency bands and services, and improve the efficient use of the orbit/spectrum resource in those frequency bands and services;

f) that, in defining the timeline and objective criteria for the milestone-based approach, there is a need to seek a balance between the prevention of spectrum warehousing, the proper functioning of coordination mechanisms and the operational requirements related to the deployment of a non-GSO system;

g) that adherence to fixed milestone periods is desirable, as this creates certainty with respect to the deployment of non-GSO systems,

recognizing

a) that the bringing into use of frequency assignments to non-GSO systems is addressed in Article **11**;

b) that any regulatory mechanism for management of frequency assignments to non-GSO systems in the Master Register should not impose an unnecessary burden;

c) that the number of orbital planes in a non-GSO system (item A.4.b.1) and the number of satellites in each orbital plane (item A.4.b.4.b) are among the notified required characteristics as specified in Appendix **4**;

d) that No. **13.6** is applicable to non-GSO systems with frequency assignments that were confirmed to have been brought into use prior to 1 January 2021 in the frequency bands and services to which this Resolution applies;

e) that, for frequency assignments to non-GSO systems brought into use and having reached the end of the period referred to in No. **11.44** prior to 1 January 2021 in the frequency bands and services to which this Resolution applies, affected notifying administrations should be given either the opportunity to confirm completion of the deployment of satellites in accordance with the Appendix **4** characteristics of their recorded frequency assignments or sufficient time to complete deployment in accordance with this Resolution;

f) that No. **11.49** addresses the suspension of recorded frequency assignments to a space station of a satellite network or to space stations of a non-GSO system,

recognizing further

that this Resolution relates to those aspects of non-GSO systems to which *resolves* 1 applies with regard to the notified required characteristics as specified in Appendix **4**, and the conformity of the notified required characteristics of the non-GSO systems, other than those referred to in *recognizing c)* above, is outside the scope of this Resolution,

noting

that for the purpose of this Resolution:

– the term “frequency assignments” is understood to refer to frequency assignments to a space station of a non-GSO system;

– the term “notified orbital plane” means an orbital plane of the non-GSO system, as provided to the Radiocommunication Bureau (BR) in the most recent notification information for the system’s frequency assignments, that possesses the general characteristics of items:

  – A.4.b.4.a, the inclination of the orbital plane of the space station;

  – A.4.b.4.d, the altitude of the apogee of the space station;

  – A.4.b.4.e, the altitude of the perigee of the space station; and

  – A.4.b.4.i, the argument of the perigee of the orbit of the space station (only for orbits whose altitudes of the apogee and perigee are different)

  in Table A of Annex 2 to Appendix **4**;

– the term “total number of satellites” is understood to mean the sum of the various values of Appendix **4** data item A.4.b.4.b associated with the notified orbital planes in the most recent notification information submitted to BR,

resolves

1 that this Resolution applies to frequency assignments to non-GSO systems brought into use in accordance with Nos. **11.44** and **11.44C**, in the frequency bands and for the services listed in the Table below:

TABLE

Frequency bands and services for application of the milestone-based approach

Frequency bands (GHz)	Space radiocommunication services		
	Region 1	**Region 2**	**Region 3**
10.70-11.70	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)	FIXED-SATELLITE (space-to-Earth)	
11.70-12.50	FIXED-SATELLITE (space-to-Earth)		
12.50-12.70	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)	FIXED-SATELLITE (space-to-Earth)	BROADCASTING-SATELLITE FIXED-SATELLITE (space-to-Earth)
12.70-12.75	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)	FIXED-SATELLITE (Earth-to-space)	BROADCASTING-SATELLITE FIXED-SATELLITE (space-to-Earth)
12.75-13.25	FIXED-SATELLITE (Earth-to-space)		
13.75-14.50	FIXED-SATELLITE (Earth-to-space)		
17.30-17.70	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)	None	FIXED-SATELLITE (Earth-to-space)
17.70-17.80	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)	FIXED-SATELLITE (space-to-Earth)	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)
17.80-18.10	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)		
18.10-19.30	FIXED-SATELLITE (space-to-Earth)		
19.30-19.60	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)		
19.60-19.70	FIXED-SATELLITE (space-to-Earth) (Earth-to-space)		
19.70-20.10	FIXED-SATELLITE (space-to-Earth) Mobile-satellite (space-to-Earth)	FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth)	FIXED-SATELLITE (space-to-Earth) Mobile-satellite (space-to-Earth)
20.10-20.20	FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth)		
27.00-27.50		FIXED-SATELLITE (Earth-to-space)	
27.50-29.50	FIXED-SATELLITE (Earth-to-space)		
29.50-29.90	FIXED-SATELLITE (Earth-to-space) Mobile-satellite (Earth-to-space)	FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space)	FIXED-SATELLITE (Earth-to-space) Mobile-satellite (Earth-to-space)
29.90-30.00	FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space)		
37.50-38.00	FIXED-SATELLITE (space-to-Earth)		
38.00-39.50	FIXED-SATELLITE (space-to-Earth)		

Frequency bands (GHz)	Space radiocommunication services		
	Region 1	Region 2	Region 3
39.50-40.50	FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth)		
40.50-42.50	FIXED-SATELLITE (space-to-Earth) BROADCASTING-SATELLITE		
47.20-50.20	FIXED-SATELLITE (Earth-to-space)		
50.40-51.40	FIXED-SATELLITE (Earth-to-space)		

2 that, for frequency assignments to which *resolves* 1 applies, and for which the end of the seven-year regulatory period specified in No. **11.44** is on or after 1 January 2021, the notifying administration shall communicate to BR the required deployment information in accordance with Annex 1 to this Resolution no later than 30 days after the end of the regulatory period specified in No. **11.44** or 30 days after the end of the bringing into use period in No. **11.44C**, whichever comes later;

3 that, for frequency assignments to which *resolves* 1 applies, and for which the end of the seven-year regulatory period specified in No. **11.44** has expired prior to 1 January 2021, the notifying administration shall communicate to BR the required deployment information in accordance with Annex 1 to this Resolution no later than 1 February 2021;

4 that, for the purposes of this Resolution, all references to 100% of the total number of satellites indicated in the latest notification information shall mean either 100% of the filed satellites (counting the number of satellites in each notified orbital plane), or 100% of the filed satellites minus one satellite;

5 that, upon receipt of the required deployment information submitted in accordance with *resolves* 2 or 3 above, BR shall:

a) promptly make this information available "as received" on the ITU website;

b) add a remark to the Master Register entry, if available, or to the latest notification information, as appropriate, stating that the assignments are subject to the application of *resolves* 7 to 18 of this Resolution if the number of satellites communicated to BR under *resolves* 2 or 3 above is less than 100% of the total number of satellites indicated in the latest notification information published in the International Frequency Information Circular (BR IFIC) (Part I-S) or in the latest notification information received by BR, as appropriate, for the frequency assignments; and

c) publish the results of action taken pursuant to *resolves* 5*b)* above in the BR IFIC and on the ITU website;

6 that, if the number of satellites communicated to BR under *resolves* 2 or 3 above is 100% of the total number of satellites indicated in the Master Register in Part II-S of the BR IFIC, if available, or in the latest notification information published in the BR IFIC (Part I-S) for the frequency assignments, *resolves* 7 to 18 of this Resolution are not applicable;

7 that, for the frequency assignments to which *resolves* 2 applies, the notifying administration shall communicate to BR the required deployment information in accordance with Annex 1 to this Resolution as of the expiry of the milestone periods mentioned in subsections *a*) through *c*) below (see also *resolves* 9):

a) no later than 30 days after the expiry of the two-year period after the end of the seven-year regulatory period referred to in No. **11.44**;

b) no later than 30 days after the expiry of the five-year period after the end of the seven-year regulatory period referred to in No. **11.44**;

c) no later than 30 days after the expiry of the seven-year period after the end of the seven-year regulatory period referred to in No. **11.44**;

8 that, for frequency assignments to which *resolves* 3 applies, the notifying administration shall communicate to BR the complete deployment information in accordance with Annex 1 to this Resolution as of 1 January of the years mentioned in subsections *a)* through *c)* below (see also *resolves* 9):

a) no later than 1 February 2023 (corresponding to 30 days after the expiry of the two-year period after 1 January 2021);

b) no later than 1 February 2026 (corresponding to 30 days after the expiry of the five-year period after 1 January 2021);

c) no later than 1 February 2028 (corresponding to 30 days after the expiry of the seven-year period after 1 January 2021);

9 that, for purposes of *resolves* 7 and 8:

a) BR shall process the deployment information required to be submitted under *resolves* 7*a)*/8*a)* or 7*b)*/8*b),* as appropriate*,* at any point during the relevant period, if the notifying administration reports that the total number of satellites required to be deployed as of the end of that milestone period has been achieved;

b) BR shall process, at any time, a report from the notifying administration stating that the total number of satellites deployed as a part of the system is 100% of the total number of satellites indicated in the Master Register in Part II-S of the BR IFIC, if available, or in the latest notification information published in the BR IFIC (Part I-S) for the frequency assignments;

c) if the total number of satellites deployed as part of the system during any relevant milestone period is greater than the number of satellites that remain deployed as part of the system as of the expiry of the relevant milestone period, BR shall take into account the total number of satellites deployed during the period that has been reported by the notifying administration if:

i) the notifying administration includes a detailed explanation of the circumstances which led to having the reduced number of satellites deployed as of the expiry of that milestone period with the complete deployment information in accordance with Annex 1 to this Resolution; and

ii) the notifying administration provides an indication of whether any of the satellites no longer counted as of the expiry of the relevant milestone period have been or will be used to satisfy milestone obligations associated with frequency assignment(s) of any other non-GSO system(s) subject to this Resolution and, if so, how many satellites and the identity of the non-GSO system(s) in question;

d) the notifying administration shall provide with its reporting under *resolves* 7 or 8, as appropriate, an indication of whether any of the satellites counted as of the expiry of the relevant milestone period have been used to satisfy milestone obligations associated with frequency assignment(s) of any other non-GSO system(s) subject to this Resolution and, if so, how many satellites and the identity of the non-GSO system(s) in question;

10 that, upon receipt of the required deployment information submitted in accordance with *resolves* 7 or 8, BR shall:

a) promptly make this information available “as received” on the ITU website;

b) conduct an examination of the information provided for compliance with the minimum number of satellites to be deployed as prescribed for each period in *resolves* 11*a)*, 11*b)* or 11*c)*, as appropriate;

c) modify the Master Register entry, if available, or the latest notification information, as appropriate, for the frequency assignments to the system to remove the remark added in accordance with *resolves* 5*b)*, stating that the assignments are subject to the application of this Resolution if the number communicated to BR under *resolves* 7 or 8 is 100% of the total number of satellites indicated in the Master Register entry for the non-GSO system;

d) publish this information and its findings in the BR IFIC and make that information available on the ITU website as soon as possible;

11 that the notifying administration shall also submit to BR, no later than 90 days after the expiry of each of the milestone periods referred to in *resolves* 7 or 8, as appropriate, the modifications to the characteristics of the notified or recorded frequency assignments if the number of space stations declared as deployed:

a) under *resolves* 7*a)* or 8*a),* as appropriate, is less than 10% of the total number of satellites (rounded down to the lower integer) indicated in the latest notification information published in Part I-S of the BR IFIC for the frequency assignments; in this case, the modified total number of satellites shall not be greater than 10 times the number of space stations declared as deployed under *resolves* 7*a)* or 8*a)*;

b) under *resolves* 7*b)* or 8*b),* as appropriate, is less than 50% of the total number of satellites (rounded down to the lower integer) indicated in the latest notification information published in Part I-S of the BR IFIC for the frequency assignments; in this case, the modified total number of satellites shall not be greater than two times the number of space stations declared as deployed under *resolves* 7*b)* or 8*b)*;

c) under *resolves* 7*c)* or 8*c),* as appropriate, is less than 100% of the total number of satellites indicated in the latest notification information published in Part I-S of the BR IFIC for the frequency assignments; in this case, the modified total number of satellites shall not be greater than the number of space stations declared as deployed under *resolves* 7*c)* or 8*c)*;

12 that *resolves* 11*a)* shall not apply for frequency assignments for which the end of the seven-year regulatory period in No. **11.44** is before 28 November 2022, provided that the notifying administration submits the complete information listed in Annex 2 to this Resolution to BR by 1 March 2023, and a favourable determination is made by the Radio Regulations Board (RRB) or WRC-23;

13 that BR shall, no later than 45 days before any deadline for submission by a notifying administration under *resolves* 2, 3, 7*a)*, 7*b),* 7*c),* 8*a)*, 8*b),* 8*c)*, 19, 20 or 21 send a reminder to the notifying administration to provide the information required;

14 that, upon receipt of the modifications to the characteristics of the notified or recorded frequency assignments as referred to in *resolves* 11 or 21:

a) BR shall promptly make this information available “as received” on the ITU website;

b) BR shall conduct an examination for compliance with the maximum number of satellites as per *resolves* 11*a)*, 11*b)* or 11*c)* and Nos. **11.43A/11.43B**, as appropriate;

c) BR, for the purpose of No. **11.43B**, shall retain the original dates of entry of the frequency assignments in the Master Register if:

i) BR reaches a favourable finding under No. **11.31**; and

ii) the modifications are limited to reduction of the number of orbital planes (Appendix **4** data item A.4.b.2) and modifications to the longitude of the ascending node (Appendix **4** data item A.4.b.4.j) associated with the remaining orbital planes, or reduction of the number of space stations per plane (Appendix **4** data item A.4.b.4.b) and modifications of the initial phase angle of the space stations (Appendix **4** data item A.4.b.4.h) within planes; and

iii) the notifying administration provides 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 (see Appendix **4** data item A.23.a);

d) for modifications submitted under *resolves* 11, BR shall ensure the remark stating that the assignments are subject to the application of this Resolution as defined in *resolves* 7 or 8 is retained until the milestone process in *resolves* 7 to 18 of this Resolution is complete;

e) BR shall publish the information provided and its findings in the BR IFIC;

15 that, if a notifying administration fails to communicate the information required under *resolves* 2, 3, 7*a)*, 7*b),* 7*c)*, 8*a)*, 8*b),* 8*c),* 11*a)*, 11*b),* 11*c)*, 19, 20 or 21, as appropriate, BR shall promptly send to the notifying administration a reminder asking the administration to provide the required information within 30 days from the date of this reminder from BR;

16 that, if a notifying administration fails to provide information after the reminder sent under *resolves* 15, BR shall send to the notifying administration a second reminder asking it to provide the required information within 15 days from the date of the second reminder;

17 that, if a notifying administration fails to provide the required information:

a) under *resolves* 2 or 3, as appropriate, following the reminders under *resolves* 15 and 16, BR shall continue to take the entry in the Master Register into account when conducting its examinations until the decision is made by RRB to cancel the entry;

b) under *resolves* 7*a)*, 7*b),* 7*c)*, 8*a)*, 8*b),* 8*c)*, 11*a)*, 11*b),* 11*c)*, 19, 20 or 21, as appropriate, following the reminders under *resolves* 15 and 16, BR shall:

i) modify the entry by suppressing the notified orbital parameters of all satellites not listed in the last complete deployment information submitted under *resolves* 2, 3, 7, 8, 19 or 20, as appropriate; and

ii) no longer consider the frequency assignments under subsequent examinations under Nos. **9.36**, **11.32** or **11.32A**, and inform administrations having frequency assignments subject to subsection IA of Article **9** that those assignments shall not cause harmful interference to, nor claim protection from, other frequency assignments recorded in the Master Register with a favourable finding under No. **11.31**;

18 that the suspension of the use of frequency assignments in accordance with No. **11.49** at any point prior to the end of a milestone period as specified in *resolves* 7*a)*, 7*b),* 7*c),* 8*a)*, 8*b)* or 8*c)* of this Resolution, as applicable, shall not alter or reduce the requirements associated with any of the remaining milestones as derived from *resolves* 7*a)*, 7*b),* 7*c),* 8*a)*, 8*b)* or 8*c)*, as appropriate;

19 that the notifying administration for a non-GSO system that has completed the milestone process described in this Resolution, including application of *resolves* 10*c)* by BR, and for systems to which *resolves* 6 applies, shall communicate to BR the required deployment information in accordance with Annex 1 to this Resolution no later than 30 days after the expiry of the 11-year period after the end of the seven-year regulatory period referred to in No. **11.44** (for

frequency assignments to which *resolves* 2 applies) or no later than 1 February 2032 (corresponding to 30 days after the expiry of the 11-year period after 1 January 2021) (for frequency assignments to which *resolves* 3 applies);

20 that the notifying administration for a non-GSO system that has provided deployment information under *resolves* 19 shall, no later than 30 days after the expiry of a four-year period from the due date of the submission under *resolves* 19, and every four years thereafter, communicate to BR the required deployment information in accordance with Annex 1 to this Resolution;

21 that, if the number of satellites reported pursuant to *resolves* 19 or 20 is less than:

$$X = N \cdot 50\% \qquad \text{for } N \leq 340$$

$$X = N - 67 \cdot \log(N) \qquad \text{for } 340 < N \leq 4\,950$$

$$X = N \cdot 95\% \qquad \text{for } N > 4\,950$$

where N is the total number of satellites in the non-GSO system indicated in the Master Register in Part II-S of the BR IFIC, if available, or in the latest notification information published in the BR IFIC (Part I-S) for the frequency assignments, and if the number of satellites deployed remains less than X in the formula above on the due date of the subsequent report under *resolves* 20, the notifying administration shall submit modifications to the characteristics of the notified or recorded frequency assignments to align with the number of space stations declared as deployed no later than 90 days after the due date of the subsequent report;

22 that, for a non-GSO system that has completed the milestone process described in this Resolution, including application of *resolves* 10*c)* by BR, and for systems to which *resolves* 6 applies, if the number of satellites considered as part of the system falls below the total number of satellites indicated in the Master Register in Part II-S of the BR IFIC, if available, or in the latest notification information published in the BR IFIC (Part I-S) for the frequency assignments, the notifying administration shall, for information purposes only:

a) provide a report to BR, on an annual basis as of the completion of the milestone process, within 30 days of the anniversary, containing the date when this event, or events, began, and a general explanation of the event(s) for each affected satellite;

b) provide to BR, either as part of the annual report under *resolves* 22*a)*, or with the next report under *resolves* 19 or 20, whichever comes first, the date or dates on which each affected satellite was restored to operational status or replaced;

23 that BR shall:

a) make any information reported under *resolves* 22*a)* and 22*b)* available on its website; and

b) include a report of its activities and data gathered under *resolves* 22 to the relevant ITU-R study group and a future competent conference(s),

further resolves

to apply *resolves* 19 to 23 above on a provisional basis as of the *date of entry into force of the Radio Regulations* pending review by a future competent Conference,

instructs the Radiocommunication Bureau

1 to take the necessary actions to implement this Resolution;

2 to report any difficulties it encounters in the implementation of this Resolution to future competent WRCs;

3 to continue to identify and report on specific frequency bands in specific services for which there may be a problem similar to that which resulted in the creation of this Resolution, as

early as possible, but not later than the penultimate meeting of the responsible group prior to the second session of the Conference Preparatory Meeting,

invites the ITU Radiocommunication Sector

to continue studies with a view to confirming the suitability of, and the regulatory implementation of, the post-milestone procedure in *resolves* 19 to 21 above, and to recommend appropriate action under Resolution **86 (Rev.WRC-07)**.

ANNEX 1 TO RESOLUTION 35 (REV.WRC-23)

Information to be submitted about the deployed space stations

A Satellite system information

1) Name of the satellite system
2) Name of the notifying administration
3) Country symbol
4) Reference to the advance publication information or the request for coordination, or the notification information, if available
5) Total number of space stations deployed into each notified orbital plane of the satellite system with the capability of transmitting or receiving the frequency assignments
6) Orbital plane number indicated in the latest notification information published in Part I-S of the BR IFIC for the frequency assignments into which each space station is deployed.

B Launch information to be provided for each deployed space station

1) Name of the launch vehicle provider
2) Name of the launch vehicle
3) Name and location of the launch facility
4) Launch date.

C Space station characteristics for each space station deployed

1) Frequency bands from the notification information in which the space station can transmit or receive
2) Orbital characteristics of the space station (altitude of the apogee and perigee, inclination, and argument of the perigee)
3) Name of the space station.

ANNEX 2 TO RESOLUTION 35 (REV.WRC-23)

Information to be provided by the notifying administration pursuant to *resolves* 12

1) Reference to notification information already submitted

2) Current deployment and operational information

3) Report indicating efforts made and detailing status of coordination with systems or networks

4) Clear evidence of a binding agreement for the manufacture or procurement of a sufficient number of satellites to meet the milestone obligation in *resolves* 7*b)* or 8*b)*, as appropriate

5) Clear evidence of a binding agreement to launch a sufficient number of satellites to meet the milestone obligation in *resolves* 7*b)* or 8*b)*, as appropriate.

NOTE – The manufacturing or procurement agreement should identify the contract milestones leading to the completion of manufacture or procurement of satellites required, and the launch agreement should identify the launch window, launch site and launch service provider.

The information required under this Annex shall be submitted in the form of a written commitment by the responsible administration, including manufacturer or launch provider letters or declarations, and evidence of guaranteed funding arrangements for the implementation of the project, where possible.

The notifying administration is responsible for authenticating the evidence of agreement.

Agenda item 9.2

MOD

RESOLUTION 49[1] (REV.WRC-23)

Administrative due diligence applicable to some satellite radiocommunication services

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that Resolution 18 (Kyoto, 1994) of the Plenipotentiary Conference instructed the Director of the Radiocommunication Bureau (BR) to initiate a review of some important issues concerning international satellite network coordination and to make a preliminary report to WRC-95 and a final report to WRC-97;

b) that the Director of BR provided a comprehensive report to WRC-97, including a number of recommendations for action as soon as possible and for identifying areas requiring further study;

c) that one of the recommendations in the Director's report to WRC-97 was that administrative due diligence should be adopted as a means of addressing the problem of reservation of orbit and spectrum capacity without actual use;

d) that experience may need to be gained in the application of the administrative due diligence procedures adopted by WRC-97, and that several years may be needed to see whether administrative due diligence measures produce satisfactory results;

e) that new regulatory approaches may need to be carefully considered in order to avoid adverse effects on networks already going through the different phases of the procedures;

f) that Article 44 of the ITU Constitution sets out the basic principles for the use of the radio-frequency spectrum and the geostationary-satellite and other satellite orbits, taking into account the needs of developing countries,

considering further

a) that WRC-97 decided to reduce the regulatory time-frame for bringing a satellite network into use;

b) that WRC-2000 considered the results of the implementation of the administrative due diligence procedures and prepared a report to the 2002 Plenipotentiary Conference in response to Resolution 85 (Minneapolis, 1998) of the Plenipotentiary Conference,

resolves

that the administrative due diligence procedure contained in Annex 1 to this Resolution shall be applied for a satellite network or satellite system of the fixed-satellite service, mobile-satellite service or broadcasting-satellite service for which the request for coordination under No. **9.30**, or for which the request for modifications of the Region 2 Plan under Article 4, § 4.2.1 *b)* of Appendices **30** and **30A** that involve the addition of new frequencies or orbital positions, or for

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[1] This Resolution does not apply to satellite networks or satellite systems of the broadcasting-satellite service in the frequency band 21.4-22 GHz in Regions 1 and 3.

which the request for modifications of the Region 2 Plan under Article 4, § 4.2.1 *a)* of Appendices **30** and **30A** that extend the service area to another country or countries in addition to the existing service area, or for which the request for additional uses in Regions 1 and 3 under § 4.1 of Article 4 of Appendices **30** and **30A**, or for which the submission under Appendix **30B** is received, with the exception of submissions of new Member States seeking the acquisition of their respective national allotments[2] for inclusion in the Appendix **30B** Plan,

further resolves

that the procedures in this Resolution are in addition to the provisions under Article **9** or **11** of the Radio Regulations or Appendices **30**, **30A** or **30B**, as applicable, and, in particular, do not affect the requirement to coordinate under those provisions (Appendices **30**, **30A**) in respect of extending the service area to another country or countries in addition to the existing service area,

instructs the Director of the Radiocommunication Bureau

to report to future competent world radiocommunication conferences on the results of the implementation of the administrative due diligence procedure.

ANNEX 1 TO RESOLUTION 49 (REV.WRC-23)

1 Any satellite network or satellite system of the fixed-satellite service, mobile-satellite service or broadcasting-satellite service with frequency assignments that are subject to coordination under Nos. **9.7**, **9.11**, **9.12**, **9.12A** and **9.13** shall be subject to these procedures.

2 Any request for modifications of the Region 2 Plan under the relevant provisions of Article 4 of Appendices **30** and **30A** that involve the addition of new frequencies or orbit positions or for modifications of the Region 2 Plan under the relevant provisions of Article 4 of Appendices **30** and **30A** that extend the service area to another country or countries in addition to the existing service area or request for additional uses in Regions 1 and 3 under the relevant provisions of Article 4 of Appendices **30** and **30A** shall be subject to these procedures.

3 Any submission of information under Article 6 of Appendix **30B**, with the exception of submissions of new Member States seeking the acquisition of their respective national allotments[3] for inclusion in the Appendix **30B** Plan, shall be subject to these procedures.

4 For any satellite network subject to § 1 above, administrations shall send to the Radiocommunication Bureau (BR) no later than 30 days following the end of the period established as a limit to bringing into use in No. **11.44**, the due diligence information relating to the identity of the satellite network, the spacecraft manufacturer and the launch service provider specified in Annex 2 to this Resolution.

5 An administration requesting a modification of the Region 2 Plan or additional uses in Regions 1 and 3 under Appendices **30** and **30A** under § 2 above shall send to BR no later than 30 days following the end of the period established as a limit to bringing into use in accordance with the relevant provisions of Article 4 of Appendix **30** and the relevant provisions of Article 4 of Appendix **30A**, the due diligence information relating to the identity of the satellite network, the spacecraft manufacturer and the launch service provider specified in Annex 2 to this Resolution.

6 An administration applying Article 6 of Appendix **30B** under § 3 above shall send to BR no later than 30 days following the end of the period established as a limit to bringing into use

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[2] See § 2.3 of Appendix **30B**.

[3] See § 2.3 of Appendix **30B**.

in § 6.1 of that Article, the due diligence information relating to the identity of the satellite network, the spacecraft manufacturer and the launch service provider specified in Annex 2 to this Resolution.

7 The information to be submitted in accordance with § 4, 5 or 6 above shall be signed by an authorized official of the notifying administration or of an administration that is acting on behalf of a group of named administrations.

8 On receipt of the due diligence information under § 4, 5 or 6 above, BR shall promptly examine that information for completeness. If the information is found to be complete, BR shall publish the complete information in a special section of the International Frequency Information Circular (BR IFIC) within 30 days.

9 If the information is found to be incomplete, BR shall immediately request the administration to submit the missing information. In all cases, the complete due diligence information shall be received by BR within the appropriate time period specified in § 4, 5 or 6 above.

10 Six months before expiry of the period specified in § 4, 5 or 6 above and if the administration responsible for the satellite network has not submitted the due diligence information under § 4, 5 or 6 above, BR shall send a reminder to the responsible administration.

11 If the complete due diligence information is not received by BR within the time limits specified in § 4, 5 or 6, as appropriate, the networks covered by § 1, 2 or 3 above shall be cancelled by BR. The provisional recording in the MIFR shall be deleted by BR after it has informed the concerned administration. BR shall publish this information in the BR IFIC.

With respect to the request for modification of the Region 2 Plan or for additional uses in Regions 1 and 3 under Appendices **30** and **30A** under § 2 above, the modification shall lapse if the complete due diligence information is not submitted in accordance with § 5.

With respect to the request for application of Article 6 of Appendix **30B** under § 3 above, the network shall also be deleted from the Appendix **30B** List if the complete due diligence information is not submitted in accordance with § 6. When an allotment under Appendix **30B** is converted into an assignment, the assignment shall be reinstated in the Plan in accordance with § 6.33 *c)* of Article 6 of Appendix **30B**.

12 When an administration has completely fulfilled the due diligence procedure but has not completed coordination, this does not preclude the application of No. **11.41** by that administration.

ANNEX 2 TO RESOLUTION 49 (REV.WRC-23)

A Identity of the satellite network

a) Identity of the satellite network

b) Name of the administration

c) Country symbol

d) Reference to the request for modification of the Region 2 Plan or for additional uses in Regions 1 and 3 under Appendices **30** and **30A**; or reference to the information processed under Article 6 of Appendix **30B**

e) Reference to the request for coordination (not applicable for Appendices **30**, **30A** and **30B**)

f) Frequency band(s)

g) Name of the operator

h) Name of the satellite

i) Orbital characteristics.

B Spacecraft manufacturer*

a) Name of the spacecraft manufacturer

b) Date of execution of the contract

c) Contractual “delivery window”

d) Number of satellites procured.

C Launch services provider

a) Name of the launch vehicle provider

b) Date of execution of the contract

c) Launch or in-orbit delivery window

d) Name of the launch vehicle

e) Name and location of the launch facility.

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* NOTE − In cases where a contract for satellite procurement covers more than one satellite, the relevant information shall be submitted for each satellite.

MOD

RESOLUTION 55 (REV.WRC-23)

Electronic submission of, and communications on, notice forms for satellite networks, earth stations and radio astronomy stations and reports of harmful interference affecting space services

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that submission of notices for all satellite networks, earth stations and radio astronomy stations in electronic format would further facilitate the tasks of the Radiocommunication Bureau (BR) and of administrations, and would accelerate the processing of these notices;

b) that the volume of advance publication information, coordination requests, notifications and filings under Appendices **30**, **30A** and **30B** for satellite networks or systems has been steadily increasing in recent years;

c) that a significant amount of effort is required to maintain the relevant databases;

d) that a paperless electronic approach to the submission of satellite network filings and comments, if required, would make this information readily accessible to all and would limit the workload for administrations and BR in the processing of these filings;

e) that the use of electronic means of communication in an integrated online platform for administrative correspondence related to advance publication, coordination and notification of satellite networks, earth stations and radio astronomy stations would facilitate the tasks of BR and of administrations, with the potential to improve efficiency and the coordination and notification process by reducing the amount of duplicated correspondence,

recognizing

a) that, should the processing delays related to the coordination and notification procedures extend beyond the periods specified in Articles **9** and **11** as well as in Appendices **30**, **30A** and **30B**, administrations may be faced with a shortened time window in which to effect coordination;

b) that administrations could use the time freed by a reduction in administrative correspondence to effect coordination;

c) that BR has successfully implemented the online platforms e-Communications and e-Submission of Satellite Network Filings in response to Resolutions of previous WRCs;

d) that, since 1 August 2018, all satellite network filings are submitted to BR through the e-Submission of Satellite Network Filings platform;

e) that, since 23 October 2019, all correspondence relating to the submission of, and commenting on, satellite network filings has been able to be communicated through the e-Communications platform;

f) that, since 1 September 2018, reports of harmful interference affecting space services have been submitted by administrations through the Satellite Interference Reporting and Resolution System (SIRRS) implemented by BR for this purpose,

resolves

1 that, as from 3 June 2000, all notices (AP4/II and AP4/III), radio astronomy notices (AP4/IV) and API (AP4/V and AP4/VI) and due diligence information (Resolution **49 (Rev.WRC-19/23)**) for satellite networks and earth stations submitted to BR pursuant to Articles **9** and **11** shall be submitted in electronic format compatible with the BR electronic notice form capture software (SpaceCap);

2 that, as from 17 November 2007, all notices for satellite networks, earth stations and radio astronomy stations submitted to BR pursuant to Articles **9** and **11**, as well as Appendices **30** and **30A** and Resolution **49 (Rev.WRC-19/23)**, shall be submitted in electronic format compatible with the BR electronic notice form capture software (SpaceCap and SpaceCom);

3 that, as from 1 June 2008, all notices for satellite networks and earth stations submitted to BR pursuant to Appendix **30B** shall be submitted in electronic format compatible with the BR electronic notice form capture software (SpaceCap);

4 that, as from 1 July 2009, comments/objections submitted to BR in accordance with Nos. **9.3** and **9.52** with respect to Nos. **9.11** to **9.14** and **9.21** of Article **9**, or in accordance with § 4.2.10, 4.2.13 or 4.2.14 of Appendices **30** and **30A** with respect to modification to the Region 2 Plan and use of the guardbands under Article 2A of those Appendices in Region 2, shall be submitted in electronic format compatible with the BR electronic notice form capture software (SpaceCom);

5 that, as from 18 February 2012, all requests for inclusion or exclusion submitted to BR under No. **9.41** of Article **9** shall be submitted in electronic format compatible with the BR electronic notice form capture software (SpaceCom);

6 that, since 3 June 2000, all graphical data associated with the submissions addressed in *resolves* 1, 2 and 3 should be submitted in graphics data format compatible with BR's data capture software (graphical interference management system (GIMS));

7 that all information indicated in *resolves* 1 to 6, in Annexes 1 and 2 to Resolution **35 (WRC-19)**, in Annex 2 to Resolution **552 (Rev.WRC-19/23)** and in the Attachment to Resolution **553 (Rev.WRC-23)** under §§ 8 and 9 shall be submitted to BR, using the ITU e-Submission of Satellite Network Filings platform;

8 that administrative correspondence between administrations and BR related to the advance publication, coordination, notification and recording processes, including correspondence related to Appendices **30**, **30A** and **30B**, for satellite networks, earth stations and radio astronomy stations shall be communicated, whenever possible, using the ITU e-Communications platform;

9 that reports of harmful interference affecting space services and associated correspondence exchanged between administrations and BR in accordance with Article **15** and No. **13.2** shall be submitted, whenever possible, using the ITU SIRRS platform and following the guidance provided in the most recent version of Recommendation ITU-R SM.2149;

10 that, wherever the words "telegram", "telex" or "fax" are inserted in provisions related to the advance publication, coordination, notification and recording processes for satellite systems or networks, earth stations and radio astronomy stations, including the provisions contained in Appendices **30**, **30A** and **30B** and related Resolutions, the e-Communications platform shall be used instead;

11 that other, traditional means of communication can be used in case of difficulty encountered in applying *resolves* 8, 9 and 10,

instructs the Radiocommunication Bureau

1 to make available coordination requests and notifications referred to in *resolves* 1 “as received” within 30 days of receipt on its website;

2 to provide administrations with the latest versions of the capture and validation software and any necessary technical means, training and manuals, along with any assistance requested by administrations to enable them to comply with *resolves* 1 to 4 above;

3 to integrate the validation software with the capture software to the extent practicable;

4 to continue to develop and improve the e-Submission of Satellite Network Filings, e-Communications and SIRRS platforms to meet the needs of the Radio Regulations with respect to the submission of, and comments on, satellite network filings, as well as the associated correspondence.

Agenda item 7(J)

MOD

RESOLUTION 76 (REV.WRC-23)

Protection of geostationary fixed-satellite service and geostationary broadcasting-satellite service networks from the maximum aggregate equivalent power flux-density produced by multiple non-geostationary fixed-satellite service systems in frequency bands where equivalent power flux-density limits have been adopted

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that WRC-97 adopted, in Article **22**, provisional equivalent power flux-density (epfd) limits to be met by non-geostationary fixed-satellite service (non-GSO FSS) systems in order to protect GSO FSS and GSO broadcasting-satellite service (BSS) networks in parts of the frequency range 10.7-30 GHz;

b) that WRC-2000 revised Article **22** to ensure the limits contained therein provide adequate protection to GSO networks without placing undue constraints on any of the systems and services sharing these frequency bands;

c) that WRC-2000 decided that a combination of single-entry validation, single-entry operational and, for certain antenna sizes, single-entry additional operational epfd limits, contained in Article **22**, along with the aggregate limits in Tables 1A to 1D as contained in Annex 1 to this Resolution, which apply to non-GSO FSS systems, protects GSO networks in these frequency bands;

d) that these single-entry validation limits have been derived from aggregate epfd masks contained in Tables 1A to 1D, assuming a maximum effective number of non-GSO FSS systems of 3.5;

e) that the aggregate interference caused by all co-frequency non-GSO FSS systems in these frequency bands into GSO FSS networks should not exceed the aggregate epfd limits in Tables 1A to 1D;

f) that to achieve the objective in *considering e)*, administrations of non-GSO FSS systems would need to establish collaboration through consultation meetings;

g) that WRC-97 decided, and WRC-2000 confirmed, that non-GSO FSS systems in the frequency bands in question are to mutually coordinate the use of frequencies in these frequency bands under the provisions of No. **9.12**;

h) that the orbital characteristics of such systems are likely to be inhomogeneous;

i) that, as a result of this likely inhomogeneity, the aggregate epfd levels from multiple non-GSO FSS systems will not be directly related to the actual number of systems sharing a frequency band, and the number of such systems operating co-frequency is likely to be small;

j) that the possible misapplication of single-entry limits should be avoided,

recognizing

a) that non-GSO FSS systems are likely to need to implement interference mitigation techniques to mutually share frequencies;

b) that, on account of the use of such interference mitigation techniques, it is likely that the number of non-GSO systems will remain small, as will the aggregate interference caused by non-GSO FSS systems into GSO networks;

c) that, notwithstanding *considering d)* and *e)* and *recognizing b)*, there may be instances where the aggregate interference from non-GSO systems could exceed the interference levels given in Tables 1A to 1D;

d) that administrations operating GSO networks may wish to ensure that the aggregate epfd produced by all operating co-frequency non-GSO FSS systems in the frequency bands referred to in *considering a)* above into GSO FSS and/or GSO BSS networks does not exceed the aggregate interference levels given in Tables 1A to 1D,

noting

a) that Recommendation ITU-R S.1588 provides methodologies for calculating aggregate downlink equivalent power flux-density produced by multiple non-geostationary fixed-satellite service systems into a geostationary fixed-satellite service network;

b) that, given *considering j)*, some non-GSO FSS systems use multiple filings, which may be submitted by more than one administration,

resolves

1 that administrations operating or planning to operate non-GSO FSS systems, for which coordination or notification information, as appropriate, was received after 21 November 1997, in the frequency bands referred to in *considering a)* above, individually or in collaboration, shall take all possible steps, including, if necessary, by means of appropriate modifications to their systems, to ensure that the aggregate interference into GSO FSS and GSO BSS networks caused by such systems operating co-frequency in these frequency bands does not cause the aggregate power levels given in Tables 1A to 1D to be exceeded (see No. **22.5K**);

2 that, in the event that the aggregate interference levels in Tables 1A to 1D are exceeded, administrations operating non-GSO FSS systems in these frequency bands shall take all necessary measures expeditiously to reduce the aggregate epfd levels to the limits given in Tables 1A to 1D, or to higher levels where those levels are acceptable to the affected GSO administration (see No. **22.5K**);

3 that, in order to fulfil the requirements in *resolves* 1, administrations operating or planning to operate non-GSO FSS systems shall, on a regular basis (e.g. yearly), hold a consultation meeting to determine the level of aggregate interference caused to GSO FSS or GSO BSS networks from non-GSO FSS systems and determine the necessary measures to ensure compliance with the required level for protecting GSO FSS and GSO BSS networks;

4 that administrations engaged in consultation meetings, when developing agreements to carry out their obligations under *resolves* 1 and 2 above, shall establish mechanisms to ensure that all administrations are given full visibility of the process and its outcome and the aggregate interference allowance into GSO FSS or GSO BSS networks is shared fairly among non-GSO FSS systems;

5 that those administrations participating in the consultation meeting shall designate one administration that shall communicate to the Radiocommunication Bureau the results of any

technical or operational amendment to the relevant non-GSO FSS systems following the application of *resolves* 2 above;

6 that consultation meetings to achieve the objective of *resolves* 1 and 2 shall be held after the ITU Radiocommunication Sector (ITU-R) adopts the Recommendation specified in *invites the ITU Radiocommunication Sector* 1 below, with the exception of meetings for the purpose of organizing the functioning of the consultation meetings and establishing preliminary terms of reference;

7 that administrations, when evaluating the aggregate interference into GSO FSS or GSO BSS networks under *resolves* 1, shall take into account the submission of appropriate notification information under No. **11.2** for non-GSO FSS systems and the submission of the information referred to in Resolution **35 (Rev.WRC-23)** for non-GSO FSS systems, along with the relevant information provided to the consultation meetings referred to in *considering f)*;

8 that the aggregate epfd calculations performed within the scope of the consultation meeting referred to in *resolves* 3 shall involve two assessments, one considering only the operational space stations of non-GSO FSS systems and another for information only, if needed, considering also non-GSO FSS space stations planned to be deployed before the next consultation meeting;

9 that any amendment to the relevant non-GSO FSS systems mentioned in *resolves* 7 above shall not affect the regulatory status of the affected non-GSO FSS systems, including following any modifications to their published characteristics,

invites the ITU Radiocommunication Sector

1 to continue its studies on the subject and develop, as a matter of urgency and preferably before 30 July 2027, and taking into account existing and relevant ITU-R Recommendations, a Recommendation on a suitable methodology for calculating the aggregate co-frequency epfd produced by non-GSO FSS systems and accurately modelling non-GSO FSS operations in the frequency bands referred to in *considering a)* above into GSO FSS and GSO BSS networks, which may be used to determine whether the systems are in compliance with the aggregate power levels given in Tables 1A to 1D of Annex 1, taking into account relevant elements of Recommendations ITU-R S.1588 and ITU-R S.1503, as appropriate;

2 to develop, as a matter of urgency and preferably before 30 July 2027, a Recommendation on a suitable methodology to adapt the operation of co-frequency non-GSO FSS systems in the frequency bands referred to in *considering a)* above to ensure that the aggregate power levels given in Tables 1A to 1D of Annex 1 are met;

3 to continue to verify, as a matter of urgency, the effectiveness of the provisions defined in this Resolution and, if needed, to study and analyse possible amendments to those provisions,

instructs the Director of the Radiocommunication Bureau

1 to participate in the consultation meetings mentioned in *resolves* 3 to 9 and to observe carefully the results of the epfd calculation mentioned in *resolves* 3;

2 to publish in the Radiocommunication Bureau International Frequency Information Circular the information referred to in *resolves* 5 and *instructs the Director of the Radiocommunication Bureau* 1;

3 to report to WRC-27, and subsequent WRCs, on the implementation of this Resolution;

4 to examine the possibility, if needed, of developing software that can be used to calculate the epfd level mentioned under *resolves* 1,

invites the 2027 world radiocommunication conference

to review the report on the implementation of this Resolution and to take any necessary action, as appropriate,

invites administrations

1 to participate in the discussions and determinations mentioned under *resolves* 5, as appropriate;

2 to provide to the Bureau, and to all participants in the consultation meetings, access to software developed, taking into consideration the methodology referred to in *invites the ITU Radiocommunication Sector* 1, to calculate the epfd level mentioned under *resolves* 2.

ANNEX 1 TO RESOLUTION 76 (REV.WRC-23)

TABLE 1A[1, 2, 3]

Limits on aggregate epfd↓ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**epfd↓ (dB(W/m²))**	**Percentage of time during which epfd↓ may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference radiation pattern[4]**
10.7-11.7 in all Regions 11.7-12.2 in Region 2 12.2-12.5 in Region 3 12.5-12.75 in Regions 1 and 3	−170 −168.6 −165.3 −160.4 −160 −160	0 90 99 99.97 99.99 100	40	60 cm Recommendation ITU-R S.1428
	−176.5 −173 −164 −161.6 −161.4 −160.8 −160.5 −160 −160	0 99.5 99.84 99.945 99.97 99.99 99.99 99.9975 100	40	1.2 m Recommendation ITU-R S.1428
	−185 −184 −182 −168 −164 −162 −160 −160	0 90 99.5 99.9 99.96 99.982 99.997 100	40	3 m [5] Recommendation ITU-R S.1428
	−190 −190 −166 −160 −160	0 99 99.99 99.998 100	40	10 m [5] Recommendation ITU-R S.1428

[1] For certain GSO FSS receive earth stations, see also Nos. **9.7A** and **9.7B**.

[2] In addition to the limits shown in Table 1A, the following aggregate epfd↓ limits apply to all antenna sizes greater than 60 cm in the frequency bands listed in Table 1A:

100% of the time epfd↓ (dB(W/(m^2 · 40 kHz)))	**Latitude (North or South) (degrees)**
−160	0 ≤ | Latitude | ≤ 57.5
−160 + 3.4(57.5 − | Latitude |)/4	57.5 < | Latitude | ≤ 63.75
−165.3	63.75 < | Latitude |

[3] For each reference antenna diameter, the limit consists of the complete curve on a plot which is linear in decibels for the epfd↓ levels and logarithmic for the time percentages, with straight lines joining the data points.

[4] For this Table, reference patterns in Recommendation ITU-R S.1428 shall be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

[5] The values for the 3 m and 10 m antennas are applicable only for the methodology referred to *invites the ITU Radiocommunication Sector* 1.

TABLE 1B[1, 2, 3]

Limits on aggregate epfd↓ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**epfd↓ (dB(W/m^2))**	**Percentage of time during which epfd↓ may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference radiation pattern[4]**
17.8-18.6	−170 −170 −164 −164	0 90 99.9 100	40	1 m Recommendation ITU-R S.1428
	−156 −156 −150 −150	0 90 99.9 100	1 000	
	−173 −173 −166 −164 −164	0 99.4 99.9 99.92 100	40	2 m Recommendation ITU-R S.1428
	−159 −159 −152 −150 −150	0 99.4 99.9 99.92 100	1 000	
	−180 −180 −172 −164 −164	0 99.8 99.8 99.992 100	40	5 m Recommendation ITU-R S.1428
	−166 −166 −158 −150 −150	0 99.8 99.8 99.992 100	1 000	

[1] For certain GSO FSS receive earth stations, see also Nos. **9.7A** and **9.7B**.

[2] For each reference antenna diameter, the limit consists of the complete curve on a plot which is linear in decibels for the epfd↓ levels and logarithmic for the time percentages, with straight lines joining the data points.

[3] A non-GSO system shall meet the limits of this Table in both the 40 kHz and the 1 MHz reference bandwidths.

[4] For this Table, reference patterns in Recommendation ITU-R S.1428 shall be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

TABLE 1C[1, 2, 3]

Limits on aggregate epfd↓ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	epfd↓ (dB(W/m²))	Percentage of time during which epfd↓ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[4]
19.7-20.2	−182 −172 −154 −154	0 90 99.94 100	40	70 cm Recommendation ITU-R S.1428
	−168 −158 −140 −140	0 90 99.94 100	1 000	
	−185 −176 −165 −160 −154 −154	0 91 99.8 99.8 99.99 100	40	90 cm Recommendation ITU-R S.1428
	−171 −162 −151 −146 −140 −140	0 91 99.8 99.8 99.99 100	1 000	
	−191 −162 −154 −154	0 99.933 99.998 100	40	2.5 m Recommendation ITU-R S.1428
	−177 −148 −140 −140	0 99.933 99.998 100	1 000	
	−195 −184 −175 −161 −154 −154	0 90 99.6 99.984 99.9992 100	40	5 m Recommendation ITU-R S.1428
	−181 −170 −161 −147 −140 −140	0 90 99.6 99.984 99.9992 100	1 000	

[1] For certain GSO FSS receive earth stations, see also Nos. **9.7A** and **9.7B**.

[2] For each reference antenna diameter, the limit consists of the complete curve on a plot which is linear in decibels for the epfd↓ levels and logarithmic for the time percentages, with straight lines joining the data points.

[3] A non-GSO system shall meet the limits of this Table in both the 40 kHz and the 1 MHz reference bandwidths.

[4] For this Table, reference patterns in Recommendation ITU-R S.1428 shall be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

TABLE 1D[1, 2]

Limits on aggregate epfd↓ radiated by non-GSO FSS systems in certain frequency bands into 30 cm, 45 cm, 60 cm, 90 cm, 120 cm, 180 cm, 240 cm and 300 cm BSS antennas

Frequency band (GHz)	epfd↓ (dB(W/m^2))	Percentage of time during which epfd↓ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[3]
11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	−160.4 −160.1 −158.6 −158.6 −158.33 −158.33	0 25 96 98 98 100	40	30 cm Recommendation ITU-R BO.1443, Annex 1
	−170 −167 −164 −160.75 −160 −160	0 66 97.75 99.33 99.95 100	40	45 cm Recommendation ITU-R BO.1443, Annex 1
	−171 −168.75 −167.75 −162 −161 −160.2 −160 −160	0 90 97.8 99.6 99.8 99.9 99.99 100	40	60 cm Recommendation ITU-R BO.1443, Annex 1
	−173.75 −173 −171 −165.5 −163 −161 −160 −160	0 33 98 99.1 99.5 99.8 99.97 100	40	90 cm Recommendation ITU-R BO.1443, Annex 1
	−177 −175.25 −173.75 −173 −169.5 −167.8 −164 −161.9 −161 −160.4 −160	0 90 98.9 98.9 99.5 99.7 99.82 99.9 99.965 99.993 100	40	120 cm Recommendation ITU-R BO.1443, Annex 1

TABLE 1D[1, 2] (*end*)

Frequency band (GHz)	epfd↓ (dB(W/m^2))	Percentage of time during which epfd↓ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[3]
11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	−179.5 −178.66 −176.25 −163.25 −161.5 −160.35 −160 −160	0 33 98.5 99.81 99.91 99.975 99.995 100	40	180 cm Recommendation ITU-R BO.1443, Annex 1
	−182 −180.9 −178 −164.4 −161.9 −160.5 −160 −160	0 33 99.25 99.85 99.94 99.98 99.995 100	40	240 cm Recommendation ITU-R BO.1443, Annex 1
	−186.5 −184 −180.5 −173 −167 −162 −160 −160	0 33 99.5 99.7 99.83 99.94 99.97 100	40	300 cm Recommendation ITU-R BO.1443, Annex 1

[1] For BSS antenna diameters of 180 cm, 240 cm and 300 cm, in addition to the aggregate limits shown in Table 1D, the following aggregate 100% of the time epfd↓ limits also apply:

100% of the time epfd↓ (dB(W/(m^2 · 40 kHz)))	Latitude (North or South) (degrees)
−160	0 ≤ | Latitude | ≤ 57.5
−160 + 3.4(57.5 − | Latitude |)/4	57.5 < | Latitude | ≤ 63.75
−165.3	63.75 < | Latitude |

[2] For each reference antenna diameter, the limit consists of the complete curve on a plot which is linear in decibels for the epfd↓ levels and logarithmic for the time percentages, with straight lines joining the data points. For BSS antenna of diameter 240 cm, in addition to the above aggregate 100% of the time epfd↓ limit, a −167 dB(W/(m^2 · 40 kHz)) aggregate 100% of the time operational epfd↓ limit also applies to receive antennas located in Region 2, west of 140° W, north of 60° N, pointing toward GSO BSS satellites at 91° W, 101° W, 110° W, 119° W and 148° W with elevation angles greater than 5°. This limit is implemented during a transition period of 15 years.

[3] For this Table, reference patterns in the Annex 1 to Recommendation ITU-R BO.1443 shall be used only for the calculation of interference from non-GSO FSS systems into GSO BSS systems.

Agenda item 4

MOD

RESOLUTION 85 (REV.WRC-23)

Application of Article 22 of the Radio Regulations to the protection of geostationary fixed-satellite service and broadcasting-satellite service networks from non-geostationary fixed-satellite service systems

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that WRC-2000 adopted, in Article **22**, single-entry limits applicable to non-geostationary (non-GSO) fixed-satellite service (FSS) systems in certain parts of the frequency range 10.7-30 GHz to protect geostationary-satellite (GSO) networks operating in the same frequency bands;

b) that, taking into account Nos. **22.5H** and **22.5I**, wherever the limits referred to in *considering a)* are exceeded by a non-GSO FSS system to which the limits apply without the agreement of the concerned administrations, this constitutes a violation of the obligations under No. **22.2**;

c) that Recommendation ITU-R S.1503 provides a functional description to be used in developing software tools for determining the conformity of non-GSO FSS networks with limits contained in Article **22**;

d) that there was no software tool available to the Radiocommunication Bureau for epfd examinations until the publication of the Circular Letter CR/414 on 6 December 2016 informing administrations of the availability of software for implementing Recommendation ITU-R S.1503-2;

e) that the software may not adequately model certain non-GSO FSS systems and further improvements to Recommendation ITU-R S.1503 may be necessary;

f) that, before the availability of the epfd validation software, the Bureau had requested commitments from the notifying administrations that they will meet the epfd limits in Tables **22-1A**, **22-1B**, **22-1C**, **22-1D**, **22-1E**, **22-2** and **22-3**, and that under these commitments the Bureau gave qualified favourable findings to their systems;

g) that the epfd validation software based on Recommendation ITU-R S.1503-2 does not allow the Bureau to perform examinations in relation to Nos. **9.7A** and **9.7B** when earth stations communicate with GSO space stations in inclined orbits and, thus, Recommendation ITU-R S.1714 was revised to assist the Bureau with this task;

h) that during the examination under Nos. **9.35** and **11.31**, the Bureau examines non-GSO FSS systems to ensure their compliance with the single-entry epfd limits given in Tables **22-1A**, **22-1B**, **22-1C**, **22-1D**, **22-1E**, **22-2** and **22-3**,

recognizing

that some non-GSO FSS systems are pending review of the qualified favourable findings despite the availability of epfd validation software,

resolves

1 that when the Bureau is unable to examine non-GSO FSS systems subject to Nos. **22.5C**, **22.5D** and **22.5F** under Nos. **9.35** and/or **11.31**, the notifying administration shall send to the Bureau a commitment that the non-GSO FSS system complies with the limits given in Tables **22-1A**, **22-1B**, **22-1C**, **22-1D**, **22-1E**, **22-2** and **22-3** in addition to the information submitted under Nos. **9.30** and **11.15**; a detailed technical description including the results of epfd calculations using existing epfd validation software, the results of epfd calculations using simulation software with adequate modelling of the non-GSO satellite FSS system, and identification of particular areas of the most recent version of Recommendation ITU-R S.1503 that fail to adequately model the non-GSO system shall also be provided;

1*bis* that the Bureau shall promptly make available on the ITU website the information referred to in *resolves* 1 that it has received from the administration of the non-GSO satellite system, and publish it in the Radiocommunication Bureau International Frequency Information Circular (BR IFIC);

2 that the Bureau shall issue either a qualified favourable finding under No. **9.35** or a favourable finding with a date of review under No. **11.31** with respect to the limits contained in Tables **22-1A**, **22-1B**, **22-1C**, **22-1D**, **22-1E**, **22-2** and **22-3**, if *resolves* 1 is satisfied, otherwise the non-GSO FSS system will receive a definitive unfavourable finding;

3 that if an administration believes that a non-GSO FSS system, for which the commitment referred to in *resolves* 1 was sent, has the potential to exceed the limits given in Tables **22-1A**, **22-1B**, **22-1C**, **22-1D**, **22-1E**, **22-2** and **22-3**, it may request from the notifying administration additional information with regard to the compliance with the limits mentioned above. Both administrations shall cooperate to resolve any difficulties, with the assistance of the Bureau, if so requested by either of the parties, and may exchange any additional relevant information that may be available;

4 that the Bureau shall determine coordination requirements between GSO FSS earth stations and non-GSO FSS systems under Nos. **9.7A** and **9.7B** based on bandwidth overlap, GSO FSS earth station antenna maximum isotropic gain, *G*/*T* and emission bandwidth;

5 that *resolves* 1 to 4 shall no longer be applied since, as per *considering d)*, the Bureau has communicated to all administrations via a Circular Letter that the epfd validation software is available and the Bureau is able to verify compliance with the limits in Tables **22-1A**, **22-1B**, **22-1C**, **22-1D**, **22-1E**, **22-2** and **22-3** and, as per *considering g)*, Recommendation ITU-R S.1714 has been revised and allows the Bureau to determine the coordination requirements between GSO FSS earth stations and non-GSO FSS systems under Nos. **9.7A** and **9.7B** based on all the conditions and criteria specified in Table 5-1 of Appendix **5**;

6 that notwithstanding *resolves* 5:

6.1 the course of actions described in *resolves* 2 and 3 (without the need to satisfy *resolves* 1) and *resolves* 4 shall continue to apply for non-GSO systems that can be adequately modelled using the existing version of the epfd validation software tool, notified after the publication of the Circular Letter referred to in *considering d)*, until the review of all the non-GSO FSS systems with qualified favourable findings is completed; and

6.2 *resolves* 1 to 3 and *resolves* 4, as appropriate, shall continue to apply to non-GSO systems that cannot be adequately modelled by the version of the software available until a new version of the software which adequately models the non-GSO system is made available,

invites the ITU Radiocommunication Sector

1 to amend, as a matter of urgency and taking into account the information referred to in *resolves* 1, as appropriate, the algorithm of Recommendation ITU-R S.1503 to ensure that the epfd validation software available to the Bureau for epfd examinations can adequately model non-GSO satellite FSS systems while maintaining the level of protection for GSO satellite networks in Article **22**;

2 to conduct studies, as a matter of urgency, to ensure that an indefinite application of a qualified favourable finding for a given non-GSO FSS system is avoided,

instructs the Director of the Radiocommunication Bureau

1 to encourage administrations to develop the epfd validation software;

2 to continue to review, using the available epfd validation software, the qualified favourable findings made in accordance with Nos. **9.35** and **11.31**;

3 to review, once a version of the epfd validation software that adequately models the non-GSO systems to which *resolves* 1 applies is available, the qualified favourable findings made in accordance with Nos. **9.35** and **11.31**;

4 to take the necessary actions to implement this Resolution.

MOD

RESOLUTION 99 (REV.WRC-23)

Provisional application of certain provisions of the Radio Regulations as revised by the 2023 World Radiocommunication Conference and abrogation of certain Resolutions and Recommendations

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that this conference has, in accordance with its terms of reference, adopted a partial revision to the Radio Regulations (RR), which will enter into force on 1 January 2025;

b) that some of the provisions, as amended by this conference, need to apply provisionally before that date;

c) that, as a general rule, new and revised Resolutions and Recommendations enter into force at the time of the signing of the Final Acts of a conference;

d) that, as a general rule, Resolutions and Recommendations which a world radiocommunication conference has decided to suppress are abrogated at the time of the signing of the Final Acts of a conference,

resolves

1 that the date of entry into force of the frequency bands 1 614.4225-1 618.725 MHz or 1 616.3-1 620.38 MHz and 2 483.59-2 499.91 MHz, Nos. **5.111Z**, **5.368**, **33.50**, **33.53**, as well as Appendix **15** for the frequency bands 1 614.4225-1 618.725 MHz or 1 616.3-1 620.38 MHz and 2 483.59-2 499.91 MHz is stipulated in *resolves* 5 of Resolution **COM4/5 (WRC-23)**;

2 that, as of 16 December 2023, the following provisions of the Radio Regulations shall provisionally apply:

– Appendix **30**: 4.1.10d; 4.1.13*bis*; 4.1.13*ter*; 4.1.30; 4.1.31; 4.1.32; 5.1.6*bis*;

– Appendix **30A**: 4.1.10d; 4.1.13*bis*; 4.1.13*ter*; 4.1.34; 4.1.35; 4.1.36; 5.1.10*bis*;

– Appendix **30B**: 6.4*bis*; 6.15; 6.15*quat*; 6.15*quin*; 6.27*bis*; 6.29*bis*; 6.29*ter*; 8.10*bis*; 8.10*ter*,

further resolves

to abrogate the following Resolutions as of 16 December 2023:

Resolution **75 (Rev.WRC-12)**

Resolution **160 (WRC-15)**

Resolution **161 (WRC-15)**

Resolution **171 (WRC-19)**

Resolution **172 (WRC-19)**

Resolution **173 (WRC-19)**

Resolution 174 (WRC-19)

Resolution **175 (WRC-19)**

Resolution **428 (WRC-19)**

Resolution **429 (WRC-19)**

Resolution **430 (WRC-19)**

Resolution **656 (Rev.WRC-19)**

Resolution **657 (Rev.WRC-19)**

Resolution **661 (WRC-19)**

Resolution **662 (WRC-19)**

Resolution **772 (WRC-19)**

Resolution **177 (WRC-19)**
Resolution **178 (WRC-19)**
Resolution 245 (WRC-19)
Resolution **246 (WRC-19)**
Resolution 247 (WRC-19)
Resolution **248 (WRC-19)**
Resolution **250 (WRC-19)**
Resolution **361 (Rev.WRC-19)**
Resolution **427 (WRC-19)**
Resolution **773 (WRC-19)**
Resolution **774 (WRC-19)**
Resolution **776 (WRC-19)**
Resolution **811 (WRC-19)**
Resolution **812 (WRC-19)**
Resolution **904 (WRC-07)**
Resolution **907 (Rev.WRC-15)**
Resolution **908 (Rev.WRC-15)**

MOD

RESOLUTION 140 (REV.WRC-23)

Measures and studies associated with the equivalent power flux-density (epfd) limits in the frequency band 19.7-20.2 GHz

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that, after several years of study, WRC-2000 adopted epfd limits in a number of frequency bands to give practical effect to No. **22.2**, in order to facilitate non-geostationary-orbit (non-GSO) systems in the fixed-satellite service (FSS) to operate while still ensuring protection of GSO FSS networks from unacceptable interference;

b) that in Resolution **76 (WRC-2000)**[*], WRC-2000 also adopted aggregate epfd↓ limits in the same frequency bands for the protection of GSO FSS systems;

c) that a small number of systems based on constellations of satellites in highly elliptical orbits (HEOs), in certain FSS bands, have been operating for many years;

d) that since the late 1990s, especially after WRC-2000, there has been a growing interest in HEOs in a number of frequency bands and for several space services, predominantly in the FSS allocations below 30 GHz;

e) that ITU-R studies reported to WRC-03 considered HEO systems to be a sub-category of non-GSO systems and characterized their operational features;

f) that in the period between WRC-2000 and WRC-03, ITU-R developed Recommendations concerning frequency sharing between HEO FSS systems and other systems, including GSO, low Earth orbit (LEO), medium Earth orbit (MEO) and HEO systems;

g) that certain types of HEO system would have difficulty in meeting the long-term portion of epfd↓ limits in force in the frequency band 19.7-20.2 GHz,

noting

a) that, in the long-term portion, the epfd↓ limits in the frequency band 19.7-20.2 GHz are considerably more stringent than those in the 17.8-18.6 GHz frequency band;

b) that Nos. **9.7A** and **9.7B** apply in this frequency band;

c) that the frequency band 19.7-20.2 GHz is one of the few bands identified by WRC-03 on a global basis for high-density applications in the fixed-satellite service;

d) that Recommendation ITU-R S.1715 provides guidelines to protect GSO FSS networks in the frequency band 19.7-20.2 GHz,

resolves to invite administrations

to consider using the relevant ITU-R Recommendations regarding the protection of GSO FSS satellite networks from interference by non-GSO FSS systems as a guideline for consultation between administrations, to fulfil their obligations under No. **22.2** in the frequency band 19.7-

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[*] *Note by the Secretariat:* This Resolution was revised by WRC-15.

20.2 GHz, and in the case where an administration responsible for a non-GSO FSS system requests the application of No. **22.5CA**,

instructs the Radiocommunication Bureau

in cases where an administration responsible for a non-GSO FSS system indicates in its coordination request its wish to apply No. **22.5CA** with respect to the epfd↓ limits in Table **22-1C** in the frequency band 19.7-20.2 GHz but has not yet reached the necessary agreements, to make a qualified favourable finding with respect to this provision. This provisional finding regarding compliance with epfd↓ limits shall be changed to a definitive favourable finding at the notification stage, only if all explicit agreements from administrations for which epfd limits are exceeded are obtained and an indication thereof is provided to the Bureau within two years from the date of receipt of the coordination request. Otherwise, this provisional finding shall be changed to a definitive unfavourable finding.

MOD

RESOLUTION 156 (REV.WRC-23)

Use of the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz by earth stations in motion communicating with geostationary space stations in the fixed-satellite service[1]

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that there is some regulatory ambiguity in the current No. **5.526** with respect to its scope of application;

b) 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 (ESIMs) to communicate with space stations of the fixed-satellite service (FSS);

c) that the ITU Radiocommunication Sector (ITU-R) has studied certain aspects of the technical and operational use of ESIMs and that the result of these studies is contained in Reports ITU-R S.2223 and ITU-R S.2357;

d) that appropriate technical, regulatory and operational procedures are required for ESIMs;

e) that current regulatory provisions and their associated Rules of Procedure provide the possibility that an earth station operate within the envelope of coordination agreements established for the corresponding satellite network;

f) that there may be a need to clarify that ESIMs as referred to in this Resolution are not intended to be used nor to be relied upon for the provision of safety-of-life applications,

recognizing

a) that the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz are globally allocated on a primary basis to the FSS and are used by geostationary-satellite orbit (GSO) FSS networks;

b) that, in the frequency band 29.5-30.0 GHz there is an allocation to the fixed and mobile services on a secondary basis in a number of countries (see No. **5.542**) and in the frequency band 19.7-20.2 GHz there is an allocation to the fixed and mobile services on a primary basis in a number of countries (see No. **5.524**);

c) that there is a need to take actions to eliminate harmful interference which may be caused to terrestrial services of those administrations listed in No. **5.542**;

d) that, currently, there is no specific regulatory procedure for the coordination of the ESIMs with regard to terrestrial services;

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[1] As referred to in the Table of Frequency Allocations.

e) that the World Radiocommunication Conference (Geneva, 2015) adopted No. **5.527A** to clarify that ESIMs can communicate with GSO FSS space stations in the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz under certain conditions specified in *resolves* 1-4 below;

f) that a class of station is defined in the Preface to the International Frequency Information Circular of the Radiocommunication Bureau (BR IFIC) for ESIMs communicating with GSO FSS space stations for the application of the provisions of No. **5.527A** for satellite network filings under Articles **9** and **11**;

g) that successful coordination does not in any way imply licensing authorization to provide a service within the territory of a Member State (see also *recognizing b)* of Resolution **25 (Rev.WRC-23)**),

resolves

1 that ESIMs communicating with the GSO FSS shall operate under the following conditions:

1.1 with respect to satellite networks of other administrations, the earth station shall remain within the envelope of the coordination agreements of the satellite networks with which this earth station is associated or, in the absence of such agreements, comply with the off-axis e.i.r.p. density levels given in the Annex;

1.2 with respect to terrestrial services of other administrations mentioned in No. **5.524**, the ESIM shall not claim protection or impose constraints on the development of these services operating in the frequency band 19.7-20.1 GHz in Regions 1 and 3;

1.3 with respect to any terrestrial systems operating in the frequency band 29.5-29.9 GHz in Regions 1 and 3 in the countries listed in No. **5.542**, the notifying administrations operating maritime ESIMs operating in international waters and aeronautical ESIMs operating in international airspace shall ensure that such operations do not cause unacceptable interference;

1.4 in case of interference, the administration responsible for the satellite network shall, upon receipt of a report of harmful interference with respect to any terrestrial systems operating in the countries listed in No. **5.542**, immediately cease or reduce the interference to the acceptable level;

1.5 to this effect, that administration shall submit to the Bureau a commitment for implementation of *resolves* 1.4 above;

1.6 that these earth stations be subject to permanent monitoring and control by a Network Control and Monitoring Centre (NCMC) or equivalent facility and be capable of receiving and acting upon at least “enable transmission” and “disable transmission” commands from the NCMC;

1.7 that these earth stations not be used or relied upon for safety-of-life applications;

2 that the administration responsible for the satellite network shall ensure that the ESIMs employ techniques to track the associated GSO FSS satellite and that they are resistant to capturing and tracking adjacent GSO satellites;

3 that the notifying administration for the satellite network within which the ESIMs operate by means of fixed, mobile or transportable terminals shall ensure that they have the capability to limit operations of such earth stations to the territory or territories of administrations having authorized those earth stations and to comply with Article **18**;

4 that administrations authorizing ESIMs shall require the operators to provide a point of contact for the purpose of tracing any suspected cases of interference from ESIMs.

ANNEX TO RESOLUTION 156 (REV.WRC-23)

Off axis e.i.r.p. density levels for earth stations in motion communicating with geostationary space stations of the fixed-satellite service in the frequency band 29.5-30.0 GHz[2]

This annex provides a set of off-axis e.i.r.p. levels for earth stations in motion (ESIMs) operating in the frequency band 29.5-30.0 GHz.

ESIMs operating and communicating with geostationary space stations in the fixed-satellite service transmitting in the frequency band 29.5-30.0 GHz shall be designed in such a manner that at any angle, θ, which is 2° or more from the vector from the earth station antenna to the associated satellite (see Figure 1 below for the reference geometry of an ESIMs compared to an earth station at a fixed location), the e.i.r.p. density in any direction within 3° of the GSO, shall not exceed the following values:

Angle θ	**Maximum e.i.r.p. per 40 kHz***
$2° \le \theta \le 7°$	$(19 - 25 \log \theta)$ dB(W/40 kHz)
$7° < \theta \le 9.2°$	−2 dB(W/40 kHz)
$9.2° < \theta \le 48°$	$(22 - 25 \log \theta)$ dB(W/40 kHz)
$48° < \theta \le 180°$	−10 dB(W/40 kHz)

* Other levels may be coordinated and mutually agreed between affected administrations (see also *resolves* 1.1).

NOTE 1 – The values above are maximal values under clear-sky conditions. In the case of networks employing uplink power control, these levels should include any additional margins above the minimum clear-sky level necessary for the implementation of uplink power control.
When attenuation by rain occurs and uplink power control is used, the levels stated above may be exceeded to compensate for that attenuation. When uplink power control is not used and the e.i.r.p. density levels given above are not met, different values could be used in compliance with the values agreed to through bilateral coordination of GSO FSS satellite networks.

NOTE 2 – The e.i.r.p. density levels for angles of θ less than 2° may be determined from GSO FSS coordination agreements taking into account the specific parameters of the two GSO FSS satellite networks.

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[2] See also Report ITU-R S.2357 for ease of reference.

NOTE 3 – For geostationary space stations in the fixed-satellite service employing code division multiple access (CDMA) with which the ESIMs are expected to transmit simultaneously in the same 40 kHz band, the maximum e.i.r.p. density values should be decreased by 10 log(*N*) dB, where *N* is the number of ESIMs that are in the receive satellite beam of the associated satellite and that are expected to transmit simultaneously on the same frequency. Alternative methods may be used if agreed between affected administrations.

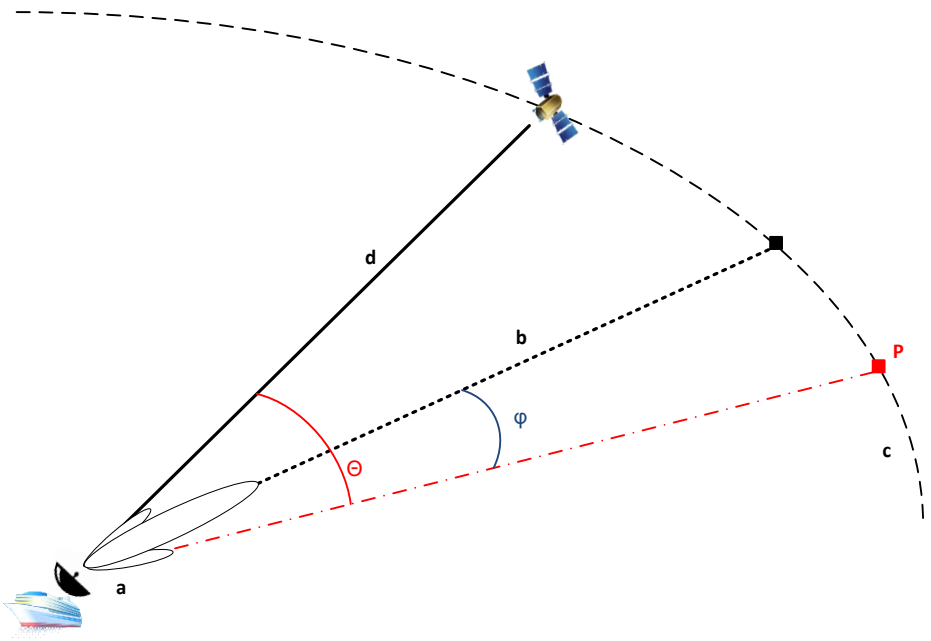
NOTE 4 – Potential aggregate interference from ESIMs operating within the fixed-satellite service using multi-spot frequency reuse technologies should be taken into account in coordination with respect to other GSO satellite networks.

NOTE 5 – ESIMs operating in the frequency band 29.5-30.0 GHz with low elevation angles to the GSO will require higher e.i.r.p. levels relative to the same terminals at high elevation angles to achieve the same power flux-densities (pfd) at the GSO due to the combined effect of increased distance and atmospheric absorption. Earth stations with low elevation angles may exceed the above levels by the following amount:

Elevation angle to GSO (ε)	**Increase in e.i.r.p. spectral density (dB)**
$\varepsilon \leq 5°$	2.5
$5° < \varepsilon \leq 30°$	$3 - 0.1\,\varepsilon$

Figure 1 below illustrates the definition of angle θ[3].

FIGURE 1



[3] In Figure 1 proportions are illustrative and not to scale.

where:

a represents the ESIM;

b represents the boresight of the earth station antenna;

c represents the geostationary-satellite orbit (GSO);

d represents the vector from the ESIM to the associated GSO FSS satellite;

φ represents the angle between the boresight of the earth station antenna and a point P on the GSO arc;

θ represents the angle between the vector d and point P on the GSO arc;

P represents a generic point on the GSO arc which angles θ and φ are referred to.

MOD

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),

considering

a) that there is a need for greater broadband connectivity in underserved communities and in rural and remote areas;

b) that WRC-15 invited the ITU Radiocommunication Sector (ITU-R) to study additional spectrum needs for fixed high-altitude platform station (HAPS) links to provide broadband connectivity and to facilitate the use of HAPS links on a global or regional basis, recognizing that the existing HAPS identifications were established without reference to today's broadband capabilities;

c) that HAPS can provide broadband connectivity with minimal ground network infrastructure;

d) that ITU-R has conducted studies dealing with compatibility between systems using HAPS and existing services in the frequency band 21.4-22 GHz in Region 2, leading to Report ITU-R F.2471,

considering further

that current technologies can be used to deliver broadband applications by HAPS, which can provide broadband connectivity and disaster-recovery communications with minimal ground network infrastructure,

recognizing

a) that a 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, and is subject to No. **4.23**;

b) that the aeronautical mobile service (AMS) within the mobile service operates in the frequency range 21.2-21.5 GHz on a primary basis within Region 2,

noting

a) that limits to be met at the border by HAPS transmitters may not be appropriate for frameworks for the introduction of HAPS nationally;

b) that Reports ITU-R F.2438 and ITU-R F.2439 provide information relevant to the development of a framework for the introduction of HAPS by administrations,

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:

$0.7\,\theta - 135$	dB(W/(m² · MHz))	for	$0° \le \theta < 10°$
$2.4\,\theta - 152$	dB(W/(m² · MHz))	for	$10° \le \theta < 20°$
$0.45\,\theta - 113$	dB(W/(m² · MHz))	for	$20° \le \theta < 60°$
-86	dB(W/(m² · MHz))	for	$60° \le \theta \le 90°$

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:

$-0.76\,\theta - 9.5$	dB(W/100 MHz)	for	$-4.53° \le \theta < 35.5°$
-36.5	dB(W/100 MHz)	for	$35.5° \le \theta \le 90°$

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/(m^2 · 290 MHz)) for continuum observations and −192 dB(W/(m^2 · 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:

$$pfd = e.i.r.p._{nominal\ clear\ sky}(Az, \theta) + Att_{618_{p=2\%}} - 10\log\left(4\pi d^2\right) - GasAtt(\theta)$$

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

$Att_{618p=2\%}$: 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

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

4 that *resolves* 3 applies at any radio astronomy station that was in operation prior to 22 November 2019 and has been notified to the Radiocommunication Bureau (BR) in the frequency band 22.21-22.5 GHz before 22 May 2020, or at any radio astronomy station that was notified before the date of receipt of the complete Appendix **4** information for notification, for the HAPS

system to which *resolves* 3 applies; radio astronomy stations notified after this date may seek an agreement with administrations that have authorized HAPS;

5 that, for the purpose of protecting the AMS operating in the frequency band 21.2-21.5 GHz, the e.i.r.p. per HAPS shall not exceed 17.5 dB(W/100 MHz) in the frequency range 21.4-21.5 GHz;

6 that administrations planning to implement a HAPS system in the frequency band 21.4-22 GHz shall notify the frequency assignments by submitting all mandatory elements of Appendix **4** to BR for the examination of compliance with respect to this Resolution with a view to their registration in the Master International Frequency Register,

instructs the Director of the Radiocommunication Bureau

to take all necessary measures to implement this Resolution.

MOD

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),

considering

a) that there is a need for greater broadband connectivity in underserved communities and in rural and remote areas;

b) that WRC-15 invited the ITU Radiocommunication Sector (ITU-R) to study additional spectrum needs for fixed high-altitude platform station (HAPS) links to provide broadband connectivity and to facilitate the use of HAPS links on a global or regional basis, recognizing that the existing HAPS identifications were established without reference to today's broadband capabilities;

c) that HAPS can provide broadband connectivity with minimal ground network infrastructure;

d) that ITU-R has conducted studies dealing with compatibility between HAPS systems and systems in existing services in the frequency band 24.25-27.5 GHz and in the adjacent band in Region 2, leading to Report ITU-R F.2472-0,

considering further

that current technologies can be used to deliver broadband applications by HAPS, which can provide broadband connectivity and disaster-recovery communications with minimal ground network infrastructure,

recognizing

that, in the frequency bands 24.75-25.25 GHz and 27.0-27.5 GHz, with respect to earth stations in the fixed-satellite service (FSS) (Earth-to-space) and HAPS ground station receivers which operate in the fixed service, No. **9.17** applies,

resolves

1 that, for the purpose of protecting fixed-service systems in the territory of other administrations in the frequency band 27-27.5 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:

$0.39\,\theta - 132.12$	dB(W/(m^2 · MHz))	for	$0° \le \theta < 13°$
$2.715\,\theta - 162.3$	dB(W/(m^2 · MHz))	for	$13° \le \theta < 20°$
$0.45\,\theta - 117$	dB(W/(m^2 · MHz))	for	$20° \le \theta < 60°$
-90	dB(W/(m^2 · MHz))	for	$60° \le \theta \le 90°$

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 mobile-service systems in the territory of other administrations in the frequency band 24.25-25.25 GHz, the 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:

-110.3	dB(W/(m^2 · MHz))	for	$0° \le \theta \le 4°$
$-110.3 + 1.2\,(\theta - 4)$	dB(W/(m^2 · MHz))	for	$4° < \theta \le 9°$
-104.3	dB(W/(m^2 · MHz))	for	$9° < \theta \le 90°$

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

The limits above take into account the 3 dB aggregate loss due to polarization mismatch, and body loss was not taken into account.

During periods of rain, the 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;

3 that, for the purpose of protecting mobile-service systems in the territory of other administrations in the frequency band 27-27.5 GHz, the 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:

$0.95\,\theta - 114$	dB(W/(m^2 · MHz))	for	$0° \le \theta < 5.7°$
$0.6\,\theta - 112$	dB(W/(m^2 · MHz))	for	$5.7° \le \theta < 20°$
-100	dB(W/(m^2 · MHz))	for	$20° \le \theta \le 90°$

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

The limits above take into account the 3 dB aggregate loss due to polarization mismatch, and body loss was not taken into account.

During periods of rain, the 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;

4 that, for the purpose of protecting mobile-service systems operating in the frequency band 25.25-27 GHz in the territory of neighbouring administrations, coordination of a transmitting HAPS ground station is required when the pfd in dB(W/(m^2 · MHz)) at the border of a neighbouring administration exceeds a pfd limit of -110.3 dB(W/(m^2 · MHz)), and the pfd values shall be verified considering a percentage of time of 1% using the most recent version of Recommendation ITU-R P.452 and a mobile-station antenna height of 20 m;

5 that, for the purpose of protecting the inter-satellite service and the FSS, the e.i.r.p. density per HAPS in the frequency band 27-27.5 GHz shall not exceed −10.7 dB(W/MHz) for off-nadir angles higher than 85.5°;

6 that, for the purpose of protecting the inter-satellite service, the e.i.r.p. density per HAPS in the frequency band 24.45-24.75 GHz shall not exceed −19.9 dB(W/MHz) for off-nadir angles higher than 85.5°;

7 that, for the purpose of protecting non-geostationary space stations of the inter-satellite service, the e.i.r.p. density per HAPS ground station in the frequency band 25.25-27 GHz shall not exceed 12.3 dB(W/MHz) under clear-sky conditions;

In addition, for the purpose of protecting geostationary space stations of the inter-satellite service, the maximum e.i.r.p. density in the frequency band 25.25-27 GHz of HAPS ground stations shall not exceed 0.5 dB(W/MHz) in the direction of geostationary arc under clear-sky conditions. It is also needed to take into account a possible orbit inclination of GSO space stations of between −5° and 5°.

Automatic power control may be used to increase the e.i.r.p. density only to the level to compensate rain fade, by up to 20 dB;

8 that, for the purpose of protecting the FSS, the e.i.r.p. density per HAPS in the frequency band 24.75-25.25 GHz shall not exceed −9.1 dB(W/MHz) for off-nadir angles higher than 85.5°;

9 that, for the purpose of protecting the Earth exploration-satellite service (EESS) (passive) in the frequency band 23.6-24 GHz, the e.i.r.p. density in the frequency band 23.6-24 GHz per HAPS operating in the frequency band 24.25-25.25 GHz shall not exceed:

$-0.7714\,\theta - 16.5$	dB(W/200 MHz)	for	$-4.53° \le \theta < 35°$
−43.5	dB(W/200 MHz)	for	$35° \le \theta \le 90°$

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

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/(m^2 · MHz))

EESS non-GSO: pfd = −97 dB(W/(m^2 · MHz))

EESS GSO: pfd = −129 dB(W/(m^2 · 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:

$$pfd = e.i.r.p._{nominal\ clear\ sky}\left(Az, \theta\right) + Att_{618_{p=2\%}} - 10\log\left(4\pi d^2\right) - GasAtt\left(\theta\right)$$

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/(m^2 · 400 MHz)) for continuum observations and in dB(W/(m^2 · 250 kHz)) for spectral line observations in the frequency band 23.6-24 GHz

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

12 that *resolves* 11 applies at any radio astronomy station that was in operation prior to 22 November 2019 and has been notified to the Radiocommunication Bureau (BR) in the frequency band 23.6-24 GHz before 22 May 2020, or at any radio astronomy station that was notified before the date of receipt of the complete Appendix **4** information for notification, for the HAPS system to which *resolves* 11 applies; radio astronomy stations notified after this date may seek an agreement with administrations that have authorized HAPS;

13 that administrations planning to implement a HAPS system in the frequency band 24.25-27.5 GHz shall notify the frequency assignments by submitting all mandatory elements of Appendix **4** to BR for the examination of compliance with respect to this Resolution with a view to their registration in the Master International Frequency Register,

instructs the Director of the Radiocommunication Bureau

to take all necessary measures to implement this Resolution.

MOD

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),

considering

a) that there is a need for greater broadband connectivity in underserved communities and in rural and remote areas;

b) that WRC-15 invited the ITU Radiocommunication Sector (ITU-R) to study additional spectrum needs for fixed high-altitude platform station (HAPS) links to provide broadband connectivity and to facilitate the use of HAPS links on a global or regional basis, recognizing that the existing HAPS identifications were established without reference to today's broadband capabilities;

c) that ITU-R has conducted studies dealing with compatibility between systems using HAPS and passive services in the frequency band 31.3-31.8 GHz, leading to Report ITU-R F.2473;

d) that Report ITU-R F.2439 provides deployment and technical characteristics of broadband HAPS systems;

e) that Report ITU-R F.2438 contains worldwide spectrum needs of HAPS systems;

f) that ITU-R has conducted studies dealing with sharing between systems using HAPS in the fixed service and other types of systems in the fixed service in the frequency band 31-31.3 GHz, leading to Report ITU-R F.2473,

considering further

that current technologies, such as HAPS, can be used to deliver broadband applications for broadband connectivity and disaster-recovery communications with minimal ground network infrastructure,

recognizing

that, during periods of rain, the equivalent isotropically radiated power (e.i.r.p.) of the HAPS 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. under clear-sky conditions indicated in Appendix **4**,

noting

a) that WRC-2000 adopted No. **5.543A**, which was modified at WRC-03 and then again at WRC-07 to permit the use of HAPS in the fixed service in the frequency band 31-31.3 GHz in certain Region 1 and 3 countries on a non-harmful interference, non-protection basis;

b) that the frequency band 31-31.3 GHz is widely used or planned to be used by a number of different services and a number of other types of applications in the fixed service;

c) that, while the decision to deploy HAPS can be taken on a national basis, such deployment may affect neighbouring administrations, particularly in small countries;

d) that results of some ITU-R studies indicate that, in the frequency band 31-31.3 GHz, sharing between fixed-service systems using HAPS and other conventional fixed-service systems in the same area is subject to appropriate interference mitigation techniques to be developed and implemented,

resolves

1 that, for the purpose of protecting fixed-service systems in the territory of other administrations in the frequency band 31-31.3 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:

$0.875\,\theta - 143$	dB(W/(m² · MHz))	for	$0° \le \theta < 8°$
$2.58\,\theta - 156.6$	dB(W/(m² · MHz))	for	$8° \le \theta < 20°$
$0.375\,\theta - 112.5$	dB(W/(m² · MHz))	for	$20° \le \theta < 60°$
-90	dB(W/(m² · MHz))	for	$60° \le \theta \le 90°$

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

2 that, with regard to the protection of fixed-service stations with pointing elevation beyond 5°, an administration believing that unacceptable interference may still be caused shall, within four months of the date of publication of the relevant International Frequency Information Circular (BR IFIC), provide its comments with the relevant justification to the notifying administration;

3 that, in order to ensure the protection of the Earth-exploration satellite service (EESS) (passive), the level of unwanted power density in the frequency band 31.3-31.8 GHz into the antenna of a HAPS ground station operating in the frequency band 31-31.3 GHz shall be limited to −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;

4 that, in order to ensure the protection of the EESS (passive), the level of unwanted emission e.i.r.p. density per HAPS transmitter operating in the frequency band 31-31.3 GHz into the frequency band 31.3-31.8 GHz shall be limited to:

$-\theta - 13.1$	dB(W/200 MHz)	for	$-4.53° \le \theta < 22°$
-35.1	dB(W/200 MHz)	for	$22° \le \theta < 90°$

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

5 that, in order to ensure the protection of the radio astronomy service (RAS), the pfd level produced by any HAPS ground station operating in the frequency band 31-31.3 GHz at RAS station locations at a height of 50 m shall not exceed −141 dB(W/(m^2 · 500 MHz)) in the frequency

band 31.3-31.8 GHz; this limit relates to the pfd which would be obtained under assumed propagation conditions predicted by the most recent version of Recommendation ITU-R P.452 using a time percentage of 2%;

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:

$$pfd(\theta) = e.i.r.p._{nominal\ clear\ sky}(Az, \theta) + Att_{618\,p=2\%} - 10\log(4\pi d^2) - GassAtt(\theta)$$

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

$Att_{618p=2\%}$: 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

$pfd(\theta)$: pfd at the Earth's surface per HAPS station in dB(W/(m² · 500 MHz))

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

7 that *resolves* 5 and 6 apply at any radio astronomy station that was in operation prior to 22 November 2019 and has been notified to the Radiocommunication Bureau (BR) in the frequency band 31.3-31.8 GHz before 22 May 2020, or at any radio astronomy station that was notified before the date of receipt of the complete Appendix **4** information for notification, for the HAPS system to which *resolves* 5 and 6 apply; radio astronomy stations notified after this date may seek an agreement with administrations that have authorized HAPS;

8 that administrations planning to implement a HAPS system in the frequency band 31-31.3 GHz shall notify the frequency assignments by submitting all mandatory elements under Appendix **4** to BR for the examination of compliance with respect to this Resolution with a view to their registration in the Master International Frequency Register,

instructs the Director of the Radiocommunication Bureau

to take all necessary measures to implement this Resolution.

MOD

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),

considering

a) that there is a need for greater broadband connectivity in underserved communities and in rural and remote areas;

b) that WRC-15 invited the ITU Radiocommunication Sector (ITU-R) to study additional spectrum needs for fixed high-altitude platform station (HAPS) links to provide broadband connectivity and to facilitate the use of HAPS links on a global or regional basis, recognizing that the existing HAPS identifications were established without reference to today's broadband capabilities;

c) that Report ITU-R F.2439 provides updated deployment and technical characteristics of broadband HAPS systems;

d) that Report ITU-R F.2438 contains worldwide spectrum needs of HAPS systems;

e) that ITU-R has conducted studies dealing with compatibility between systems using HAPS and existing services in the frequency band 38-39.5 GHz, leading to Report ITU-R F.2475,

considering further

that current technologies, such as HAPS, can be used to deliver broadband applications for broadband connectivity and disaster-recovery communications with minimal ground network infrastructure,

recognizing

a) that, during periods of rain, the equivalent isotropically radiated power (e.i.r.p.) of the HAPS 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. under clear-sky conditions indicated in Appendix **4**;

b) that existing services shall be protected from HAPS operations, and no undue constraints shall be imposed on the future development of existing services by HAPS,

resolves

1 that, for the purpose of protecting fixed-service systems in the territory of other administrations in the frequency band 38-39.5 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:

-137	dB(W/(m² · MHz))	for	$0° \le \theta \le 13°$
$-137 + 3.125\ (\theta - 13)$	dB(W/(m² · MHz))	for	$13° < \theta \le 25°$
$-99.5 + 0.5\ (\theta - 25)$	dB(W/(m² · MHz))	for	$25° < \theta \le 50°$
-87	dB(W/(m² · MHz))	for	$50° < \theta \le 90°$

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

2 that, with regard to the protection of fixed-service stations with pointing elevation beyond 15°, an administration believing that unacceptable interference may still be caused shall, within four months of the date of publication of the relevant International Frequency Information Circular (BR IFIC), provide its comments with relevant justification to the notifying administration;

3 that, for the purpose of protecting mobile-service systems in the territory of other administrations in the frequency band 38-39.5 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:

−107.8	dB(W/(m² · MHz))	for	$0° \le \theta \le 4°$
−107.8 + 1.5 (θ − 4)	dB(W/(m² · MHz))	for	$4° < \theta \le 10°$
−98.8	dB(W/(m² · MHz))	for	$10° < \theta \le 90°$

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

The limits above take into account the 3 dB aggregate loss due to polarization mismatch, and body loss was not taken into account;

4 that, for the purpose of protecting mobile-service systems operating in the frequency band 38-39.5 GHz in the territory of neighbouring administrations, coordination of a transmitting HAPS ground station is required when the pfd in dB(W/(m² · MHz)) at the border of a neighbouring administration exceeds a pfd limit of −110.8 dB(W/(m² · MHz)), and the pfd values shall be verified considering a percentage of time of 1% in the relevant propagation model of the most recent version of Recommendation ITU-R P.452 and a mobile-station antenna height of 20 m;

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	$0° \le \alpha < 0.136°$
−133.9	dB(W/(m² · MHz))	for	$0.136° \le \alpha < 1°$
−133.9 + 25 log α	dB(W/(m² · MHz))	for	$1° \le \alpha < 47.9°$
−91.9	dB(W/(m² · MHz))	for	$47.9° \le \alpha \le 180°$

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:

$$pfd = e.i.r.p. - 10\log\left(4\pi d^2\right) - Att_{gaz}$$

where:

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

Att_{gaz}: attenuation in dB due to atmospheric gases on the HAPS-to-GSO FSS earth station path (see 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);

6 that, for the purpose of protecting non-geostationary-satellite (non-GSO) systems in the FSS (space-to-Earth) in the territory of other administrations from HAPS interference, administrations implementing HAPS shall seek explicit agreement with any other administration when the distance between the HAPS nadir point and any point on such other administration's border is less than the distance calculated by the following formula, where the minimum earth station elevation angle is 10 degrees; this does not preclude lower elevation angles being used for the operation of earth stations; and this distance can be decreased by explicit agreement of affected administrations on a case-by-case basis:

$$d = \frac{\pi R}{180}\left(90 - \theta - \operatorname{asin}\left(\frac{R}{R+h}\cos\theta\right)\right)$$

where:

R: Earth's radius (6 371 km)

θ: minimum elevation angle at the non-GSO FSS earth station (10°)

h: HAPS altitude (km);

7 that, in making assignments to HAPS systems (HAPS ground stations and HAPS) in the fixed service in the frequency band 38-39.5 GHz, administrations shall protect the space research service (SRS) (space-to-Earth) in the frequency band 37-38 GHz from harmful interference by unwanted emissions, taking into account the SRS (space-to-Earth) protection level of −217 dB(W/Hz) at the input of the SRS receiver with 0.001% exceedance due to atmospheric and precipitation effects, as referred to in the relevant ITU-R Recommendations;

8 that, for the purpose of protecting earth stations in the GSO and non-GSO FSS (space to-Earth) in the territory of neighbouring administrations, coordination of a transmitting HAPS ground station is required when the pfd in dB(W/(m² · MHz)) at the border of a neighbouring administration exceeds a pfd limit of −111.3 dB(W/(m² · MHz)) for non-GSO operations and −108.9 dB(W/(m² · MHz)) for GSO operations, and the pfd values shall be verified considering a percentage of time of 20% in the relevant propagation model of the most recent version of Recommendation ITU-R P.452 and an FSS earth station antenna height of 10 m;

9 that the notifying administration for the HAPS system shall send to the Radiocommunication Bureau (BR) a commitment that the HAPS operation shall be in conformity with the Radio Regulations, including this Resolution;

10 that administrations planning to implement a HAPS system in the frequency band 38-39.5 GHz shall notify the frequency assignments by submitting all mandatory elements of Appendix **4** to BR for the examination of compliance with respect to this Resolution with a view to their registration in the Master International Frequency Register;

11 that the notifying administration for the HAPS system shall send to BR a commitment that, upon receiving an unacceptable interference report with relevant justification on exceedance of the limits set in this Resolution, the notifying administration for the HAPS system shall take the required action to eliminate or reduce interference to an acceptable level,

resolves further

that, should an administration operating HAPS agree, with its neighbouring administrations, to levels higher than the limits contained in this Resolution, such agreement shall not affect other administrations that are not party to that agreement,

instructs the Director of the Radiocommunication Bureau

to take all necessary measures to implement this Resolution,

invites the ITU Radiocommunication Sector

to develop a Recommendation to provide technical guidance to facilitate the implementation of HAPS operations while ensuring the protection of non-GSO FSS earth stations.

MOD

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),

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 (ESIMs) to communicate with space stations of the 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 ESIMs;

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, without the imposition of undue constraints, from the operation of ESIMs;

d) that the ITU Radiocommunication Sector has studied whether aeronautical ESIMs are capable of protecting non-geostationary (non-GSO) mobile-satellite service (MSS) feeder-link satellite receivers in the frequency band 29.1-29.5 GHz,

recognizing

a) that the administration authorizing ESIMs on territory under its jurisdiction has the right to require that the ESIMs referred to above only use those assignments associated with GSO FSS networks which have been successfully coordinated, notified, brought into use and recorded in the Master International Frequency Register 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 ESIMs, the operation of ESIMs on those assignments in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz needs to be in accordance with the provisions of No. **11.42** with respect to any recorded frequency assignment which was the basis of the unfavourable finding under No. **11.38**;

c) that any course of action taken under this Resolution has no impact on the original date of receipt of the frequency assignments of the GSO FSS satellite network with which ESIMs communicate or on the coordination requirements of that satellite network;

d) that successful compliance with this Resolution does not oblige any administration to authorize/license any ESIM to operate within the territory under its jurisdiction,

resolves

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

1.1 with respect to space services in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz, ESIMs 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 characteristics of typical earth stations associated with the satellite network with which the ESIMs communicate;

1.1.2 the use of ESIMs shall not cause more interference and shall not claim more protection than for typical earth stations in this GSO FSS network;

1.1.3 the notifying administration of the GSO FSS network with which the ESIMs communicate shall ensure that the operation of ESIMs complies with the coordination agreements for the frequency assignments of the typical earth station of this GSO FSS network obtained under the relevant provisions of the Radio Regulations, taking into account *recognizing b)* above;

1.1.4 for the implementation of *resolves* 1.1.1 above, the notifying administration for the GSO FSS network with which the ESIMs communicate shall, in accordance with this Resolution, send to the Radiocommunication Bureau (BR) the relevant Appendix **4** notification information related to the characteristics of the ESIMs intended to communicate with that GSO FSS network, together with the commitment that the ESIM operation shall be in conformity with the Radio Regulations, including this Resolution;

1.1.5 upon receipt of the notification information referred to in *resolves* 1.1.4 above, BR shall examine it with respect to the provisions referred to in *resolves* 1.1.1 above and publish the result of such examination in the International Frequency Information Circular (BR IFIC);

1.1.6 for the protection of non-GSO FSS systems operating in the frequency band 27.5-28.6 GHz, ESIMs 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 of non-GSO systems for which complete coordination information was received before, and for which feeder-link earth stations were in service as of, 28 October 2019 in the frequency band 29.1-29.5 GHz, ESIMs communicating with GSO FSS networks should consider Annex 2 to this Resolution;

1.1.8 ESIMs 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 ESIMs shall not claim protection from broadcasting-satellite service 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 the protection of terrestrial services to which the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz are allocated and operating in accordance with the Radio Regulations, ESIMs shall comply with the following conditions:

1.2.1 receiving ESIMs in the frequency band 17.7-19.7 GHz shall not claim protection from terrestrial services to which the frequency band is allocated and operating in accordance with the Radio Regulations;

1.2.2 transmitting aeronautical and maritime ESIMs in the frequency band 27.5-29.5 GHz shall not cause unacceptable interference to terrestrial services to which the frequency band is allocated and operating in accordance with the Radio Regulations, and Annex 3 to this Resolution shall apply;

1.2.3 transmitting land ESIMs in the frequency band 27.5-29.5 GHz shall not cause unacceptable interference to terrestrial services in neighbouring countries to which the frequency band is allocated and operating in accordance with the Radio Regulations (see *resolves* 3);

1.2.4 the provisions in this Resolution, including Annex 3, set the conditions for the purpose of protecting terrestrial services from unacceptable interference from aeronautical and maritime ESIMs in neighbouring countries in the frequency band 27.5-29.5 GHz; however, the requirement not to cause unacceptable interference to, or claim protection from, terrestrial services to which the frequency band is allocated and operating in accordance with the Radio Regulations remains valid (see *resolves* 4);

1.2.5 for the application of Part II of Annex 3 as referred to in *resolves* 1.2.2 and 1.2.4 above, BR shall examine the characteristics of aeronautical ESIMs with respect to the conformity with the power flux-density (pfd) limits on the Earth's surface specified in Part II of Annex 3 and publish the results of such examination in the BR IFIC;

1.2.6 the notifying administration for the GSO FSS network with which the ESIMs communicate shall send to BR a commitment that, upon receiving a report of unacceptable interference, the notifying administration for the GSO FSS network with which the ESIMs communicate shall follow the procedures in *resolves* 4;

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

3 that the operation of ESIMs within the territory, including territorial waters and territorial airspace, of an administration shall be carried out only if authorized by that administration;

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 on the matter and provide, to the extent of its ability, any required information on the operation of the 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 GSO FSS network with which the ESIM communicates shall, jointly or individually, as the case may be, upon receipt of a report of unacceptable interference, take required action to eliminate or reduce interference to an acceptable level;

5 that the administration responsible for the GSO FSS satellite network with which ESIMs communicate shall ensure that:

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

5.2 all necessary measures are taken so that ESIMs are subject to permanent monitoring and control by a network control and monitoring centre (NCMC) or equivalent facility in order to comply with the provisions in this Resolution, and are capable of receiving and acting upon at least "enable transmission" and "disable transmission" commands from the NCMC or equivalent facility;

5.3 measures, when required, are taken to limit the operation of ESIMs in the territory, including territorial waters and territorial airspace, under the jurisdiction of the administrations authorizing ESIMs;

5.4 a permanent point of contact is provided for the purpose of tracing any suspected cases of unacceptable interference from ESIMs and to immediately respond to requests from the focal point of the authorizing administration;

6 that the application of this Resolution does not provide regulatory status to ESIMs different from that derived from the GSO FSS network with which they communicate, taking into account the provisions referred to in this Resolution (see *recognizing b)* above);

7 that, if BR is unable to examine, in accordance with *resolves* 1.2.5 above, aeronautical ESIMs with respect to conformity with the pfd limits on the Earth's surface specified in Part II of Annex 3, the notifying administration shall send to BR a commitment that the aeronautical ESIMs comply with those limits;

8 that BR shall formulate a qualified favourable finding under No. **11.31** with respect to the limits contained in Part II of Annex 3, if *resolves* 7 is applied successfully, otherwise it shall formulate an unfavourable finding,

resolves further

that, should an administration authorizing ESIMs agree to pfd levels higher than the limits contained in Part II of Annex 3 within the territory under its jurisdiction, such agreement shall not affect other countries that are not party to that agreement,

instructs the Director of the Radiocommunication Bureau

1 to take all necessary actions to facilitate the implementation of this Resolution, together with providing any assistance for the resolution of interference, when required;

2 to report to future world radiocommunication conferences any difficulties or inconsistencies encountered in the implementation of this Resolution, including whether or not the responsibilities relating to the operation of ESIMs have been properly addressed;

3 to review, if necessary, once the methodology to examine the characteristics of aeronautical ESIMs with respect to conformity with the pfd limits on the Earth's surface specified in Part II of Annex 3 is available, its findings made in accordance with No. **11.31**,

invites administrations

to collaborate for the implementation of this Resolution, in particular for resolving interference, if any,

invites the ITU Radiocommunication Sector

to conduct, as a matter of urgency, relevant studies to determine a methodology with respect to the examination referred to in *resolves* 1.2.5 above,

instructs the Secretary-General

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

ANNEX 1 TO RESOLUTION 169 (REV.WRC-23)

Provisions for earth stations in motion to protect non-geostationary fixed-satellite service systems in the frequency band 27.5-28.6 GHz

1 In order to protect the non-GSO FSS systems referred to in *resolves* 1.1.6 of this Resolution in the frequency band 27.5-28.6 GHz, ESIMs 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 GSO network in the frequency band 27.5-28.6 GHz 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 arc:

Off-axis angle	*Maximum e.i.r.p. density*
$3° \le \varphi \le 7°$	$28 - 25 \log\varphi$ dB(W/40 kHz)
$7° < \varphi \le 9.2°$	7 dB(W/40 kHz)
$9.2° < \varphi \le 48°$	$31 - 25 \log\varphi$ dB(W/40 kHz)
$48° < \varphi \le 180°$	−1 dB(W/40 kHz)

b) for any ESIM operating in the frequency band 27.5-28.6 GHz that does not meet 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 2 TO RESOLUTION 169 (REV.WRC-23)

Protection of non-geostationary mobile-satellite service feeder links in the frequency band 29.1-29.5 GHz from earth stations in motion

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

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 may be used to ensure compatibility between the affected non-GSO MSS feeder-link systems in the frequency band 29.1-29.5 GHz and the GSO FSS network with which the ESIM is associated.

TABLE 1

ESIM operational characteristics and parameters

E.i.r.p. density per carrier (single per ESIM)	≤ 35.5 dBW/MHz
Off-axis e.i.r.p. density	as per No. **22.32**
Average carrier burst duty cycle	≤ 10% (averaged over 30 seconds)
Number of transmitting ESIMs 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 or operating conditions listed in Table 2 below, coordination may be used to ensure compatibility between the affected non-GSO MSS feeder-link systems in the frequency band 29.1-29.5 GHz and the GSO FSS network with which the ESIM is associated. However, depending on the values of these parameters and characteristics in combination, there may need to be an exclusion zone or other constraint(s) on ESIMs developed by the parties and included in the agreement. Until such time as an agreement on coordination is reached, it may be appropriate for administrations to restrict ESIMs from operating within 500 km of a non-GSO MSS feeder-link earth station in any portion of the frequency band 29.1-29.5 GHz used by non-GSO MSS feeder-link earth stations, and to require that ESIMs operate subject to the condition that they do not cause harmful interference.

TABLE 2

ESIM operational characteristics and parameters

E.i.r.p. density per carrier (single per ESIM)	≤ 50 dBW/MHz
Off-axis e.i.r.p. density	as per No. **22.32**
Average carrier burst duty cycle	100% (averaged over 4 hours)
Number of transmitting ESIMs 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, it may be appropriate for administrations to restrict ESIMs from operating within 725 km of the non-GSO MSS feeder-link earth station in any portion of the frequency band 29.1-29.5 GHz used by non-GSO MSS feeder-link earth stations, and to require that any ESIM operations between 725 and 1 450 km of a non-GSO MSS feeder-link earth station in any portion of the frequency band 29.1-29.5 GHz used by non-GSO MSS feeder-link earth stations be subject to the condition that the ESIMs do not cause harmful interference.

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

1 The parts below contain provisions to ensure that maritime and aeronautical ESIMs do not cause unacceptable interference in neighbouring countries to terrestrial service operations when ESIMs operate in frequencies overlapping with those used by terrestrial services at any time to which the frequency band 27.5-29.5 GHz is allocated and operating in accordance with the Radio Regulations (see also *resolves* 3 of this Resolution).

Part I: Maritime ESIMs

2 The notifying administration of the GSO FSS network with which a maritime ESIM communicates shall ensure compliance of the maritime ESIM operating within the frequency band 27.5-29.5 GHz, or parts thereof, with both of the following conditions for the protection of terrestrial services to which the frequency band is allocated within a coastal State:

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

2.2 The maximum maritime ESIM e.i.r.p. spectral density towards the horizon shall be limited to 24.44 dB(W/14 MHz). Transmissions from maritime ESIMs with higher e.i.r.p. spectral density levels towards the territory of any coastal State shall be subject to the prior agreement of the coastal State concerned.

Part II: Aeronautical ESIMs

3 The notifying administration of the GSO FSS satellite network with which an aeronautical ESIM communicates shall ensure compliance of the aeronautical ESIM operating within the frequency band 27.5-29.5 GHz, or parts thereof, with all of the following conditions for the protection of terrestrial services to which the frequency band is allocated:

3.1 When within line-of-sight of the territory of an administration, and above an altitude of 3 km, the maximum pfd produced at the surface of the Earth on the territory of an administration by emissions from a single aeronautical ESIM shall not exceed:

$$\begin{aligned}
&pfd(\theta) = -124.7 && (dB(W/(m^2 \cdot 14\ MHz))) && \text{for} && 0° \le \theta \le 0.01° \\
&pfd(\theta) = -120.9 + 1.9 \cdot \log\theta && (dB(W/(m^2 \cdot 14\ MHz))) && \text{for} && 0.01° < \theta \le 0.3° \\
&pfd(\theta) = -116.2 + 11 \cdot \log\theta && (dB(W/(m^2 \cdot 14\ MHz))) && \text{for} && 0.3° < \theta \le 1° \\
&pfd(\theta) = -116.2 + 18 \cdot \log\theta && (dB(W/(m^2 \cdot 14\ MHz))) && \text{for} && 1° < \theta \le 2° \\
&pfd(\theta) = -117.9 + 23.7 \cdot \log\theta && (dB(W/(m^2 \cdot 14\ MHz))) && \text{for} && 2° < \theta \le 8° \\
&pfd(\theta) = -96.5 && (dB(W/(m^2 \cdot 14\ MHz))) && \text{for} && 8° < \theta \le 90.0°
\end{aligned}$$

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

3.2 When within line-of-sight of the territory of an administration, and up to an altitude of 3 km, the maximum pfd produced at the surface of the Earth on the territory of an administration by emissions from a single aeronautical ESIM shall not exceed:

$$\begin{aligned}
&pfd(\theta) = -136.2 && (dB(W/(m^2 \cdot 1\ MHz))) && \text{for} && 0° \le \theta \le 0.01° \\
&pfd(\theta) = -132.4 + 1.9 \cdot \log\theta && (dB(W/(m^2 \cdot 1\ MHz))) && \text{for} && 0.01° < \theta \le 0.3° \\
&pfd(\theta) = -127.7 + 11 \cdot \log\theta && (dB(W/(m^2 \cdot 1\ MHz))) && \text{for} && 0.3° < \theta \le 1° \\
&pfd(\theta) = -127.7 + 18 \cdot \log\theta && (dB(W/(m^2 \cdot 1\ MHz))) && \text{for} && 1° < \theta \le 12.4° \\
&pfd(\theta) = -108 && (dB(W/(m^2 \cdot 1\ MHz))) && \text{for} && 12.4° < \theta \le 90°
\end{aligned}$$

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

3.3 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 frequency bands without prior agreement of that administration (see also *resolves* 3 of this Resolution).

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).

Agenda item 9.2

MOD

RESOLUTION 170 (REV.WRC-23)

Additional measures for satellite networks in the fixed-satellite service in frequency bands subject to Appendix 30B for the enhancement of equitable access to these frequency bands

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that WARC Orb-88 created an allotment Plan for the use of the frequency bands 4 500-4 800 MHz, 6 725-7 025 MHz, 10.70-10.95 GHz, 11.20-11.45 GHz and 12.75-13.25 GHz;

b) that WRC-07 revised the regulatory regime governing the use of the frequency bands mentioned in *considering a)* above,

considering further

a) the additional regulatory measures for the enhancement of equitable access included in Resolution **553 (WRC-15)**;

b) that the Rule of Procedure on No. **9.6** states that "the intent of Nos. **9.6** (**9.7** to **9.21**), **9.27** and Appendix **5** is to identify to which administrations a request for coordination is to be addressed, and not to state an order of priorities for rights to a particular orbital position",

recognizing

a) that Article 44 of the ITU Constitution lays down the basic principles for the use of the radio-frequency spectrum and the geostationary-satellite and other satellite orbits, taking into account the needs of developing countries;

b) that the "first-come first-served" concept can restrict and sometimes prevent access to and use of certain frequency bands and orbital positions;

c) the relative disadvantage for developing countries in coordination negotiations for various reasons such as a lack of resources and expertise;

d) that Resolution **2 (Rev.WRC-03)** resolves that "the registration with the Radiocommunication Bureau of frequency assignments for space radiocommunication services and their use do not provide any permanent priority for any individual country or groups of countries and do not create an obstacle to the establishment of space systems by other countries",

recognizing further

a) that information provided by the Radiocommunication Bureau (BR) in ITU Radiocommunication Sector studies indicates that a very significant number of Appendix **30B** submissions have been received by BR in the time period 1 January 2009 to 22 November 2019, and that the table below summarizes the data provided by BR into those studies (see also Attachment 2 to this Resolution) and shows the variations for the number of networks at the various stages;

	Request for conversion without change of initial allotment (national service area)	**Request for conversion with changes within the envelope of initial allotment (national service area)**	**Request for conversion with changes outside the envelope of initial allotment (national service area)**	**Request for conversion with changes outside the envelope of initial allotment (supra national service area)**	**Request for additional use (national service area)**	**Request for additional use (supra national service area and global coverage**)**	**Suppression**
2009 Q1 + Q2	0	0	0	1	3	11	0
2009 Q3 + Q4	0	0	0	0	0	6	15
2010 Q1 + Q2	1	0	0	0	1	14	2
2010 Q3 + Q4	0	0	0	0	1	19	1
2011 Q1 + Q2	1	0	0	0	2	18	1
2011 Q3 + Q4	1	0	0	0	2	20	23
2012 Q1 + Q2	0	0	0	0	3	20	1
2012 Q3 + Q4	1	0	2	0	2	23	4
2013 Q1 + Q2	1	0	0	0	4	27	7
2013 Q3 + Q4	1	0	0	0	0	17	12
2014 Q1 + Q2	1	0	0	0	2	30	42
2014 Q3 + Q4	0	0	0	0	7	20	0
2015 Q1 + Q2	0	0	1	0	1	30	11
2015 Q3 + Q4	0	0	0	0	0	26	7
2016 Q1 + Q2	0	1	0	0	0	23	8
2016 Q3 + Q4	0	0	0	0	1	24	4

2017 Q1 + Q2	0	0	0	0	4	34	1
2017 Q3 + Q4	0	1	0	0	0	25	7
2018 Q1 + Q2	0	0	0	0	6	20	9
2018 Q3 + Q4	0	0	0	0	0	10	15
2019 Q1 + Q2	1	1	0	0	0	4	17
2019 Q3	0	0	0	0	1	3	6

** Notices for additional use with service area and coverage beyond the national territory of the notifying administration.

b) that the number of Appendix **30B** submissions made by some administrations is large, which may not be realistic;

c) that the use of certain combinations of technical parameters in submissions (e.g. high-gain receiving space station antennas) can make systems/submissions overly sensitive to interference, in such a way that subsequent submissions for conversion from allotment into assignments with changes would cause interference to those systems,

taking into account

that the majority of submissions under § 6.1 of Appendix **30B** have a global coverage and service area, which is typically changed to limited service area with a considerably wider coverage area at the time of submission under § 6.17, notwithstanding the Note to Appendix **4** data item B.3.b.1, which states “Taking due account of applicable technical restrictions and allowing some reasonable degree of flexibility for satellite operations, administrations should, to the extent practicable, align the areas the satellite steerable beams could cover with the service area of their networks with due regard to their service objectives”, and this is complicating coordination for administrations attempting to convert their national allotments into assignments or introducing an additional system for national use in a technically and economically viable manner, or for administrations acting on behalf of a group of named administrations introducing an additional system for their national use in a technically and economically viable manner,

resolves

that, as of 23 November 2019, the special procedure described in Attachment 1 to this Resolution shall be applied for the processing of submissions received by BR under Article 6 of Appendix 30B for conversion of the allotment of an administration into an assignment with modifications outside the envelope of the initial allotment while restricted to providing service to its national territory, designated by test points as contained in the corresponding allotment, a submission by an administration of an additional system the service area of which is limited to its national territory, designated by test points as contained in the allotment, or a submission by an administration acting on behalf of a group of named administrations of an additional system the service area of which is limited to the national territories of the group of named administrations, designated by test points as contained in the allotments, in the frequency bands 4 500-4 800 MHz, 6 725-7 025 MHz, 10.70-10.95 GHz, 11.20-11.45 GHz and 12.75-13.25 GHz, if requested by an administration or one acting on behalf of a group of named administrations in respect of its submission, as specified in Attachment 1 to this Resolution; additional test points may be submitted inside the national territory of each participating administration provided that they are located on land and within the corresponding national territory, and that the total number of test points, per national territory, including those of the associated allotment, shall not exceed 20,

further resolves

that, when coordinating networks submitted under these additional measures, administrations, in particular those having satellite networks in process or included in the List with global coverage, exercise the utmost goodwill, and endeavour to overcome any difficulties encountered by the incoming network, in order to accommodate the incoming submission while respecting the underlying principles of No. **9.6** and its associated Rule of Procedure[1] which would apply by analogy to Article 6 of Appendix **30B**; in addressing, in particular, difficulties encountered in coordination due to the issue of potential Earth-to-space harmful interference caused by an incoming network which originates outside the service area of other potentially affected networks, administrations having potentially affected networks with global coverage shall implement, to the maximum extent possible, means to accommodate the incoming network, taking into account actual operating characteristics of the potentially affected networks,

instructs the Director of the Radiocommunication Bureau

to provide assistance, if requested by an administration, in the generation of a minimum ellipse as called for in § 3 c) of Attachment 1 to this Resolution.

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[1] "in the application of Article **9** no administration obtains any particular priority as a result of being the first to start either the advance publication phase (Section I of Article **9**) or the request for coordination procedure (Section II of Article **9**)."

ATTACHMENT 1 TO RESOLUTION 170 (REV.WRC-23)

Additional measures for satellite networks in the fixed-satellite service in frequency bands subject to Appendix 30B for the enhancement of equitable access to these frequency bands

1 The special procedure described in this Attachment can only be applied once by an administration, or one acting on behalf of a group of named administrations[2], having no assignment in the List of Appendix **30B** or assignment submitted under § 6.1 of Appendix **30B**.

2 With regard to the latter case, in order to benefit from application of the special procedure, the submitting administration may either withdraw or modify its submission previously sent to the Radiocommunication Bureau (BR) under § 6.1 of Appendix **30B** or submit its submission under § 6.17 of Appendix **30B** to meet the criteria of this special procedure. Whenever an administration acts on behalf of a group of named administrations, all members of that group shall withdraw their submissions, if any, previously sent to BR under § 6.1 of Appendix **30B**.

3 Administrations, or ones acting on behalf of a group of named administrations, seeking to apply this special procedure shall submit their request to BR, with the information specified in § 6.1 of Appendix **30B**. Specifically, this information shall contain:

a) in the cover letter to BR, the information that the administration, or one acting on behalf of a group of named administrations, requests the use of this special procedure;

b) for an administration acting on its own behalf, a service area limited to the territory as contained in its national allotment, or as submitted in the case that a new Member State of the Union does not have an allotment in the Plan and has not submitted a request under § 7.2 of Article 7 of Appendix **30B**, or, in the case of submission of an additional system by an administration acting on behalf of a group of named administrations, a service area limited to the national territories of the named administrations;

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[2] Whenever, under this Resolution, an administration acts on behalf of a group of named administrations, all members of that group can no longer apply this procedure or take part in another group of named administrations that requests to apply this procedure. Furthermore, all members of that group shall have no assignment in the List of Appendix **30B** or assignment submitted under § 6.1 of Appendix **30B**.

c) a minimum ellipse for an administration acting on its own behalf, or a beam formed by combining all individual minimum ellipses for a group of named administrations, determined by a set of test points, as specified in the *resolves* part of this Resolution for each participating administration, using the relevant BR software application. An administration, or one acting on behalf of a group of named administrations, may request BR to create such a diagram (see the *resolves* section of this Resolution).

4 If the information submitted under § 3 above is found to be incomplete, BR shall immediately seek from the administration concerned any clarification required and information not provided.

5 An administration, or one acting on behalf of a group of named administrations, using this special procedure shall effect coordination with other administrations as required in § 6 below before:

i) submitting a request under § 6.17[3] of Appendix **30B** to have the satellite network entered into the Appendix **30B** List; and

ii) bringing into use a frequency assignment.

6 Following the successful application of §§ 1 to 4 above, BR shall, ahead of submissions not yet processed under § 6.3 of Appendix **30B**, promptly:

a) examine the information with respect to its conformity with § 6.3 of Appendix **30B**;

b) identify, in accordance with Appendix 1 to this Attachment, any administration with which coordination may need to be effected[4, 5];

c) include their names in the publication under d) below;

d) publish[6], as appropriate, the complete information in the International Frequency Information Circular (BR IFIC) within the time-limit as specified in Appendix **30B**;

e) inform the administrations concerned of its actions and communicate the results of its calculations, drawing attention to the relevant BR IFIC.

7 In applying §§ 6.5, 6.12, 6.14, 6.21 and 6.22 of Appendix **30B**, the criteria in Annex 4 to Appendix **30B** shall be replaced by those given in Appendix 1 to this Attachment.

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[3] During the coordination with an administration identified as affected, the notifying administration may change the beam to a shaped beam. Therefore, BR shall accept submissions of satellite networks applying this Resolution and containing a shaped beam under § 6.17 of Appendix **30B**, if the characteristics of the submission under § 6.17 of Appendix **30B** are within the envelope of the characteristics of the submission under § 6.1 of Appendix **30B**.

[4] BR shall also identify the specific satellite networks with which coordination needs to be effected.

[5] Whenever an administration acts on behalf of a group of named administrations, all members of that group retain the right to respond in respect of their own allotments or assignments.

[6] If the payments are not received in accordance with the provisions of ITU Council Decision 482, as amended, on the implementation of cost recovery for satellite network filings, BR shall cancel the publication, after informing the administration concerned. BR shall inform all administrations of such action and that the network specified in the publication in question no longer has to be taken into consideration by BR and other administrations. BR shall send a reminder to the notifying administration not later than two months prior to the deadline for the payment in accordance with above-mentioned Council Decision 482 unless the payment has already been received.

8 Administrations identified under § 6*b)* above, especially with a global coverage in uplink and limited service area, are required to apply all practical measures to overcome coordination difficulties encountered by the incoming network, in accordance with *further resolves* above.

9 If there is still continuing disagreement, the notifying administration may seek the assistance of BR.

10 If there is still continuing disagreement, the notifying administration can resubmit the notice under § 6.25 of Appendix **30B** and insist upon its reconsideration; BR, on the condition of a favourable finding under § 6.21 and § 6.22 of Appendix **30B** with respect to allotments in the Plan, shall enter the assignment provisionally in the List.

11 The administration responsible for the assignment which was the basis of the provisional entry under § 6.25 of Appendix **30B** shall be deemed to have agreed to the proposed assignment if BR is informed that the new assignment in the List has been in use, together with the assignment which was the basis for the disagreement, for at least four months without any complaint of harmful interference being made, and § 6.29 does not apply[7].

12 The start of the four-month period referred to in § 11 above and the conditions for the operation to verify no harmful interference during this period shall be agreed by both administrations. If there is no agreement between administrations, any administration may seek the assistance of BR.

13 If there is no reply under § 8 or § 12 above from the notifying administration of the existing network to the request for collaboration of the notifying administration of the incoming network, or if there are problems in communication between the two administrations, the notifying administration of the incoming network may seek the assistance of BR. In this event, BR shall forthwith send a telefax to the notifying administration of the existing network which has failed to reply, requesting an immediate beginning of collaboration with the notifying administration of the incoming network.

14 If there is no acknowledgement of receipt within 30 days after BR's action under § 13 above, BR shall immediately send a reminder providing an additional 15-day period for response. In the absence of such an acknowledgement within 15 days, it shall be deemed that the notifying administration of the existing network which has failed to acknowledge receipt has undertaken that no complaint will be made in respect of any harmful interference affecting its own assignments which may be caused by the assignment of the notifying administration of the incoming network for which coordination was requested.

15 The calculation of the reference situation (*C*/*I*) of an assignment with which agreement has been deemed to have been obtained under § 11 above shall not take into account the interference produced by the assignment for which the provisions of § 6.25 of Appendix **30B** have been applied until an explicit agreement has been reached.

16 The provisions in this Attachment are supplementary to the provisions of Article 6 of Appendix **30B**.

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[7] Should harmful interference be caused at any later time by an assignment submitted under the provisions of this Resolution and for which § 14 has not been applied and which is entered in the List under § 6.25 of Appendix **30B** to any assignment in the List in respect of which § 6.25 of Appendix **30B** was applied, the administrations shall exercise the utmost goodwill and efforts to overcome any difficulties encountered by the incoming network, and the interfered-with administration shall identify appropriate remedial measures to be implemented, taking into account actual operations and cooperation with the incoming network.

APPENDIX 1 TO ATTACHMENT 1 TO RESOLUTION 170 (REV.WRC-23)

Criteria for determining whether an assignment is considered to be affected by networks submitted to Appendix 30B under this Resolution

The criteria as contained in Annex 4 to Appendix **30B** continue to apply in order to determine if a proposed new assignment applying the procedures of this Attachment affects:

a) national allotments in the Plan;

b) an assignment stemming from the conversion of an allotment into an assignment without modification or with modification within the envelope of the allotment;

c) an allotment requested under Article 7 of Appendix **30B** by a new Member State of the Union which has received unfavourable findings under Article 7 and has been subsequently treated as a submission under § 6.1 of Appendix **30B**;

d) assignments stemming from the application of § 6.35 of Appendix **30B**;

e) assignments for which the procedures of this Resolution have been previously applied;

f) assignments recorded in the List until 22 November 2019 with a service area limited to the national territories.

An assignment which appears in the List with a service area beyond national territories or which BR has previously examined after receiving complete information and published under § 6.7 of Appendix **30B**, which does not fall into any of the above categories and that is not applying the procedures of this Attachment, is considered as being affected by a proposed new assignment that is applying the procedures of this Attachment:

1) if the orbital spacing between its orbital position and the orbital position of the proposed new assignment is equal to or less than:

   1.1) 7° in the frequency bands 4 500-4 800 MHz (space-to-Earth) and 6 725-7 025 MHz (Earth-to-space);

   1.2) 6° in the frequency bands 10.70-10.95 GHz (space-to-Earth), 11.20-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space);

2) however, an administration is considered as not being affected by a proposed new assignment that is applying the procedures of this Attachment if the conditions listed in 2.1 or 2.2 are satisfied:

2.1) the calculated[8] Earth-to-space single-entry carrier-to-interference $(C/I)_u$ value at each test point associated with the assignment under consideration is greater than or equal to a reference value of 27 dB, or $(C/N)_u$ + 6 dB[9], or any already accepted Earth-to-space single entry (C/I), whichever is the lowest, and the calculated[8] space-to-Earth single-entry $(C/I)_d$ value everywhere within the service area of the assignment under consideration is greater than or equal to a reference value[10] of 23.65 dB, or $(C/N)_d$ + 8.65 dB[11], or any already accepted value, whichever is the lowest, and the calculated[8] overall aggregate $(C/I)_{agg}$ value at each test point associated with the assignment under consideration is greater than or equal to a reference value of 21 dB, or $(C/N)_t$ + 7 dB[12], or any already accepted overall aggregate $(C/I)_{agg}$ value, whichever is the lowest, with a tolerance of 0.45 dB[13] in the case of assignments not stemming from the conversion of an allotment into an assignment without modification, or when the modification is within the envelope characteristics of the initial allotment;

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[8] Including a computational precision of 0.05 dB.

[9] $(C/N)_u$ is calculated as in Appendix 2 to Annex 4 to Appendix **30B**.

[10] The reference values within the service area are interpolated from the reference values at the test points.

[11] $(C/N)_d$ is calculated as in Appendix 2 to Annex 4 to Appendix **30B**.

[12] $(C/N)_t$ is calculated as in Appendix 2 to Annex 4 to Appendix **30B**.

[13] Inclusive of the 0.05 dB computational precision.

2.2) in the frequency band 4 500-4 800 MHz (space-to-Earth), the power flux-density (pfd) produced under assumed free-space propagation conditions does not exceed the threshold values shown below, anywhere within the service area of the potentially affected assignment:

$0 \leq$	θ	≤ 0.09	-240.5	dB(W/(m^2 · Hz))
$0.09 <$	θ	≤ 3	$-240.5 + 20\log(\theta/0.09)$	dB(W/(m^2 · Hz))
$3 <$	θ	≤ 5.5	$-216.79 + 0.75 \cdot \theta^2$	dB(W/(m^2 · Hz))
$5.5 <$	θ	≤ 7	$-194.1 + 25\log(\theta/5.5)$	dB(W/(m^2 · Hz))

where θ denotes nominal geocentric separation (degrees) between interfering and interfered with satellite networks;

in the frequency band 6 725-7 025 MHz (Earth-to-space), the pfd produced at the location in the geostationary-satellite orbit (GSO) of the potentially affected assignment under assumed free-space propagation conditions does not exceed $-201.0 - G_{Rx}$ dB(W/(m^2 · Hz)), where G_{Rx} is the relative space station uplink receive antenna gain of the potentially affected assignment at the location of the interfering earth station;

in the frequency bands 10.7-10.95 and 11.2-11.45 GHz (space-to-Earth), the pfd produced under assumed free-space propagation conditions does not exceed the threshold values shown below, anywhere within the service area of the potentially affected assignment:

$0 \leq$	θ	≤ 0.05	-235.0	dB(W/(m^2 · Hz))
$0.05 <$	θ	≤ 3	$-235.0 + 20\log(\theta/0.05)$	dB(W/(m^2 · Hz))
$3 <$	θ	≤ 5	$-207.98 + 0.95 \cdot \theta^2$	dB(W/(m^2 · Hz))
$5 <$	θ	≤ 6	$-184.23 + 25\log(\theta/5)$	dB(W/(m^2 · Hz))

where θ denotes nominal geocentric separation (degrees) between interfering and interfered with satellite networks;

in the frequency band 12.75-13.25 GHz (Earth-to-space), the pfd produced at the location in the GSO of the potentially affected assignment under assumed free-space propagation conditions does not exceed $-205.0 - G_{Rx}$ dB(W/(m^2 · Hz)), where G_{Rx} is the relative space station uplink receive antenna gain of the potentially affected assignment at the location of the interfering earth station.

APPENDIX 2 TO ATTACHMENT 1 TO RESOLUTION 170 (REV.WRC-23)

Protection criteria for a new incoming network

Incoming network	Allotments or assignments to be protected	Protection criteria
Assignment applying the special procedure or allotment proposed under Article 7 of Appendix **30B**	Allotment in the Plan	Annex 4 to Appendix **30B**
	Assignment converted from allotment without modification	Annex 4 to Appendix **30B**
	Assignment converted from allotment with modification within the envelope of the allotment	Annex 4 to Appendix **30B**
	Assignment converted from allotment with modification outside the envelope of the allotment and the special procedure applied	Annex 4 to Appendix **30B**
	Assignment converted from allotment with modification outside the envelope of the allotment and the special procedure NOT applied	New criteria specified in this Resolution
	Former existing system	Annex 4 to Appendix **30B**
	Additional system for which the special procedure applied	Annex 4 to Appendix **30B**
	Additional system with frequency assignments recorded in the List until 22 November 2019 with service area limited to national territories for which the special procedure NOT applied	Annex 4 to Appendix **30B**
	Additional system with frequency assignments submitted under item 6.1 of Appendix **30B** with service area limited to national territories for which the special procedure NOT applied	New criteria specified in this Resolution
	Additional system with frequency assignments with service area beyond national territories for which the special procedure NOT applied	New criteria specified in this Resolution
	Request under Article 7 but transferred to Article 6	Annex 4 to Appendix **30B**
	New allotment through the application of § 6.35	Annex 4 to Appendix **30B**
Conversion of allotment or new additional system for which the special procedure NOT applied	All	Annex 4 to Appendix **30B**

ATTACHMENT 2 TO RESOLUTION 170 (REV.WRC-23)

Number of Appendix 30B submissions that have been received by the Radiocommunication Bureau

Number of new submissions

	Request for conversion without change of initial allotment (national service area)	Request for conversion with changes within the envelope of initial allotment (national service area)	Request for conversion with changes outside the envelope of initial allotment (national service area)	Request for conversion with changes outside the envelope of initial allotment (supra national service area)	Request for additional use (national service area)	Request for additional use (with supra national service area and global coverage)	Total
F						103	103
HOL						33	33
RUS/IK						29	29
E						28	28
PNG						28	28
IND					12	14	26
CHN					8	15	23
G						21	21
UAE						19	19
ISR						17	17
RUS					9	7	16
QAT						12	12
ARS/ARB						10	10
LUX						10	10
S						8	8
B			2		2	3	7
D						6	6
INS					3	3	6
J						6	6
USA				1		5	6
BLR	1					4	5
CYP						5	5
BGD	1					3	4

IRN		1				3	4
MCO						4	4
MEX	1				3		4
MLA					1	3	4
TUR						4	4
CAN			1			2	3
KAZ						3	3
BUL	1					1	2
HNG						2	2
LAO						2	2
NCG						2	2
NPL		1			1		2
VTN					1	1	2
ALG						1	1
ARM						1	1
BOL		1					1
CBG						1	1
ETH						1	1
GRC						1	1
IRQ						1	1
MNE	1						1
MNG	1						1
NOR						1	1
PAK						1	1
ROU	1						1
SDN	1						1
Total:	**8**	**3**	**3**	**1**	**40**	**424**	**479**

Number of suppressions

	2009-2019	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019*
ARS/ARB	11						3	1	1	1	2	3
BLR	1										1	
BUL	1					1						
CAN	2						1	1				
CHN	16						15					1
E	1											1
F	14						2	1			6	5
F/EUT	38	15	3	16	2	1			1			
G	9				1			6		1		1
HOL	5								3			2
IND	8			1				6	1			
ISR	4										2	2
KOR	10					10						
LBY	1			1								
LUX	26			1		4	13		2	5	1	
MCO	1					1						
MLA	1								1			
NOR	2						1	1				
PNG	6			3						1	1	1
RUS	12			2	1	1	5	1	2			
RUS/IK	9										6	3
S	4						2		1		1	
SDN	1											1
TUR	2										2	
UAE	4										1	3
USA	2					1		1				
VTN	2				1						1	
Total	**193**	**15**	**3**	**24**	**5**	**19**	**42**	**18**	**12**	**8**	**24**	**23**

* In 2019, the statistics stop at 30 September.

Agenda item 10

MOD

RESOLUTION 176 (REV.WRC-23)

Studies on the use of the frequency bands 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space), or parts thereof, by aeronautical and maritime earth stations in motion in the fixed-satellite service

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the frequency bands 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) are globally allocated on a primary basis to the fixed-satellite service (FSS);

b) that there is an increasing need for mobile communications, including global broadband satellite services, and that some of this need can be met by allowing aeronautical and maritime earth stations in motion (ESIMs) to communicate with FSS space stations operating in the frequency bands mentioned in *considering a)*;

c) that in the FSS, there are geostationary-satellite (GSO) networks and non-geostationary (non-GSO) systems operating and/or planned for near-term operation in the frequency bands mentioned in *considering a)* that are allocated to the FSS;

d) that some administrations have already deployed, and plan to expand their use of, ESIMs with operational and future FSS GSO networks and non-GSO systems;

e) that the space stations mentioned in *considering c)* in the frequency bands mentioned in *considering a)* are required to be coordinated and notified in accordance with the provisions of Articles **9** and **11**;

f) that the frequency bands in *considering a)* are also allocated to several other services on a primary basis, the allocated services are used by a variety of different systems in many administrations, and these existing services and their future development should be protected without undue constraints;

g) the need to encourage the development and implementation of new technologies in the FSS at frequencies above 30 GHz;

h) that advances in technology, including the use of tracking techniques, allow ESIMs to operate within the characteristics of fixed earth stations of the FSS;

i) that the operation of ESIMs within the territory, including territorial waters and territorial airspace, of an administration shall be carried out only if authorized by that administration,

noting

a) that Article **21** contains power flux-density (pfd) limits for the space stations mentioned in *considering c)*;

b) that WRC-15 adopted No. **5.527A** and Resolution **156 (WRC-15)** related to ESIMs with GSO FSS networks in the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz;

c) that WRC-19 adopted No. **5.517A** and Resolution **169 (WRC-19)** with respect to ESIMs communicating with GSO FSS networks in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz;

d) that this conference has adopted Resolution **COM5/2 (WRC-23)** with respect to aeronautical ESIMs (A-ESIMs) and maritime ESIMs (M-ESIMs) communicating with GSO space stations in the FSS in the frequency band 12.75-13.25 GHz;

e) that the ESIMs addressed by this Resolution are not to be used for safety-of-life applications;

f) that the frequency band 48.2-50.2 GHz (Earth-to-space) in Region 2 is identified for use by high-density applications in the FSS (No. **5.516B**);

g) that the provisions of No. **5.550B** apply;

h) that administrations are urged to take all practicable steps to reserve the frequency band 47.2-49.2 GHz for feeder links for the broadcasting-satellite service (BSS) operating in the frequency band 40.5-42.5 GHz (No. **5.552**);

i) that the use of the frequency bands 47.5-47.9 GHz, 48.2-48.54 GHz and 49.44-50.2 GHz by the FSS (space-to-Earth) is limited to GSO satellites (No. **5.554A**);

j) that the pfd in the frequency band 48.94-49.04 GHz produced by any GSO space station in the FSS (space-to-Earth) operating in the frequency bands 48.2-48.54 GHz and 49.44-50.2 GHz shall not exceed −151.8 dB(W/m^2) in any 500 kHz band at the site of any radio astronomy station (No. **5.555B**);

k) that the frequency band 48.94-49.04 GHz is also allocated to the radio astronomy service (RAS) on a primary basis (No. **5.555**);

l) that, in the frequency bands 49.7-50.2 GHz, 50.4-50.9 GHz and 51.4-52.6 GHz, Resolution **750 (Rev.WRC-19)** applies, and Nos. **5.338A**, **5.340** and **5.340.1** among other provisions of the Radio Regulations, apply;

m) that the fixed and mobile services are allocated on a primary basis in the frequency band 48.2-50.2 GHz on a global basis;

n) that the frequency band 50.2-50.4 GHz is allocated on a primary basis to the Earth exploration-satellite service (EESS) (passive) and space research service (SRS) (passive);

o) that the radio astronomy service is extremely susceptible to interference from space and airborne transmitters (see No. **29.12**);

p) that in the frequency band 48.94-49.04 GHz, administrations are urged to take all practicable steps to protect the RAS from harmful interference, in accordance with No. **5.149**,

recognizing

a) that the protection of the primary incumbent services in these frequency bands should be studied;

b) that the authorization of land ESIMs remains the prerogative of each administration and, as such, it is not within the scope of this Resolution;

c) that the frequency bands used for reception by A-ESIMs and M-ESIMs shall not impose constraints on other allocated services nor claim protection from allocated services operating in accordance with the Radio Regulations,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

1 studies on the spectrum needs and technical and operational characteristics of A-ESIMs and M-ESIMs that plan to operate within FSS allocations in the frequency bands mentioned in *considering a)*, or parts thereof;

2 studies on sharing and compatibility between A-ESIMs and M-ESIMs communicating with space stations in the FSS in the frequency bands mentioned in *considering a)*, or parts thereof, and the stations of primary services allocated in these frequency bands and in adjacent frequency bands, including passive services in adjacent and near-adjacent frequency bands, in order to ensure protection of, and not impose undue constraints on, those services;

3 the development, for M-ESIMs and A-ESIMs, of the technical conditions for their operation, taking into account the results of the studies above;

4 the development, for M-ESIMs and A-ESIMs communicating with GSO networks and non-GSO systems, of regulatory provisions for their operation, taking into account the results of the studies above;

5 consideration of the results of studies within the ITU Radiocommunication Sector (ITU-R) for the development of a new Recommendation for the Network Control and Monitoring Centre for ESIM operations;

6 studies on the responsibility of the administrations involved in the operations of the A-ESIMs and M-ESIMs addressed by this Resolution,

invites the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

the development, for M-ESIMs and A-ESIMs communicating with GSO networks or non-GSO systems, regulatory provisions for their operation, taking into account the results of the studies above,

invites the 2027 world radiocommunication conference

to consider the results of the above studies and take the necessary actions for GSO and non-GSO ESIMs, as appropriate, provided that the results of the studies referred to in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* are complete and agreed by the ITU-R Study Groups.

Agenda item 4

MOD

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),

considering

a) that Resolution ITU-R 56 defines the naming for International Mobile Telecommunications (IMT);

b) that the ITU Radiocommunication Sector (ITU-R), for WRC-97, recommended approximately 230 MHz for use by the terrestrial and satellite components of IMT;

c) that ITU-R studies forecast that additional spectrum may be required to support the future services of IMT and to accommodate future user requirements and network deployments;

d) that ITU-R has recognized that the satellite component is an integral part of IMT;

e) that, in No. **5.388**, WARC-92 identified frequency bands to accommodate certain mobile applications defined as IMT,

noting

a) that both the terrestrial and satellite components of IMT have already been deployed or are being considered for deployment within the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz;

b) that the availability of the satellite component of IMT in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz simultaneously with the terrestrial component of IMT in the frequency bands identified in No. **5.388** would improve the overall use of IMT,

noting further

a) that co-coverage, co-frequency deployment of independent satellite and terrestrial IMT components is not feasible unless techniques, such as the use of an appropriate guardband or other mitigation techniques, are applied to ensure coexistence and compatibility between the terrestrial and satellite components of IMT, but that co-coverage, co-frequency deployment of terrestrial and satellite components of IMT could be feasible if deployed as integrated networks supported by a system providing the management of frequency utilization by both components;

b) that, when the satellite and terrestrial components of IMT are deployed in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz, technical or operational measures may need to be implemented to avoid harmful interference,

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

This Annex provides guidance to concerned administrations on the following technical, operational and other applicable measures in the deployment of terrestrial and satellite components of International Mobile Telecommunications (IMT) for reducing the potential of harmful interference between the terrestrial and satellite components of IMT in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz for the interference scenarios indicated in the table below, noting the applicability of any relevant Article **9** coordination procedures for scenarios A2, B1 and B2. The identified measures may be applicable for some scenarios and may not be applicable to other scenarios, and may or may not be implementable in satellite and terrestrial IMT system designs.

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).

b) Consider the orientation in elevation and/or in azimuth of the IMT base station antenna pointing in the coexistence analysis with a view to reducing the interference level from the IMT base station above the horizon.

c) Consider the impact of the actual deployment scenario, including the activity factor values of the terrestrial component of IMT, on the coexistence.

d) Consider attenuation from terrain and clutter taking into account the deployment environments and propagation effects in the coexistence analysis.

e) Consider reducing the equivalent isotropically radiated power in the frequency band 1 980-2 010 MHz to a level sufficient for coexistence, for example, nominally to −10 dB(W/5 MHz)[1].

[1] See user terminal characteristics in Report ITU-R M.2292.

f) Set the transmission direction for the use of the frequency band 1 980-2 010 MHz with regard to the IMT base station to operate in receive mode as found in relevant ITU-R Recommendations.

g) Implement other applicable interference mitigation techniques.

2) Measures for the satellite component of IMT:

a) Use narrower spot beams and steeper roll-off from the boresight of the satellite antenna (i.e. not only reducing the interference level from the antenna sidelobe but also increasing frequency reuse and resilience to interference).

b) Antenna steering, where such capability exists in the satellite design.

c) Beamforming and/or beam nulling of the satellite antenna (e.g. digital processing of multi-element beamforming technique, which has the capability to suppress received interference from regions on the Earth).

d) Dynamic frequency management paired with geographical separation (e.g. monitoring interference in real time and dynamically assigning channels and/or beams).

e) Consider reducing the power flux-density to a level sufficient for coexistence, for example to nominally −122 dBW/m^2 for 1 MHz[2] for the protection of some base stations or nominally −108.8 dBW/m^2 for 1 MHz for the protection of some user equipment on the Earth's surface on the territories of other administrations using this frequency band for the terrestrial IMT component.

f) Consider an appropriate elevation angle model of an earth station and handover method by a satellite control system in the coexistence analysis.

g) Consider actual activity factor values, which may result in a reduction of interference.

h) Apply a polarization of the satellite antenna different from that of the terrestrial station receiver (for example, use of linear polarization by the terrestrial station receivers and circular polarization by the satellite may provide some benefit).

i) Implement other applicable interference mitigation techniques.

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[2] See Resolution **539 (Rev.WRC-19)** for the frequency band 2 605-2 655 MHz.

MOD

RESOLUTION 217 (REV.WRC-23)

Implementation of wind profiler radars

The World Radiocommunication Conference (Dubai, 2023),

having noted

a request to ITU from the Secretary-General of the World Meteorological Organization (WMO), in May 1989, for advice and assistance in the identification of appropriate frequencies near 50 MHz, 400 MHz and 1 000 MHz in order to accommodate allocations and assignments for wind profiler radars,

considering

a) that wind profiler radars are vertically-directed Doppler radars exhibiting characteristics similar to radiolocation systems;

b) that wind profiler radars are important meteorological systems used to measure wind direction and speed as a function of altitude;

c) that it is necessary to use frequencies in different ranges in order to have options for different performance and technical characteristics;

d) that, in order to conduct measurements up to a height of 30 km, it is necessary to allocate frequency bands for these radars in the general vicinity of 50 MHz (3 to 30 km), 400 MHz (500 m to about 10 km) and 1 000 MHz (100 m to 3 km);

e) that some administrations have either already deployed, or plan to expand their use of, wind profiler radars in operational networks for studies of the atmosphere and to support weather monitoring, forecasting and warning programmes;

f) that the Radiocommunication Study Groups have studied the technical and sharing considerations between wind profiler radars and other services allocated in bands near 50 MHz, 400 MHz and 1 000 MHz,

considering further

a) that some administrations have addressed this matter nationally by assigning frequencies for use by wind profiler radars in existing radiolocation bands or on a non-interference basis in other bands;

b) the work of the Voluntary Group of Experts on the Allocation and Improved Use of the Radio-Frequency Spectrum and Simplification of the Radio Regulations supports increased flexibility in the allocation of frequency spectrum,

noting in particular

a) that wind profiler radars operating in the meteorological aids service in the frequency band 400.15-406 MHz interfere with satellite emergency position-indicating radio beacons operating in the mobile-satellite service in the frequency band 406-406.1 MHz under No. **5.266**;

b) that in accordance with No. **5.267**, any emission capable of causing harmful interference to the authorized uses of the frequency band 406-406.1 MHz is prohibited,

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 frequency band 440-450 MHz or 470-494 MHz cannot be achieved, the frequency 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 frequency band 400.15-406 MHz;

5 to urge administrations currently operating wind profiler radars in the frequency 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, International Maritime Organization and WMO.

Agenda item 1.4

MOD

RESOLUTION 221 (REV.WRC-23)

Use of high altitude platform stations as International Mobile Telecommunications base stations in the frequency bands 1 710-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz[1]

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that there is growing demand for access to mobile broadband, requiring more flexibility in approaches to expanding the capacity and coverage provided by International Mobile Telecommunications (IMT) systems;

b) that high-altitude platform stations (HAPS) as IMT base stations (HIBS) would be used as part of terrestrial IMT networks and may use the same frequency bands as ground-based IMT base stations in order to provide mobile-broadband connectivity to underserved communities, and in rural and remote areas;

c) that HIBS would 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 HIBS is optional for administrations, and that such use should not have any priority over other terrestrial IMT use;

e) that the mobile station to be served, whether by HIBS or ground-based IMT base stations, is the same, and currently supports a variety of the frequency bands identified for IMT;

f) that, under certain deployment scenarios, platform transmissions in the frequency band 1 710-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz may occur at altitudes down to 18 km, and some sensitivity studies have shown that the difference of interference at this altitude would be negligible;

g) that the ITU Radiocommunication Sector (ITU-R) has addressed sharing and compatibility between HIBS and existing systems of primary allocated services in the frequency bands 1 710-2 025 MHz and 2 110-2 200 MHz and services in the adjacent bands;

---

[1] HIBS: High-altitude platform station as IMT base station. The conditions in this Resolution refer to these platforms operating between 18 km and 25 km.

h) that the conclusion of the compatibility studies between HIBS operating above 1 710 MHz and meteorological-satellite service (MetSat) operations in the adjacent frequency band 1 670-1 710 MHz has assumed that the use of HIBS in the frequency band 1 710-1 785 MHz is limited to reception by HIBS;

i) that the conclusion of the compatibility studies between HIBS operating above 2 110 MHz and space research service (SRS)/space operation service/Earth exploration-satellite service operations in the adjacent frequency band 2 025-2 110 MHz and the conclusion of the sharing studies between HIBS and SRS in the frequency band 2 110-2 120 MHz have both assumed that the use of HIBS in the frequency band 2 110-2 170 MHz is limited to transmission from HIBS,

recognizing

a) that a 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;

b) that, in Regions 1 and 3, the frequency bands 1 710-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz and, in Region 2, the frequency bands 1 710-1 980 MHz and 2 110-2 160 MHz are included in No. **5.388A** for the use of HIBS;

c) that the frequency bands 1 710-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz, or parts thereof, are identified for IMT in accordance with Nos. **5.384A** and **5.388**;

d) that these frequency bands are allocated to the fixed and mobile services on a co-primary basis,

resolves

1 that administrations wishing to implement HIBS shall comply with the following:

1.1 for the purpose of protecting the mobile service, including IMT terrestrial systems, in the territory of neighbouring administrations in the frequency band 1 710-1 885 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz, the following limits on power flux-density (pfd) shall apply:

– the pfd level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit for the protection of IMT mobile stations, unless explicit agreement of the affected administration is provided:

$$-111 \quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 0° < \theta \leq 90°$$

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

– the pfd level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit for the protection of IMT base stations, unless explicit agreement of the affected administration is provided:

−144.55	dB(W/(m^2 · MHz))	for	0° ≤ θ < 11°
−144.55 + 0.45 (θ − 11)	dB(W/(m^2 · MHz))	for	11° ≤ θ < 80°
−113.55	dB(W/(m^2 · MHz))	for	80° ≤ θ ≤ 90°

where θ is the angle of arrival of the incident wave above the horizontal plane, in degrees[2].

1.2 for the purpose of protecting mobile service systems including IMT terrestrial systems in the territories of Armenia, Azerbaijan, Belarus, the Russian Federation, Kazakhstan, Mongolia, Uzbekistan, Kyrgyzstan, the Democratic People's Republic of Korea, Tajikistan and Turkmenistan, in the frequency bands 1 710-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz, the pfd level per HIBS produced at the surface of the Earth in the territories of the countries listed above in this *resolves* shall not exceed the following limits, unless explicit agreement of the affected administration is provided:

−145	dB(W/(m^2 · MHz))	for	0° ≤ θ < 11°
−145 + 0.4347 (θ − 11)	dB(W/(m^2 · MHz))	for	11° ≤ θ < 80°
−115	dB(W/(m^2 · MHz))	for	80° ≤ θ < 90°

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

1.3 for the purpose of protecting fixed-service systems in the territory of other administrations in the frequency bands 1 710-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz, the pfd level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limits, unless explicit agreement of the affected administration is provided:

−150	dB(W/(m^2 · MHz))	for	0° < θ ≤ 2°
−150 + 1.78 (θ − 2)	dB(W/(m^2 · MHz))	for	2° < θ ≤ 20°
−118 + 0.215 (θ − 20)	dB(W/(m^2 · MHz))	for	20° < θ ≤ 48°
−112	dB(W/(m^2 · MHz))	for	48° < θ ≤ 90°

[2] The pfd levels to protect IMT base stations will apply unless the affected administration informs the Radiocommunication Bureau that only terminal stations need to be protected.

1.4 for the purpose of protecting fixed-service systems in the territories of Armenia, Azerbaijan, Belarus, the Russian Federation, Kazakhstan, Mongolia, Uzbekistan, Kyrgyzstan, the Democratic People's Republic of Korea, Tajikistan and Turkmenistan in the frequency bands 1 710-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz, the pfd level per HIBS produced at the surface of the Earth in the territories of the countries listed above in this *resolves* shall not exceed the following limits, unless explicit agreement of the affected administration is provided:

−165	dB(W/(m^2 · MHz))	for	$0° < \theta \leq 5°$
−165 + 1.75 (θ − 5)	dB(W/(m^2 · MHz))	for	$5° < \theta \leq 25°$
−130	dB(W/(m^2 · MHz))	for	$25° < \theta \leq 90°$

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

1.5 in order to protect fixed-service systems in Armenia, Azerbaijan, Belarus, the Russian Federation, Kazakhstan, Mongolia, Uzbekistan, Kyrgyzstan, Tajikistan and Turkmenistan from interference, a HIBS shall not exceed the following limits on out-of-band pfd at the surface of the Earth in the territories of the countries listed above in this *resolves* in the frequency band 2 025-2 110 MHz:

−165	dB(W/(m^2 · MHz))	for	$0° < \theta \leq 5°$
−165 + 1.75 (θ − 5)	dB(W/(m^2 · MHz))	for	$5° < \theta \leq 25°$
– −130	dB(W/(m^2 · MHz))	for	$25° < \theta \leq 90°$

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

1.6 for the purpose of protecting mobile earth stations operating in the territory of other administrations in the frequency bands 2 160-2 200 MHz in Region 2 and 2 170-2 200 MHz in Regions 1 and 3, the pfd of the unwanted emissions per HIBS operating in the frequency bands 2 110-2 160 MHz in Region 2 and 2 110-2 170 MHz in Regions 1 and 3 produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit:

−165	dB(W/(m^2 · 4 kHz));

1.7 for the protection of aeronautical mobile service systems operating in the frequency band 1 780-1 850 MHz from harmful interference, administrations planning to implement HIBS operating within 1 135 km of the border of the territory of other administrations in this frequency band shall obtain agreement with all affected administrations prior to implementation of HIBS unless otherwise agreed between the administrations concerned; this condition does not apply in the countries within the African Broadcasting Area, as described in Nos. **5.10**, **5.11**, **5.12** and **5.13**, and Algeria, Egypt, Libya and Morocco in Region 1;

2 that administrations intending to implement HIBS systems shall notify, in accordance with Article **11**, the frequency assignments to transmitting and receiving HIBS stations by submitting all mandatory elements of Appendix **4** to the Radiocommunication Bureau for the examination of compliance with the conditions specified in the *resolves* above;

3 the notifying administration of HIBS at the time of submission of the Appendix **4** information shall provide a firm, objective, actionable, measurable, and enforceable commitment to the Bureau to immediately eliminate unacceptable interference to existing primary services or reduce it to an acceptable level should such interference occur,

invites administrations

to adopt appropriate frequency arrangements for HIBS in order to consider the benefits of harmonized utilization of the spectrum for HIBS and protection of existing services and systems operating on a primary basis taking into account the *resolves* above and the relevant ITU-R Recommendations and Reports,

instructs the Director of the Radiocommunication Bureau

to take all necessary measures to implement this Resolution.

Agenda item 4

MOD

RESOLUTION 222 (REV.WRC-23)

Use of the frequency bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service, and procedures to ensure long-term spectrum access for the aeronautical mobile-satellite (R) service

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that prior to WRC-97, the frequency bands 1 530-1 544 MHz (space-to-Earth) and 1 626.5-1 645.5 MHz (Earth-to-space) were allocated to the maritime mobile-satellite service and the frequency bands 1 545-1 555 MHz (space-to-Earth) and 1 646.5-1 656.5 MHz (Earth-to-space) were allocated on an exclusive basis to the aeronautical mobile-satellite (R) service (AMS(R)S) in most countries;

b) that WRC-97 allocated the frequency bands 1 525-1 559 MHz (space-to-Earth) and 1 626.5-1 660.5 MHz (Earth-to-space) to the mobile-satellite service (MSS) to facilitate the assignment of spectrum to multiple MSS systems in a flexible and efficient manner;

c) that WRC-97 adopted No. **5.353A** giving priority to accommodating spectrum requirements for, and protecting from unacceptable interference, distress, urgency and safety communications of the global maritime distress and safety system (GMDSS) in the frequency bands 1 530-1 544 MHz and 1 626.5-1 645.5 MHz and No. **5.357A** giving priority to accommodating spectrum requirements for, and protecting from unacceptable interference, AMS(R)S communications as defined within priority categories 1 to 6 in Article **44** for the frequency bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz;

d) that AMS(R)S systems are an essential element of the International Civil Aviation Organization (ICAO) standardized communication infrastructure used in air traffic management for the provision of safety and regularity of flight in civil aviation;

e) that currently some MSS systems provide distress, emergency and safety communications under the MSS allocations in the frequency bands 1 525-1 559 MHz (space-to-Earth) and 1 626.5-1 660.5 MHz (Earth-to-space);

f) that it is necessary to ensure the long-term availability of the spectrum for AMS(R)S;

g) that it is necessary to retain unchanged the generic allocation for the MSS in the frequency bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz without placing undue constraints on the existing systems operating in accordance with the Radio Regulations,

further considering

a) that frequency coordination between satellite networks is required on a bilateral basis in accordance with the Radio Regulations, and that, in the frequency bands 1 525-1 559 MHz (space-to-Earth) and 1 626.5-1 660.5 MHz (Earth-to-space), frequency coordination is partially assisted by regional multilateral meetings;

b) that, in these frequency bands, geostationary mobile-satellite system operators currently use a capacity-planning approach at frequency coordination meetings, with the guidance and support of their administrations, to periodically coordinate access to the spectrum needed to accommodate their requirements;

c) that spectrum requirements for MSS networks, including the GMDSS and AMS(R)S, are currently accommodated through the capacity-planning approach and that, in the frequency bands to which Nos. **5.353A** or **5.357A** apply, this approach, supplemented, in the case of AMS(R)S, by additional procedures contained in the Annex to this Resolution, may assist in accommodating the long-term spectrum requirements for GMDSS and AMS(R)S;

d) that Report ITU-R M.2073 has concluded that prioritization and inter-system pre-emption between different mobile-satellite systems is not practical and, without a significant advance in technology, is unlikely to be feasible for technical, operational and economic reasons;

e) that there is existing and increasing demand for spectrum for AMS(R)S and non-AMS(R)S by several mobile satellite systems in the frequency bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz, and that the application of this Resolution may impact the provision of services by non-AMS(R)S systems in the MSS;

f) that according to the ITU-R studies, the long-term AMS(R)S spectrum requirements for communications within priority categories 1 to 6 of Article **44** have been estimated, at the year 2025, to be less than the available 2 × 10 MHz identified by No. **5.357A**;

g) that future requirements for GMDSS spectrum may require additional allocations,

recognizing

a) that Article 40 of the ITU Constitution establishes the priority of telecommunications concerning safety of life;

b) that ICAO has adopted standards and recommended practices addressing satellite communications with aircraft in accordance with the Convention on International Civil Aviation;

c) that all air traffic communications as defined in Annex 10 to the Convention on International Civil Aviation fall within priority categories 1 to 6 of Article **44**;

d) that Table 15-2 of Appendix **15** identifies the frequency bands 1 530-1 544 MHz (space-to-Earth) and 1 626.5-1 645.5 MHz (Earth-to-space) for distress and safety purposes in the maritime mobile-satellite service as well as for routine non-safety purposes;

e) that any administration having difficulty in applying the procedures of Articles **9** and **11** with respect to No. **5.357A** and this Resolution may at any time request assistance from the Radiocommunication Bureau and the Board under the relevant provisions of the Radio Regulations, including Article **7**, the relevant provisions of Articles **9** and **11**, as well as Articles **13** and **14**;

f) that ICAO has knowledge of aviation communication requirements,

noting

that, since spectrum resources are limited, there is a need to use them in the most efficient manner within and amongst various MSS systems, including GMDSS and AMS(R)S,

resolves

1 that, in frequency coordination of MSS networks in the frequency bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz, the notifying administrations of mobile-satellite networks shall ensure that the spectrum needed for distress, urgency and safety communications of GMDSS, as elaborated in Articles **32** and **33**, in the frequency bands where No. **5.353A** applies, and for the AMS(R)S communications within priority categories 1 to 6 of Article **44** in the frequency bands where No. **5.357A** applies, is accommodated;

2 that notifying administrations of mobile-satellite networks shall ensure the use of the latest technical advances in their mobile-satellite systems, in order to achieve the most flexible, efficient and practical use of the generic allocations;

3 that the notifying administrations of mobile-satellite networks shall ensure that, in the event that the spectrum requirements of MSS, including AMS(R)S, networks are decreasing relative to the previous frequency coordination meeting, the corresponding unused spectrum resources shall be released to facilitate efficient use of spectrum;

4 that the notifying administrations of mobile-satellite networks shall ensure that MSS operators carrying non-safety-related traffic yield capacity, as and when necessary, to accommodate the spectrum requirements for distress, urgency and safety communication of GMDSS communications, as elaborated in Articles **32** and **33**, and for AMS(R)S communications within priority categories 1 to 6 of Article **44**; this could be achieved in advance through the coordination process in *resolves* 1, and in the case of AMS(R)S the procedures contained in the Annex to this Resolution shall apply,

invites

1 administrations, if they so desire, to have their AMS(R)S traffic requirements submitted to ICAO before the frequency coordination meeting;

2 ICAO to evaluate and, as appropriate, comment on the AMS(R)S traffic requirements received from individual administrations, on the basis of the known global and regional aviation traffic requirements, including the time-scale of regional and global communication requirements,

instructs the Secretary-General

to bring this Resolution to the attention of ICAO.

ANNEX TO RESOLUTION 222 (REV.WRC-23)

Procedures to implement No. 5.357A and Resolution 222 (Rev.WRC-23)

1 The notifying administrations of planned MSS, including AMS(R)S, networks shall submit to the Radiocommunication Bureau (BR) the required technical characteristics and other relevant information of their MSS networks in accordance with Appendix **4**. Coordination of these MSS networks with other affected satellite networks operating in the frequency bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz shall proceed in accordance with Articles **9** and **11** and other relevant provisions of the Radio Regulations, as appropriate.

2 To further facilitate coordination under Articles **9** and **11**, the notifying administrations of MSS, including AMS(R)S, networks may authorize their respective MSS satellite operators, including AMS(R)S satellite operators, to enter into bilateral and multilateral coordination processes to obtain operator agreements on access to spectrum for their satellite networks.

3 At frequency coordination meetings, including operator meetings as referred to in 2 above, the notifying administration of each AMS(R)S network claiming priority under No. **5.357A**, or its respective satellite operator, shall present the spectrum requirements of each AMS(R)S network translated from their traffic requirements in accordance with an agreed methodology that considers the most recent version of Recommendation ITU-R M.2091 and was developed in response to Resolution **422 (WRC-12)**, and accompanied with the information justifying such requirements.

The participants to the frequency coordination meeting then collectively validate the requirements.

The notifying administrations or their authorized MSS operators shall accommodate validated AMS(R)S spectrum requirements in accordance with No. **5.357A** without placing undue constraints on the existing systems operating in accordance with the Radio Regulations.

4 The notifying administrations of MSS networks, including AMS(R)S, have responsibility to ensure that their respective assignments are compatible in the relevant bilateral or multilateral frequency coordination meetings (in particular when those networks span various geographic area(s)).

5 The notifying administrations shall inform BR about the total amount of spectrum assigned to AMS(R)S systems after each coordination meeting where the total AMS(R)S assignments are affected.

6 If a notifying AMS(R)S administration is of the opinion that its spectrum requirements have not been met in the frequency coordination process as per No. **5.357A**, the notifying administration may notify the Director of BR of this and request that a Reassessment Meeting be called.

7 If the Bureau receives an announcement from an administration that their AMS(R)S spectrum requirements have not been met, the Director of the Bureau shall invite the notifying administrations of mobile-satellite networks involved in step 2 for a Reassessment Meeting to be held normally within three months. The Reassessment Meeting shall limit its task to consideration of the application of No. **5.357A** and shall not enter into specific coordination activities for the modification of the assignments to individual operators. The Reassessment Meeting shall be attended by the notifying administrations. These administrations may decide to invite other parties or BR in an advisory role if agreed by all notifying administrations.

8 If the Reassessment Meeting concludes that the AMS(R)S spectrum requirements of the concerned system have not been met, the Reassessment Meeting may call for an additional specific frequency coordination meeting of the notifying administrations of mobile-satellite networks involved in step 2 and their representative MSS operators, which is requested to adapt the coordination agreement, taking due account of the advice of the Reassessment Meeting. This frequency coordination meeting should take place as soon as possible and preferably immediately following the Reassessment Meeting.

9 At the conclusion of the Reassessment Meeting, a report containing information about the issue discussed and the conclusions shall be prepared by the participating notifying administrations and submitted to BR for publication.

10 If the matter remains unresolved at the administrations' frequency coordination meeting referred to in 8 above, the notifying AMS(R)S administration shall seek the assistance of the Radiocommunication Bureau pursuant to Articles **7** and **13** and notify the respective administrations indicating that its AMS(R)S requirements have not been satisfied. The Radiocommunication Bureau shall provide a report and assistance in accordance with No. **13.3**.

11 If the matter remains unresolved after the Bureau has communicated its conclusions to the notifying AMS(R)S administration involved, the notifying AMS(R)S administration may request review of the decision of the Bureau in accordance with Article **14**.

Agenda item 1.1

MOD

RESOLUTION 223 (REV.WRC-23)

Additional frequency bands identified for International Mobile Telecommunications

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that International Mobile Telecommunications (IMT), including IMT-2000, IMT-Advanced and IMT-2020, is the ITU vision of global mobile access;

b) that IMT systems provide telecommunication services on a worldwide scale regardless of location, network or terminal used;

c) that IMT provides access to a wide range of telecommunication services supported by fixed telecommunication networks (e.g. public switched telephone network (PSTN)/integrated services digital network (ISDN), high bit rate Internet access), and to other services which are specific to mobile users;

d) that the technical characteristics of IMT are specified in ITU Radiocommunication Sector (ITU-R) and ITU Telecommunication Standardization Sector (ITU-T) Recommendations, including Recommendations ITU-R M.1457 and ITU-R M.2012, which contain the detailed specifications of the terrestrial radio interfaces of IMT;

e) that the evolution of IMT is being studied within ITU-R;

f) that the review of IMT-2000 spectrum requirements at WRC-2000 concentrated on the frequency bands below 3 GHz;

g) that at WARC-92, 230 MHz of spectrum was identified for IMT-2000 in the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz, including the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz for the satellite component of IMT-2000, in No. **5.388** and under the provisions of Resolution **212 (Rev.WRC-23)**;

h) that since WARC-92 there has been a tremendous growth in mobile communications including an increasing demand for broadband multimedia capability;

i) that the frequency bands identified for IMT are currently used by mobile systems or applications of other radiocommunication services;

j) that Recommendation ITU-R M.1308 addresses the evolution of existing mobile communication systems to IMT-2000, and that Recommendation ITU-R M.1645 addresses the evolution of the IMT systems and maps out their future development;

k) that harmonized worldwide frequency bands for IMT are desirable in order to achieve global roaming and the benefits of economies of scale;

l) that the frequency bands 1 710-1 885 MHz, 2 500-2 690 MHz and 3 300-3 400 MHz are allocated to a variety of services in accordance with the relevant provisions of the Radio Regulations;

m) that the frequency band 2 300-2 400 MHz is allocated to the mobile service on a co-primary basis in the three ITU Regions;

n) that the frequency band 2 300-2 400 MHz, or portions thereof, is used extensively in a number of administrations by other services including the aeronautical mobile service (AMS) for telemetry in accordance with the relevant provisions in the Radio Regulations;

o) that IMT has already been deployed or is being considered for deployment in some countries in the frequency bands 1 710-1 885 MHz, 2 300-2 400 MHz and 2 500-2 690 MHz and equipment is readily available;

p) that the frequency bands 1 710-1 885 MHz, 2 300-2 400 MHz and 2 500-2 690 MHz, or parts thereof, are identified for use by administrations wishing to implement IMT;

q) that technological advancement and user needs will promote innovation and accelerate the delivery of advanced communication applications to consumers;

r) that changes in technology may lead to the further development of communication applications, including IMT;

s) that timely availability of spectrum is important to support future applications;

t) that IMT systems are envisaged to provide increased peak data rates and capacity that may require a larger bandwidth;

u) that ITU-R studies forecasted that additional spectrum may be required to support the future services of IMT and to accommodate future user requirements and network deployments;

v) that the frequency band 1 427-1 429 MHz is allocated to the mobile, except aeronautical mobile, service in all three Regions on a primary basis;

w) that the frequency band 1 429-1 525 MHz is allocated to the mobile service in Regions 2 and 3 and to the mobile, except aeronautical mobile, service in Region 1 on a primary basis;

x) that the frequency band 1 518-1 559 MHz is allocated in all three Regions to the mobile-satellite service (MSS) on a primary basis[1];

y) that WRC-15 identified the frequency band 1 427-1 518 MHz for use by administrations wishing to implement terrestrial IMT systems;

z) that there is a need to ensure the continued operations of the MSS in the frequency band 1 518-1 525 MHz;

aa) that appropriate technical measures to facilitate adjacent frequency band compatibility between the MSS in the frequency band 1 518-1 525 MHz and IMT in the frequency band 1 492-1 518 MHz need to be studied;

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[1] See Table **21-4** for applicable pfd limits.

ab) Report ITU-R RA.2332, on compatibility and sharing studies between the radio astronomy service and IMT systems in the frequency bands 608-614 MHz, 1 330-1 400 MHz, 1 400-1 427 MHz, 1 610.6-1 613.8 MHz, 1 660-1 670 MHz, 2 690-2 700 MHz, 4 800-4 990 MHz and 4 990-5 000 MHz;

ac) that WRC-15, WRC-19 and this conference have identified the frequency band 3 300-3 400 MHz for use by administrations wishing to implement terrestrial IMT systems in Nos. **5.429B**, **5.429D** and **5.429F**;

ad) that the frequency band 3 100-3 400 MHz is allocated worldwide on a primary basis to the radiolocation service;

ae) that a number of administrations use the frequency band 3 300-3 400 MHz, or portions thereof, which is allocated to the fixed and mobile services on a primary basis in No. **5.429**;

af) that the frequency band 4 800-4 990 MHz is allocated worldwide to the mobile and fixed services on a primary basis;

ag) that the frequency band 4 800-4 990 MHz is identified for use by administrations wishing to implement terrestrial IMT systems in countries listed in Nos. **5.441A** and **5.441B**;

ah) that appropriate technical measures may be considered by administrations at a national level to facilitate adjacent frequency band compatibility between radio astronomy receivers in the frequency band 4 990-5 000 MHz and IMT systems in the frequency band 4 800-4 990 MHz;

ai) that Report ITU-R M.2481 addresses in-band and adjacent-band coexistence and compatibility studies between IMT systems in the frequency band 3 300-3 400 MHz and radiolocation systems in the frequency band 3 100-3 400 MHz, and that further studies were carried out in preparation for this conference;

ai bis) that the development of new ITU-R Recommendations and/or Reports could provide guidance to support administrations planning to implement IMT, to ensure co-existence with the radiolocation service operating in neighbouring countries in the frequency band 3 300-3 400 MHz,

emphasizing

a) that flexibility must be afforded to administrations:

– to determine, at a national level, how much spectrum to make available for IMT from within the identified frequency bands;

– to develop their own transition plans, if necessary, tailored to meet their specific deployment of existing systems;

– to have the ability for the identified frequency bands to be used by all services having allocations in those frequency bands;

– to determine the timing of availability and use of the frequency bands identified for IMT, in order to meet particular user demand and other national considerations;

b) that the particular needs of developing countries must be met;

c) that Recommendation ITU-R M.819 describes the objectives to be met by IMT-2000 in order to meet the needs of developing countries,

noting

a) Resolutions **224 (Rev.WRC-19/23)** and **225 (Rev.WRC-23)**, which also relate to IMT;

b) that the sharing implications between services sharing the frequency bands identified for IMT in No. **5.384A**, as relevant, will need further study in ITU-R;

c) that studies regarding the availability of the frequency band 2 300-2 400 MHz for IMT are being conducted in many countries, the results of which could have implications for the use of those frequency bands in those countries;

d) that, due to differing requirements, not all administrations may need all of the IMT frequency bands identified at WRC-07, or, due to the usage by and investment in existing services, may not be able to implement IMT in all of those frequency bands;

e) that the spectrum for IMT identified by WRC-07 may not completely satisfy the expected requirements of some administrations;

f) that currently operating mobile communication systems may evolve to IMT in their existing frequency bands;

g) that services such as the fixed service, the mobile service (second-generation systems), the space operation service, the space research service and the AMS are in operation or planned in the frequency band 1 710-1 885 MHz, or portions thereof;

h) that in the frequency band 2 300-2 400 MHz, or portions thereof, there are services such as the fixed, mobile, amateur and radiolocation services which are currently in operation or planned to be in operation in the future;

i) that services such as the broadcasting-satellite service (BSS), the BSS (sound), the MSS (in Region 3) and the fixed service (including multipoint distribution/communication systems) are in operation or planned in the frequency band 2 500-2 690 MHz, or portions thereof;

j) that the identification of several frequency bands for IMT allows administrations to choose the best frequency band or parts thereof for their circumstances;

k) that further study of the technical and operational measures regarding adjacent frequency band compatibility between IMT systems operating below 3 400 MHz and fixed-satellite service earth stations operating above 3 400 MHz may be required;

l) that ITU-R has identified additional work to address further developments in IMT;

m) that the IMT terrestrial radio interfaces as defined in Recommendations ITU-R M.1457 and ITU-R M.2012 are expected to evolve within the framework of ITU-R beyond those initially specified, in order to provide enhanced services and services beyond those envisaged in the initial implementation;

n) that the identification of a frequency band for IMT does not establish priority in the Radio Regulations and does not preclude the use of the frequency band for any application of the services to which it is allocated;

o) that the provisions of Nos. **5.317A**, **5.384A**, **5.388**, **5.429B**, **5.429D**, **5.429F**, **5.441A** and **5.441B** do not prevent administrations from having the choice to implement other technologies in the frequency bands identified for IMT, based on national requirements,

recognizing

that, for some administrations, the only way of implementing IMT would be spectrum refarming, requiring significant financial investment,

resolves

1 to invite administrations planning to implement IMT to make available, based on user demand and other national considerations, additional frequency bands or portions of the frequency bands above 1 GHz identified in Nos. **5.341B**, **5.384A**, **5.429B**, **5.429D**, **5.429F**, **5.441A** and **5.441B** for the terrestrial component of IMT; due consideration should be given to the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT, taking into account the services to which the frequency band is currently allocated;

2 to acknowledge that the differences in the texts of Nos. **5.341B**, **5.384A** and **5.388** do not confer differences in regulatory status;

3 that, in the frequency bands 4 800-4 825 MHz and 4 835-4 950 MHz, in order to identify potentially affected administrations when applying the procedure for seeking agreement under No. **9.21**for IMT stations in relation to aircraft stations, a coordination distance from an IMT station to the border of another country equal to 300 km (for land path)/450 km (for sea path) applies;

4 that in the frequency band 4 800-4 990 MHz, in order to identify potentially affected administrations when applying the procedure for seeking agreement under No. **9.21** for IMT stations in relation to fixed-service stations or other ground-based stations of the mobile service, a coordination distance from an IMT station to the border of another country equal to 70 km applies;

5 that the power flux-density (pfd) limits in No. **5.441B** shall not apply to the following countries: Armenia, Brazil, Cambodia, China, Russian Federation, Kazakhstan, Lao P.D.R., Uzbekistan, South Africa, Viet Nam and Zimbabwe,

invites the ITU Radiocommunication Sector

1 to continue providing guidance to ensure that IMT can meet the telecommunication needs of developing countries and rural areas;

2 to continue providing guidance to administrations planning to facilitate the implementation of IMT in the frequency band 3 300-3 400 MHz, taking into account *considering ai bis)*;

3 to include the results of the studies mentioned in *invites the ITU Radiocommunication Sector* above in one or more ITU-R Recommendations and Reports, as appropriate.

Agenda item 1.5

MOD

RESOLUTION 224 (REV.WRC-23)

Frequency bands for the terrestrial component of International Mobile Telecommunications below 1 GHz

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that International Mobile Telecommunications (IMT) is the root name that encompasses IMT-2000, IMT-Advanced and IMT-2020 collectively (see Resolution ITU-R 56);

b) that IMT systems are intended to provide telecommunication services on a worldwide scale, regardless of location, network or terminal used;

c) that parts of the frequency band 790-960 MHz are extensively used in the three Regions by mobile systems;

d) that IMT systems have already been deployed in the frequency band 694/698-960 MHz in some countries of the three Regions;

e) that some administrations of Regions 2 and 3 are planning to use the frequency band 470-694/698 MHz, or part of that frequency band, for IMT;

f) that the frequency band 450-470 MHz is allocated to the mobile service on a primary basis in the three Regions and that IMT systems have already been deployed in some countries of the three Regions;

g) that results of the sharing studies for the frequency band 450-470 MHz are contained in Report ITU-R M.2110;

h) that cellular-mobile systems in the three Regions in the frequency bands below 1 GHz operate using various frequency arrangements;

i) that, where cost considerations warrant the installation of fewer base stations, such as in rural and/or sparsely populated areas, frequency bands below 1 GHz are generally suitable for implementing mobile systems, including IMT;

j) that frequency bands below 1 GHz are important, especially for some developing countries and countries with large areas where economic solutions for low population density areas are necessary;

k) that Recommendation ITU-R M.819 describes the objectives to be met by IMT-2000 in order to meet the needs of developing countries, and in order to assist them to “bridge the gap” between their communication capabilities and those of developed countries;

l) that Recommendation ITU-R M.1645 also describes the coverage objectives of IMT,

recognizing

a) that the evolution of cellular-based mobile networks to IMT can be facilitated if they are permitted to evolve within their current frequency bands;

b) that some of the frequency bands or parts of the frequency bands identified for IMT below 1 GHz are used extensively in many countries by various other terrestrial mobile systems and applications, including public protection and disaster relief radiocommunications (see Resolution **646 (Rev.WRC-19)**);

c) that there is a need, in many developing countries and countries with large areas of low population density, for the cost-effective implementation of IMT, and that the propagation characteristics of frequency bands below 1 GHz identified in Nos. **5.286AA**, **5.295**, **5.308A** and **5.317A** result in larger cells;

d) that the frequency band 450-470 MHz, or parts thereof, is also allocated to services other than the mobile service;

e) that the frequency band 460-470 MHz is also allocated to the meteorological-satellite service in accordance with No. **5.290**;

f) that the frequency band 470-890 MHz, except the frequency band 608-614 MHz in Region 2, is allocated to the broadcasting service on a primary basis in all three Regions as contained in Article **5** of the Radio Regulations, and parts of this frequency band are used predominantly by this service;

g) that, in the frequency band 470-862 MHz, the GE06 Agreement applies in all Region 1 countries, except Mongolia, and in the Islamic Republic of Iran, and that this Agreement contains provisions for the terrestrial broadcasting service and other primary terrestrial services, a Plan for digital television, and a list of stations of other primary terrestrial services;

h) that the transition from analogue to digital television is expected to result in situations where the frequency band 470-806/862 MHz will be used extensively for both analogue and digital terrestrial transmission, and the demand for spectrum during the transition period may be even greater than the standalone usage of analogue broadcasting systems;

i) that the time-frame and transition period for analogue to digital television switchover may not be the same for all countries;

j) that, after analogue to digital television switchover, some administrations may decide to use all or parts of the frequency band 470-806/862 MHz for other services to which the frequency band is allocated on a primary basis, in particular the mobile service for the implementation of IMT, while in other countries the broadcasting service will continue to operate in that frequency band;

k) that in the frequency band 470-890 MHz, or parts thereof, there is an allocation on a primary basis for the fixed service;

l) that, in some countries, the frequency band 470-862 MHz, or parts thereof, for Regions 2 and 3 and the frequency band 694-862 MHz in Region 1 are allocated to the mobile service on a primary basis;

m) that the frequency band 645-862 MHz is allocated on a primary basis to the aeronautical radionavigation service in the countries listed in No. **5.312**;

n) that Recommendation ITU-R M.1036 provides frequency arrangements for implementation of the terrestrial component of IMT in the frequency bands identified for IMT in the Radio Regulations;

o) that Reports ITU-R M.2241, ITU-R BT.2215, ITU-R BT.2247, ITU-R BT.2248, ITU-R BT.2265, ITU-R BT.2301, ITU-R BT.2337 and ITU-R BT.2339 contain material relevant to compatibility studies between IMT and other services;

p) that Report ITU-R BT.2338 describes the implications of a co-primary allocation to the mobile service in the frequency band 694-790 MHz in Region 1 for the use of that frequency band by applications ancillary to broadcasting and programme-making,

emphasizing

a) that in all administrations terrestrial broadcasting is a vital part of the communication and information infrastructure;

b) that flexibility must be afforded to administrations:

– to determine, at a national level, how much spectrum to make available for IMT from within the identified frequency bands, taking into account current uses of the spectrum and the needs of other applications;

– to develop their own transition plans, if necessary, tailored to meet their specific deployment of existing systems;

– to have the ability for the identified frequency bands to be used by all services having allocations in those frequency bands;

– to determine the timing of availability and use of the frequency bands identified for IMT, in order to meet particular market demand and other national considerations;

c) that the particular needs and national conditions and circumstances of developing countries, including least-developed countries, highly-indebted poor countries with economies in transition, and countries with large territories and territories with a low subscriber density, must be met;

d) that due consideration should be given to the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT, taking into account the current and planned use of these frequency bands by all services to which these frequency bands are allocated;

e) that the use of frequency bands below 1 GHz for IMT also helps to “bridge the gap” between sparsely-populated areas and densely-populated areas in various countries;

f) that the identification of a frequency band for IMT does not preclude the use of this frequency band by other services or applications to which it is allocated;

g) that the use of the frequency band 470-862 MHz by the broadcasting service and other primary services is also covered by the GE06 Agreement;

h) that the requirements of the different services to which the frequency band is allocated, including the mobile and broadcasting services, need to be taken into account,

resolves

1 that administrations which are implementing or planning to implement IMT consider the use of frequency bands identified for IMT below 1 GHz and the possibility of cellular-based mobile network evolution to IMT, in the frequency band identified in Nos. **5.286AA**, **5.317A**, and in some countries of Regions 2 and 3, the frequency band(s) identified in Nos. **5.295**, **5.296A** and **5.308A**, and in some countries of Region 1 in the frequency band identified in No. **5.15B,** based on user demand and other considerations;

2 to encourage administrations to take into account results of the existing relevant ITU Radiocommunication Sector studies, when implementing IMT applications/systems in the frequency bands 694-862 MHz in Region 1, in the frequency band 470-806 MHz in Region 2, in the frequency band 790-862 MHz in Region 3, in the frequency band 470-698 MHz, or portions thereof, for those administrations mentioned in No. **5.296A**, in the frequency band 698-790 MHz, or portions thereof, for those administrations mentioned in No. **5.313A,** and in the frequency band 614-694 MHz, for those administrations mentioned in No. **5.15B**;

3 that administrations should take into account the need to protect existing and future broadcasting stations, both analogue and digital, except analogue in the GE06 planning area, in the frequency band 470-806/862 MHz, as well as other primary terrestrial services;

4 that administrations planning to implement IMT in the frequency bands mentioned in *resolves* 2 shall effect coordination, as required, with all neighbouring administrations prior to implementation;

5 that in Region 1 (excluding Mongolia) and in the Islamic Republic of Iran, the implementation of stations in the mobile service shall be subject to the applications of procedures contained in the GE06 Agreement; in so doing:

a) administrations which deploy stations in the mobile service for which coordination was not required, or without having obtained the prior consent of those administrations that may be affected, shall not cause unacceptable interference to, nor claim protection from, stations of the broadcasting service of administrations operating in conformity with the GE06 Agreement; this should include a signed commitment as required under § 5.2.6 of the GE06 Agreement;

b) administrations which deploy stations in the mobile service for which coordination was not required, or without having obtained the prior consent of those administrations that may be affected, shall not object to nor prevent the entry into the GE06 plan or recording in the MIFR of additional future broadcasting allotments or assignments of any other administration in the GE06 Plan with reference to those stations;

6 that, in Region 2, implementation of IMT shall be subject to the decision of each administration on the transition from analogue to digital television,

invites the Director of the Telecommunication Development Bureau

to draw the attention of the ITU Telecommunication Development Sector to this Resolution.

Agenda item 4

MOD

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 frequency 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-19/23)** and **224 (Rev.WRC-19/23)** on the implementation of the terrestrial and satellite components of IMT;

c) that the bands 1 518-1 544 MHz, 1 545-1 559 MHz, 1 610-1 626.5 MHz, 1 626.5-1 645.5 MHz, 1 646.5-1 660.5 MHz, 1 668-1 675 MHz and 2 483.5-2 500 MHz are allocated on a co-primary basis to the mobile-satellite service and other services in accordance with the Radio Regulations;

d) that, in Region 3, the bands 2 500-2 520 MHz and 2 670-2 690 MHz are allocated on a co-primary basis to the mobile-satellite service and other services in accordance with the Radio Regulations;

e) that distress, urgency and safety communications of the Global Maritime Distress and Safety System and the aeronautical mobile-satellite (R) service have priority over all other mobile-satellite service communications in accordance with Nos. **5.353A** and **5.357A**,

recognizing

a) that services such as broadcasting-satellite, broadcasting-satellite (sound), mobile-satellite, fixed (including point-to-multipoint distribution/communication systems) and mobile are in operation or planned in the band 2 500-2 690 MHz, or in portions of that band;

b) that other services such as the mobile service, the radio astronomy service and radiodetermination-satellite service are in operation or planned, in accordance with the Table of Frequency Allocations, in the bands 1 518-1 559/1 626.5-1 660.5 MHz, 1 610-1 626.5/ 2 483.5-2 500 MHz and 1 668-1 670 MHz, or in portions of those bands, and that those bands, or portions thereof, are intensively used in some countries by applications other than the IMT satellite component, and the sharing studies within ITU-R are not finished;

c) that studies of potential sharing and coordination between the satellite component of IMT and the terrestrial component of IMT, mobile-satellite service applications and other high-density applications in other services such as point-to-multipoint communication/distribution systems in the bands 2 500-2 520 MHz and 2 670-2 690 MHz are not finished;

d) that the bands 2 520-2 535 MHz and 2 655-2 670 MHz are allocated to the mobile-satellite, except aeronautical mobile-satellite, service for operation limited to within national boundaries pursuant to Nos. **5.403** and **5.420**;

e) Resolution ITU-R 47 on studies under way on satellite radio transmission technologies for IMT,

resolves

1 that, in addition to the frequency bands indicated in *considering a)* and *resolves* 2, the frequency bands 1 518-1 544 MHz, 1 545-1 559 MHz, 1 610-1 626.5 MHz, 1 626.5-1 645.5 MHz, 1 646.5-1 660.5 MHz, 1 668-1 675 MHz and 2 483.5-2 500 MHz may be used by administrations wishing to implement the satellite component of IMT, subject to the regulatory provisions related to the mobile-satellite service in these frequency bands;

2 that the bands 2 500-2 520 MHz and 2 670-2 690 MHz as identified for IMT in No. **5.384A** and allocated to the mobile-satellite service in Region 3 may be used by administrations in that Region wishing to implement the satellite component of IMT; however, depending on user demand, it may be possible in the longer term that the administrations decide to use these bands for the terrestrial component of IMT (see the Preamble of the ITU Constitution);

3 that this identification of frequency bands for the satellite component of IMT does not preclude the use of these bands by any applications of the services to which they are allocated and does not establish priority in the Radio Regulations,

invites the ITU Radiocommunication Sector

1 to study the sharing and coordination issues in the above bands related to use of the mobile-satellite service allocations for the satellite component of IMT and the use of this spectrum by the other allocated services, including the radiodetermination-satellite service;

2 to report the results of these studies to a future world radiocommunication conference,

invites the Director of the Telecommunication Development Bureau

to draw the attention of the ITU Telecommunication Development Sector to this Resolution.

MOD

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),

considering

a) that WRC-03 allocated the frequency bands 5 150-5 350 MHz and 5 470-5 725 MHz on a primary basis to the mobile service for the implementation of wireless access systems (WAS), including radio local area networks (RLANs);

b) that WRC-03 decided to make an additional primary allocation for the Earth exploration-satellite service (EESS) (active) in the frequency band 5 460-5 570 MHz and the space research service (SRS) (active) in the frequency band 5 350-5 570 MHz;

c) that WRC-03 decided to upgrade the radiolocation service to a primary status in the frequency band 5 350-5 650 MHz;

d) that the frequency band 5 150-5 250 MHz is allocated worldwide on a primary basis to the fixed-satellite service (FSS) (Earth-to-space), this allocation being limited to feeder links of non-geostationary-satellite (non-GSO) systems in the mobile-satellite service (MSS) (No. **5.447A**);

e) that the frequency band 5 150-5 250 MHz is also allocated to the mobile service, on a primary basis, in some countries (No. **5.447**) subject to agreement obtained under No. **9.21**;

f) that the frequency band 5 250-5 460 MHz is allocated to the EESS (active) and the frequency band 5 250-5 350 MHz to the SRS (active) on a primary basis;

g) that the frequency band 5 250-5 725 MHz is allocated on a primary basis to the radiodetermination service;

h) that there is a need to protect the existing primary services in the frequency bands 5 150-5 350 MHz and 5 470-5 725 MHz;

i) that results of studies in the ITU Radiocommunication Sector (ITU-R) indicate that sharing in the frequency band 5 150-5 250 MHz between WAS, including RLANs, and the FSS is feasible under specified conditions;

j) that studies have shown that sharing between the radiodetermination and mobile services in the frequency bands 5 250-5 350 MHz and 5 470-5 725 MHz is only possible with the application of mitigation techniques such as dynamic frequency selection;

k) that there is a need to specify an appropriate equivalent isotropically radiated power (e.i.r.p.) limit and, where necessary, operational restrictions for WAS, including RLANs, in the mobile service in the frequency bands 5 250-5 350 MHz and 5 470-5 570 MHz in order to protect systems in the EESS (active) and SRS (active);

l) that the deployment density of WAS, including RLANs, will depend on a number of factors including intrasystem interference and the availability of other competing technologies and services;

m) that the means to measure or calculate the aggregate power flux-density (pfd) level at FSS satellite receivers specified in Recommendation ITU-R S.1426 are currently under study;

n) that certain parameters contained in Recommendation ITU-R M.1454 related to the calculation of the number of RLANs tolerable by FSS satellite receivers operating in the frequency band 5 150-5 250 MHz require further study;

o) that an aggregate pfd level has been developed in Recommendation ITU-R S.1426 for the protection of FSS satellite receivers in the frequency band 5 150-5 250 MHz;

p) that the attenuation offered by the car and train hulls, when WAS including RLANs are located inside automobiles and trains, could facilitate a level of protection to incumbent services from WAS including RLANs,

considering further

a) that the interference from a single WAS, including RLANs, complying with the operational restrictions under *resolves* 2 will not on its own cause any unacceptable interference to FSS receivers on board satellites in the frequency band 5 150-5 250 MHz;

b) that such FSS satellite receivers may experience an unacceptable effect due to the aggregate interference from these WAS, including RLANs, especially in the case of a prolific growth in the number of these systems;

c) that the aggregate effect on FSS satellite receivers will be due to the global deployment of WAS, including RLANs, and it may not be possible for administrations to determine the location of the source of the interference and the number of WAS, including RLANs, in operation simultaneously,

noting

a) that, prior to WRC-03, a number of administrations developed regulations to permit indoor and outdoor WAS, including RLANs, to operate in the various frequency bands under consideration in this Resolution;

b) that, in response to Resolution **229 (WRC-03)***, [1], ITU-R developed Report ITU-R M.2115, which provides testing procedures for implementation of dynamic frequency selection,

recognizing

a) that in the frequency band 5 600-5 650 MHz, ground-based meteorological radars are extensively deployed and support critical national weather services, according to footnote No. **5.452**;

b) that the performance and interference criteria of spaceborne active sensors in the EESS (active) are given in Recommendation ITU-R RS.1166;

c) that a mitigation technique to protect radiodetermination systems is given in Recommendation ITU-R M.1652;

d) that Recommendation ITU-R RS.1632 identifies a suitable set of constraints for WAS, including RLANs, in order to protect the EESS (active) in the frequency band 5 250-5 350 MHz;

e) that Recommendation ITU-R M.1653 identifies the conditions for sharing between WAS, including RLANs, and the EESS (active) in the frequency band 5 470-5 570 MHz;

f) that the stations in the mobile service should also be designed to provide, on average, a near-uniform spread of the loading of the spectrum used by stations across the frequency band or bands in use to improve sharing with satellite services;

g) that WAS, including RLANs, provide effective broadband solutions;

h) that the demand for WAS/RLAN, including outdoor services, has increased since WRC-03;

i) that there is a need for administrations to ensure that WAS, including RLANs, meet the required mitigation techniques, for example, through equipment or standards compliance procedures;

j) that some sharing studies submitted to ITU-R between WAS/RLANs and the FSS for non-GSO MSS feeder uplinks, in the frequency band 5 150-5 250 MHz, have shown that WAS/RLAN outdoor relaxation up to 3 per cent of the total number of WAS/RLANs can be feasible;

k) that measures to control the number of outdoor WAS/RLANs, in the frequency band 5 150-5 250 MHz, can include: authorization approach, registration procedures, domestic notification, limited application, limitation to fixed WAS/RLAN access points, etc.,

resolves

1 that the use of these frequency bands by the mobile service is for the implementation of WAS, including RLANs, as described in the most recent version of Recommendation ITU-R M.1450;

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* *Note by the Secretariat:* This Resolution was revised by WRC-12 and WRC-19.

[1] Reference to Resolution **229 (WRC-03**) is provided as background information.

2 that, in the frequency band 5 150-5 250 MHz, stations in the mobile service shall be restricted to indoor use, including inside trains, with a maximum mean e.i.r.p.[2] of 200 mW and a maximum mean e.i.r.p. density of 10 mW/MHz in any 1 MHz band or equivalently 0.25 mW/25 kHz in any 25 kHz band; mobile stations inside automobiles shall operate with a maximum e.i.r.p. of 40 mW;

3 that in the frequency band 5 150-5 250 MHz, administrations may exercise some flexibility by taking appropriate measures that would allow controlled and/or limited outdoor usage with a maximum mean e.i.r.p.[2] of 200 mW; administrations have a further option to permit stations in the mobile service, for indoor or controlled outdoor use, to operate up to a maximum mean e.i.r.p of 30 dBm; in the case of indoor or controlled outdoor use, administrations are requested to either ensure that the maximum e.i.r.p. at any elevation angle above 5 degrees as measured from the horizon shall not exceed 200 mW (23 dBm), or to ensure that the maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon shall not exceed 125 mW (21 dBm) or to apply the emission mask described in *resolves* 5 below to maintain protection to the incumbent services; in that case, administrations shall take all appropriate measures, such as those described in *recognizing k)*, to control the number of these higher power outdoor WAS/RLAN stations up to 2 per cent of the estimated total amount of WAS/RLAN stations; if the maximum e.i.r.p. is raised above 200 mW, unwanted emissions shall not increase above the existing levels already authorized within administrations for the existing systems that operate with an in-band e.i.r.p. of not greater than 200 mW; in all cases, administrations are requested to maintain protection to the other primary services;

4 that administrations may monitor whether the aggregate pfd levels given in Recommendation ITU-R S.1426[3] 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):

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[2] In the context of this Resolution, “mean e.i.r.p.” refers to the e.i.r.p. during the transmission burst which corresponds to the highest power, if power control is implemented.

[3] $-124 - 20 \log (h_{SAT}/1\,414)$ dB(W/(m^2 · 1 MHz)), or equivalently, $-140 - 20 \log (h_{SAT}/1\,414)$ dB(W/(m^2 · 25 kHz)), at the FSS satellite orbit, where h_{SAT} is the altitude of the satellite (km).

−13 dB(W/MHz)	for	$0° \leq \theta < 8°$
$-13 - 0.716(\theta - 8)$ dB(W/MHz)	for	$8° \leq \theta < 40°$
$-35.9 - 1.22(\theta - 40)$ dB(W/MHz)	for	$40° \leq \theta \leq 45°$
−42 dB(W/MHz)	for	$45° < \theta$;

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 Recommendation ITU-R RS.1632;

7 that, in the frequency band 5 470-5 725 MHz, stations in the mobile service shall be restricted to a maximum transmitter power of 250 mW[4] with 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;

8 that, in the frequency bands 5 250-5 350 MHz and 5 470-5 725 MHz, systems in the mobile service shall either employ transmitter power control to provide, on average, a mitigation factor of at least 3 dB on the maximum average output power of the systems, or, if transmitter power control is not in use, then the maximum mean e.i.r.p. shall be reduced by 3 dB;

9 that, in the frequency bands 5 250-5 350 MHz and 5 470-5 725 MHz, the mitigation measures for systems in the mobile service found in Annex 1 to Recommendation ITU-R M.1652-1 as well as the characteristics and interference criteria for systems in the radiolocation service stated in Annex 5 to Recommendation ITU-R M.1652-1 shall be used by systems in the mobile service to ensure compatible operation with radiodetermination systems,

invites administrations

1 to consider appropriate measures, when allowing the operation of stations in the mobile service using the e.i.r.p. elevation angle mask referred in *resolves* 5 above, to ensure the equipment is operated in compliance with this mask;

2 to take appropriate measures, such as the examples in *recognizing k)*, to control the number of outdoor stations in the frequency band 5 150-5 250 MHz, if implementing *resolves* 3 above, in order to ensure the protection of incumbent services.

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[4] Administrations with existing regulations prior to WRC-03 may exercise some flexibility in determining transmitter power limits.

Agenda item 1.5

MOD

RESOLUTION 235 (REV.WRC-23)

Review of the spectrum use of the frequency band 470-694 MHz or parts thereof for some countries in Region 1

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the favourable propagation characteristics in the frequency bands below 1 GHz are beneficial in providing cost-effective solutions for coverage;

b) that there is a need to continually take advantage of technological developments in order to increase the efficient use of the spectrum and facilitate spectrum access;

c) that the frequency band 470-694 MHz is a harmonized band used to provide terrestrial television broadcasting services on a worldwide scale;

d) that, in many countries, there is a sovereign national obligation on the provision of broadcasting services;

e) that terrestrial broadcasting networks have a long life cycle and a stable regulatory environment is necessary to provide protection of investment and future development;

f) that there is a need for investment in the next decade in broadcasting service development within the frequency band 470-694 MHz and for the implementation of new-generation broadcasting technologies and new applications (e.g. UHD, 5G Broadcast);

g) that there are countries where terrestrial broadcasting is the only viable means of delivery of broadcasting services;

h) that there are countries with decreasing use of digital terrestrial television broadcasting (DTTB) due to the evolution, broader availability and increased use of alternative media distribution platforms;

i) that International Mobile Telecommunications (IMT) systems utilize, among others, the frequency band 614-694 MHz to provide telecommunication services in some countries;

j) that, in accordance with No. **5.296**, there are countries where applications ancillary to broadcasting and programme-making are operating under the land mobile service (LMS) on a secondary basis and will continue to operate in the frequency band 470-694 MHz or in parts of that frequency band, but that the availability of spectrum for these applications will be affected by the implementation of other applications of the mobile service;

k) that the frequency band 645-862 MHz is allocated on a primary basis to the aeronautical radionavigation service (ARNS) in the countries listed in No. **5.312**;

l) that, in some countries, parts of the frequency band are also allocated to the radiolocation service on a secondary basis, limited to the operation of wind profiler radars (No. **5.291A**);

m) that, in the African Broadcasting Area (see Nos. **5.10** to **5.13**), the frequency band 606-614 MHz is allocated to the radio astronomy service on a primary basis (No. **5.304**), and in the rest

of Region 1 the frequency band 608-614 MHz is allocated to the radio astronomy service on a secondary basis (No. **5.306**);

n) that this conference has allocated the frequency band 470-694 MHz in some countries in Region 1 to the mobile/mobile, except aeronautical mobile, services on a secondary basis by a footnote, which enables some countries to implement mobile-based applications in order to address their national needs and interests;

o) that this conference has allocated the frequency band 614-694 MHz in some countries in Region 1 to the mobile, except aeronautical mobile, service on a primary basis by a footnote, which enables some countries to implement mobile-based applications in order to address their national needs and interests;

p) that in the Russian Federation and Kazakhstan, the frequency band 625-650 MHz is used for the space operation service (space-to-Earth), under No. **4.4**,

recognizing

a) that the GE06 Agreement applies in all Region 1 countries, except Mongolia, and in Iran (Islamic Republic of), in particular for the frequency band 470-862 MHz;

b) that the GE06 Agreement contains provisions for the terrestrial broadcasting service and other primary terrestrial services, a Plan for digital television and a list of stations of other primary terrestrial services;

c) that a digital entry in the GE06 Plan may also be used for transmissions in a service other than the broadcasting service under the conditions set out in § 5.1.3 of the GE06 Agreement ;

d) that the sharing and compatibility studies carried out in preparation for this conference and previous relevant world radiocommunication conferences may need to be updated for applications already considered, in cases of significantly changed technical characteristics;

e) that there may be some changes over the coming years in the spectrum use and needs of broadcasting and mobile services;

f) that No. **5.149** urges administrations to take all practicable steps to protect the radio astronomy service from harmful interference in the frequency band 608-614 MHz;

g) the ongoing needs of the LMS with allocations on a secondary basis used for applications ancillary to broadcasting and programme**-**making in No. **5.296** in the frequency band 470-694 MHz, and that stations in the LMS in the countries listed in this footnote shall not cause harmful interference to other existing or planned stations, considering the need to assess the demand of these applications in various administrations,

noting

a) the ongoing development of new applications and technologies of both the broadcasting and mobile services;

b) the studies regarding spectrum use and spectrum needs of existing services within the frequency band 470-960 MHz in Region 1, in particular the spectrum requirements of the broadcasting and mobile, except aeronautical mobile, services, carried out in preparation for this conference and relevant previous world radiocommunication conferences;

c) that the ITU Radiocommunication Sector (ITU-R) is studying possible solutions for global/regional harmonization of frequency bands and tuning ranges for electronic news gathering

(ENG)[1] in accordance with Resolution ITU-R 59, to facilitate services ancillary to broadcasting (SAB)/services ancillary to programme-making (SAP) operations;

d) that coexistence between applications of existing secondary services (e.g. SAB/SAP, radio astronomy and wind profiler radars) and other applications of the mobile service requires suitable sharing methods,

resolves to invite the ITU Radiocommunication Sector after this conference and in time for the 2031 world radiocommunication conference

1 to review spectrum use and needs of applications of broadcasting and mobile services, taking into account *recognizing g)*, within the frequency band 470-694 MHz or parts thereof for countries listed in No. **5.15A**;

2 based on the review referred to in *resolves to invite the ITU Radiocommunication Sector, after this conference and in time for the 2031 world radiocommunication conference* 1, to update sharing and compatibility studies for coexistence conditions and develop new studies, as appropriate, taking into account existing primary and secondary services and No. **5.15A**, and to propose technical and regulatory conditions,

encourages administrations

1 to participate actively in the studies by submitting contributions to ITU-R;

2 to consider making spectrum available for continued SAB/SAP operation, taking into account Resolution ITU-R 59;

3 to take appropriate measures for the protection of stations in the radio astronomy service (see Nos. **5.304** and **5.306**) from stations in the mobile service, in accordance with the Radio Regulations,

invites the 2031 world radiocommunication conference

to consider, based on the results of ITU-R studies:

a) possible regulatory actions, including a review of the allocation of the frequency band 614-694 MHz to the mobile service for countries listed in No. **5.15A**;

b) and then also, a possible regulatory action to protect the radio astronomy services to which the frequency band 608-614 MHz is allocated in some countries in Region 1, taking into account the outcomes of *invites the 2031 world radiocommunication conference a)* above,

further invites the ITU Radiocommunication Sector

to ensure intersectoral collaboration with the ITU Telecommunication Development Sector in the implementation of this Resolution.

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[1] ENG within Resolution ITU-R 59 represents all applications ancillary to broadcasting and programme-making, such as terrestrial electronic news gathering, electronic field production, TV outside broadcast, wireless radio microphones and radio outside production and broadcast.

Agenda item 4

MOD

RESOLUTION 241 (REV.WRC-23)

Use of the frequency band 66-71 GHz for International Mobile Telecommunications and coexistence with other applications of the mobile service

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that International Mobile Telecommunications (IMT), including IMT-2000, IMT-Advanced and IMT-2020, and other wireless access systems are intended to provide telecommunication services on a worldwide scale regardless of location and type of network or terminal;

b) that the evolution of IMT is being studied within the ITU Radiocommunication Sector (ITU-R);

c) that harmonized worldwide frequency bands and harmonized frequency arrangements are highly desirable in order to achieve global roaming and the benefits of economies of scale;

d) that adequate and timely availability of spectrum for IMT and supporting regulatory provisions are essential to realize the objectives in Recommendation ITU-R M.2083;

e) that IMT systems are envisaged to provide increased peak data rates and capacity that may require a larger bandwidth;

f) that there is a need to protect existing services and to allow for their continued development,

noting

a) Recommendation ITU-R M.2083, on the IMT Vision – framework and overall objectives of the future development of IMT for 2020 and beyond;

b) Recommendation ITU-R M.2003, on multiple gigabit wireless systems in frequencies around 60 GHz;

c) Report ITU-R M.2227, on the use of multiple gigabit wireless systems in frequencies around 60 GHz,

recognizing

Resolutions 176 (Rev. Bucharest, 2022) and 203 (Rev. Bucharest, 2022) of the Plenipotentiary Conference,

resolves

1 that administrations wishing to implement IMT make available the frequency band 66-71 GHz identified in No. **5.559AA** for use by the terrestrial component of IMT;

2 that administrations wishing to implement IMT in the frequency band 66-71 GHz, identified for IMT under the provisions in No. **5.559AA**, which also wish to implement other applications of the mobile service, including other wireless access systems in the same frequency band, consider coexistence between IMT and these applications,

invites the ITU Radiocommunication Sector

1 to develop ITU-R Recommendations and/or Reports, as appropriate, to assist administrations in ensuring the efficient use of the frequency band through coexistence mechanisms between IMT and other applications of the mobile service, including other wireless access systems, as well as between the mobile service and other services;

2 to regularly review, as appropriate, the impact of evolving technical and operational characteristics of IMT systems (including base-station density) and those of systems of space services on sharing and compatibility, and to take into account the results of these reviews in the development and/or revision of ITU-R Recommendations/Reports addressing, *inter alia*, if necessary, applicable measures to mitigate the risk of interference into space receivers,

instructs the Director of the Radiocommunication Bureau

to bring this Resolution to the attention of relevant international organizations.

MOD

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),

considering

a) that International Mobile Telecommunications (IMT), including IMT-2000, IMT-Advanced and IMT-2020, is the ITU vision of global mobile access, and is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;

b) that the evolution of IMT is being studied within the ITU Radiocommunication Sector (ITU-R);

c) that harmonized worldwide frequency bands for IMT are desirable in order to achieve global roaming and the benefits of economies of scale;

d) that IMT systems are now being evolved to support diverse usage scenarios such as enhanced mobile broadband, massive machine-type communications and ultra-reliable and low-latency communications;

e) that ultra-low latency and very high bit-rate applications of IMT will require larger contiguous blocks of spectrum than those available in frequency bands that are currently identified for use by administrations wishing to implement IMT;

f) that the properties of higher frequency bands, such as shorter wavelength, would better enable the use of advanced antenna systems, including multiple input, multiple output (MIMO) and beam-forming techniques, in supporting enhanced broadband;

g) that identification of frequency bands allocated to the mobile service for IMT may change the sharing situation regarding applications of services to which the frequency band is already allocated, and may require regulatory actions;

h) that there is a need to protect existing services and to allow for their continued development;

i) that ITU-R has studied, in preparation for WRC-19, sharing and compatibility with services allocated in the frequency band 24.25-27.5 GHz and its adjacent band, based on characteristics available at that time, and results may change if these characteristics change;

j) that it is assumed that a very limited number of IMT base stations will be communicating with a positive elevation angle towards IMT indoor mobile stations;

k) that the allocations of frequency bands to the Earth exploration-satellite service (EESS) (passive) are defined solely by the fundamental properties of the Earth and its atmosphere, and related measurements are beneficial and used globally and extensively in meteorology, climatology and other scientific purposes for the protection of human life and natural resources; and although EESS (passive) satellites and sensors are operated by few countries, they benefit of the whole international community and are hence to be protected on a worldwide basis;

l) that sharing studies were conducted considering applications in the land mobile service,

noting

a) that Recommendation ITU-R M.2083 provides the framework and overall objectives of the future development of IMT for 2020 and beyond;

b) that Recommendation ITU-R SA.2142 provides the methodologies for calculating coordination areas around EESS and space research service (SRS) earth stations to avoid harmful interference from IMT-2020 systems in the frequency bands 25.5-27 GHz and 37-38 GHz;

c) that Recommendation ITU-R M.2161 provides guidelines to assist administrations to mitigate in-band interference from FSS earth stations operating in the frequency bands 24.65-25.25 GHz, 27-27.5 GHz, 42.5-43.5 GHz and 47.2-48.2 GHz into IMT stations,

recognizing

a) that the identification of a frequency band for IMT does not establish priority in the Radio Regulations and does not preclude the use of the frequency band by any application of the services to which it is allocated;

b) Resolutions 176 (Rev. Bucharest, 2022) and 203 (Rev. Bucharest, 2022) of the Plenipotentiary Conference;

c) that Resolution **750 (Rev.WRC-19)** establishes limits on unwanted emissions in the frequency band 23.6-24 GHz from IMT base stations and IMT mobile stations within the frequency band 24.25-27.5 GHz;

d) that the spurious emission limits of Recommendation ITU-R SM.329 Category B (−60 dB(W/MHz)) are sufficient to protect the EESS (passive) in the frequency bands 50.2-50.4 GHz and 52.6-54.25 GHz from the second harmonic of IMT base station emissions in the frequency band 24.25-27.5 GHz;

e) that ITU-R has conducted sharing studies between IMT and the inter-satellite service (ISS)/fixed-satellite service (FSS) (Earth-to-space) in the frequency band 24.25-27.5 GHz based on a number of baseline assumptions, (e.g. equivalent isotropically radiated power (e.i.r.p.) of 18 dB(W/200 MHz), base station densities of 1 200 per 10 000 km^2 and other deployment scenarios), as well as sensitivity analysis for some of them, and these baseline assumptions, as well as other assumptions, influence the sharing study results;

f) that the frequency bands immediately below the passive frequency band 23.6-24 GHz are not intended to be used for high-density mobile applications,

resolves

1 that administrations wishing to implement IMT consider use of the frequency band 24.25-27.5 GHz identified for IMT in No. **5.532AB**, and the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT, taking into account the latest relevant ITU-R Recommendations;

2 that administrations shall apply the following conditions for the frequency band 24.25-27.5 GHz:

2.1 take practical measures to ensure the transmitting antennas of outdoor base stations are normally pointing below the horizon, when deploying IMT base stations within the frequency band 24.25-27.5 GHz; the mechanical pointing needs to be at or below the horizon;

2.2 as far as practicable, sites for IMT base stations within the frequency band 24.45-27.5 GHz employing values of e.i.r.p. per beam exceeding 30 dB(W/200 MHz) should be selected so that the direction of maximum radiation of any antenna will be separated from the geostationary-satellite orbit, within line-of-sight of the IMT base station, by ±7.5 degrees;

3 that protection of EESS/SRS earth stations in the frequency band 25.5-27 GHz and radio astronomy service (RAS) stations in the frequency band 23.6-24 GHz and coexistence between FSS earth stations in the frequency bands 24.65-25.25 GHz and 27-27.5 GHz and IMT stations should be facilitated through bilateral agreements for cross-border coordination as necessary;

4 that the operation of IMT within the frequency band 24.25-27.5 GHz shall protect existing and future EESS (passive) systems in the frequency band 23.6-24 GHz;

5 that IMT stations within the frequency range 24.25-27.5 GHz are used for applications of the land mobile service,

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;

3 to apply the spurious emission limits of Recommendation ITU-R SM.329 Category B for the frequency bands 50.2-50.4 GHz and 52.6-54.25 GHz when making the frequency band 24.25-27.5 GHz available for IMT;

4 that for the future development of EESS (passive) in the frequency band 23.6-24 GHz, administrations should consider additional mitigation techniques (e.g. guardbands) beyond the limits specified in Resolution **750 (Rev.WRC-19)**, as appropriate,

invites the ITU Radiocommunication Sector

1 to update existing ITU-R Recommendations or develop a new ITU-R Recommendation, as appropriate, to provide information and assistance to the concerned administrations on possible coordination and protection measures for the RAS in the frequency band 23.6-24 GHz from IMT deployment;

2 to regularly review, as appropriate, the impact of evolving technical and operational characteristics of IMT systems (including base-station density) and those of systems of space services on sharing and compatibility, and to take into account the results of these reviews in the development and/or revision of ITU-R Recommendations/Reports addressing, *inter alia*, if necessary, applicable measures to mitigate the risk of interference into space receivers,

instructs the Director of the Radiocommunication Bureau

to bring this Resolution to the attention of relevant international organizations.

MOD

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),

considering

a) that International Mobile Telecommunications (IMT), including IMT-2000, IMT-Advanced and IMT-2020, is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;

b) that adequate and timely availability of spectrum and supporting regulatory provisions are essential to realize the objectives in Recommendation ITU-R M.2083;

c) that there is a need to continually take advantage of technological developments in order to increase the efficient use of spectrum and facilitate spectrum access;

d) that IMT systems are now being evolved to provide diverse usage scenarios and applications such as enhanced mobile broadband, massive machine-type communications and ultra-reliable and low-latency communications;

e) that ultra-low latency and very high bit-rate applications of IMT will require larger contiguous blocks of spectrum than those available in frequency bands that are currently identified for use by administrations wishing to implement IMT;

f) that the properties of higher frequency bands, such as shorter wavelength, would better enable the use of advanced antenna systems, including multiple-input and multiple-output (MIMO) and beam-forming techniques, in supporting enhanced broadband;

g) that harmonized worldwide frequency bands for IMT are desirable in order to achieve global roaming and the benefits of economies of scale;

h) that the ITU Radiocommunication Sector (ITU-R) has studied, in preparation for WRC-19, sharing and compatibility with services allocated in the frequency ranges 37-43.5 GHz and 47.2-48.2 GHz and their adjacent frequency bands, based on the characteristics available at that time, and the results may change if these characteristics change;

i) that identification of frequency bands allocated to the mobile service for IMT may change the sharing situation regarding applications of services to which the frequency band is already allocated, and may require regulatory actions;

j) that there is a need to protect existing services and to allow for their continued development;

k) that it is assumed that a very limited number of IMT base stations will be communicating with a positive elevation angle towards IMT indoor mobile stations;

l) that the use of this frequency band by the mobile service for IMT is intended for land mobile service use and sharing studies were conducted based on that assumption,

noting

a) that Recommendation ITU-R M.2083 provides the framework and overall objectives of the future development of IMT for 2020 and beyond;

b) that Report ITU-R M.2320 addresses future technology trends of terrestrial IMT systems;

c) that Report ITU-R M.2370 addresses trends impacting future IMT traffic growth beyond the year 2020 and estimates global traffic demand for the period 2020 to 2030;

d) that Resolution **143 (Rev.WRC-19)** establishes the guidelines for the implementation of high-density applications in the fixed-satellite service (HDFSS) in frequency bands identified for these applications;

e) that Recommendation ITU-R SA.2142 addresses the methodologies for calculating coordination areas around Earth exploration-satellite service (EESS) and space research service (SRS) earth stations to avoid harmful interference from IMT-2020 systems in the frequency bands 25.5-27 GHz and 37-38 GHz;

f) that Recommendation ITU-R M.2161 provides guidelines to assist administrations to mitigate in-band interference from FSS earth stations operating in the frequency bands 24.65-25.25 GHz, 27-27.5 GHz, 42.5-43.5 GHz and 47.2-48.2 GHz into IMT stations,

recognizing

a) that timely availability of wide and contiguous blocks of spectrum is important to support the development of IMT;

b) Resolutions 176 (Rev. Bucharest, 2022) and 203 (Rev. Bucharest, 2022) of the Plenipotentiary Conference;

c) the identification of HDFSS in the space-to-Earth direction in the frequency bands 39.5-40 GHz in Region 1, 40-40.5 GHz in all Regions, 40.5-42 GHz in Region 2 and 47.5-47.9 GHz in Region 1 (see No. **5.516B**);

d) that No. **5.149** applies for the purpose of protecting the radio astronomy service (RAS) in the frequency band 42.5-43.5 GHz, which is allocated on a primary basis;

e) that the frequency band 47.2-48.2 GHz is allocated to the fixed, mobile and fixed-satellite services, including planned non-geostationary-satellite (non-GSO) uplinks,

resolves

1 that administrations wishing to implement IMT consider use of the frequency band 37-43.5 GHz, or portions thereof, and the frequency band 47.2-48.2 GHz, identified for IMT in No. **5.550B** and No. **5.553B**, and the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT taking into account the latest relevant ITU-R Recommendations;

2 that, in order to ensure coexistence between IMT in the frequency bands 37-43.5 GHz and 47.2-48.2 GHz as identified by the World Radiocommunication Conference (Sharm el-Sheikh, 2019) in Article **5** and other services to which the frequency band is allocated, including the protection of these other services, administrations shall apply the following condition(s):

2.1 in order to protect the EESS (passive) in the frequency band 36-37 GHz, the following unwanted emissions of IMT stations operating in the frequency band 37-40.5 GHz apply as specified in Table 1 below:

TABLE 1

Frequency band for the EESS (passive)	Frequency band for IMT stations	Unwanted emission mean power for IMT stations[1]	Recommended limits for IMT stations[1]
36-37 GHz	37-40.5 GHz	−43 dB(W/MHz) and −23 dB(W/GHz) within the frequency band 36-37 GHz	−30 dB(W/GHz)

[1] The unwanted emission power level is considered in terms of total radiated power (TRP). The TRP is to be understood here as the integral of the power transmitted from all antenna elements in different directions over the entire radiation sphere.

2.2 protection of SRS earth stations in the frequency band 37-38 GHz and RAS stations in the frequency band 42.5-43.5 GHz from IMT stations should be facilitated through bilateral agreements for cross-border coordination as necessary;

2.3 protection of and coexistence with fixed-satellite service (FSS) earth stations within the frequency ranges 37.5-43.5 GHz and 47.2-48.2 GHz should be facilitated through bilateral agreements for cross-border coordination as necessary;

2.4 take practical measures to ensure the transmitting antennas of outdoor base stations are normally pointing below the horizon, when deploying IMT base stations within the frequency bands 42.5-43.5 GHz and 47.2-48.2 GHz; the mechanical pointing needs to be at or below the horizon;

2.5 as far as practicable, sites for IMT base stations in the frequency bands 42.5-43.5 GHz and 47.2-48.2 GHz employing values of equivalent isotropically radiated power (e.i.r.p.) per beam exceeding 30 dB(W/200 MHz) should be selected so that the direction of maximum radiation of any antenna will be separated from the geostationary-satellite orbit, within line-of-sight of the IMT base station, by ±7.5 degrees;

3 that IMT stations within the frequency ranges 37-43.5 GHz and 47.2-48.2 GHz are used for applications of the land mobile service,

invites administrations

to ensure that, when considering the spectrum to be used for IMT, due attention is paid to the need for spectrum for ubiquitous earth stations at unspecified points, as well as those used for gateways, taking into account spectrum identified in the frequency bands 39.5-40 GHz in Region 1, 40-40.5 GHz in all Regions, 40.5-42 GHz in Region 2 and 47.5-47.9 GHz in Region 1 for the HDFSS as per No. **5.516B**,

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,

encourages administrations of Region 1

to consider implementing IMT in the frequency band 40.5-43.5 GHz in order to better accommodate the needs of other services below 40.5 GHz, taking into account protection of the FSS within the frequency band 37.5-40.5 GHz in Region 1,

invites the ITU Radiocommunication Sector

1 to continue providing guidance to ensure that IMT can meet the telecommunication needs of the developing countries;

2 to develop ITU-R Reports and Recommendations, as appropriate, to assist administrations in ensuring coexistence between IMT and BSS and FSS, including HDFSS as per No. **5.516B**, within the frequency ranges 37-43.5 GHz and 47.2-48.2 GHz, as appropriate;

3 to develop a new ITU-R Recommendation, as appropriate, to provide information and assistance to the concerned administrations on possible coordination and protection measures for the RAS in the frequency band 42.5-43.5 GHz from IMT deployment;

4 to regularly review, as appropriate, the impact of evolving technical and operational characteristics of IMT systems (including base-station density) and those of systems of space services on sharing and compatibility, and to take into account the results of these reviews in the development and/or revision of ITU-R Recommendations/Reports addressing, *inter alia*, if necessary, applicable measures to mitigate the risk of interference into space receivers,

instructs the Director of the Radiocommunication Bureau

to bring this Resolution to the attention of relevant international organizations.

MOD

RESOLUTION 244 (REV.WRC-23)

International Mobile Telecommunications in the frequency band 45.5-47 GHz

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that International Mobile Telecommunications (IMT), including IMT-2000, IMT-Advanced and IMT-2020, is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;

b) that the evolution of IMT is being studied within the ITU Radiocommunication Sector (ITU-R);

c) that adequate and timely availability of spectrum and supporting regulatory provisions are essential to realize the objectives in Recommendation ITU-R M.2083;

d) that there is a need to continually take advantage of technological developments in order to increase the efficient use of spectrum and facilitate spectrum access;

e) that IMT systems are now being evolved to provide diverse usage scenarios and applications such as enhanced mobile broadband, massive machine-type communications and ultra-reliable and low-latency communications;

f) that ultra-low latency and very high bit-rate applications of IMT will require larger contiguous blocks of spectrum than those available in frequency bands that are currently identified for use by administrations wishing to implement IMT;

g) that the properties of higher frequency bands, such as shorter wavelength, would better enable the use of advanced antenna systems, including multiple-input and multiple-output (MIMO) and beam-forming techniques, in supporting enhanced broadband;

h) that harmonized worldwide frequency bands for IMT are desirable in order to achieve global roaming and the benefits of economies of scale,

noting

that Recommendation ITU-R M.2083 provides the framework and overall objectives of the future development of IMT for 2020 and beyond,

recognizing

that the identification of a frequency band for IMT does not establish priority in the Radio Regulations and does not preclude the use of the frequency band by any application of the services to which it is allocated,

resolves

that administrations wishing to implement IMT consider use of the frequency band 45.5-47 GHz, identified for IMT in No. **5.553A**, and the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT taking into account the latest relevant ITU-R Recommendations,

invites the ITU Radiocommunication Sector

to continue providing guidance to ensure that IMT can meet the telecommunication needs of the developing countries in the context of the studies referred to above.

Agenda item 10

MOD

RESOLUTION 249 (REV.WRC-23)

Study of technical and operational issues and regulatory provisions for space-to-space transmissions in the frequency bands 1 518-1 544 MHz, 1 545-1 559 MHz, 1 610-1 645.5 MHz, 1 646.5-1 660 MHz, 1 670-1 675 MHz and 2 483.5-2 500 MHz

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that many non-geostationary-satellite orbit (non-GSO) satellites operate with limited and non-real-time connectivity to earth stations;

b) that, by utilizing space-to-space communication between such non-GSO satellites and mobile-satellite service (MSS) satellites operating at higher orbital altitudes, including in the geostationary-satellite orbit (GSO), to relay data to or from the ground, data can be made available in near-real time, enhancing the availability and value of instrument data for low latency applications;

c) that all MSS allocations in the frequency bands 1 518.0-1 544.0 MHz, 1 545.0-1 559.0 MHz, 1 610.0-1 645.5 MHz, 1 646.5-1 660.0 MHz, 1 670.0-1 675.0 MHz and 2 483.5-2 500.0 MHz include a space-to-Earth or Earth-to-space direction indicator but do not include a space-to-space direction indicator;

d) that the ITU Radiocommunication Sector (ITU-R) has begun preliminary studies on the technical and operational issues associated with the operation of space-to-space links between non-GSO MSS satellites and GSO MSS satellites in some of the above frequency bands, but no studies have been conducted on the technical and operational issues associated with the operation of space-to-space links between non-GSO MSS satellites and non-GSO MSS satellites in the above frequency bands to determine whether space-to-space operations are compatible;

e) that it is technically feasible for a lower orbital altitude non-GSO space station to transmit data to and receive data from a higher orbital altitude non-GSO or GSO space station when passing within the satellite antenna coverage beam that is directed towards the Earth;

f) that several satellite systems operate space-to-space transmissions in some of the above frequency bands under No. **4.4**, without defined regulatory protection mechanisms, subject to the application of No. **8.5**;

g) that there is growing interest for utilizing space-to-space satellite links for a variety of applications;

h) that a precedent for space-to-space links sharing with Earth-to-space links or space-to-Earth links exists for other space services, for example, the space operation, Earth exploration-satellite, and space research services in the frequency bands 2 025-2 110 MHz and 2 200-2 290 MHz through the inclusion of a space-to-space direction indicator,

recognizing

a) that it is necessary to study the impact on, and to protect, other services, including Earth-to-space and space-to-Earth operation within the MSS, from the operation of space-to-space links in the above frequency bands, taking into account applicable footnotes to the Table of Frequency Allocations, to ensure compatibility with all primary allocated services in these frequency bands and the adjacent frequency bands and avoid harmful interference;

b) that there should be no additional regulatory or technical constraints imposed on primary services to which the frequency bands and adjacent frequency bands are currently allocated;

c) that it is necessary to study whether space-to-Earth direction transmissions from space stations at higher orbital altitudes, including GSO, can be successfully received by lower orbital altitude non-GSO satellites, without imposing any additional constraints on all allocated services in these frequency bands;

d) that the sharing scenarios may vary widely because of the wide variety of orbital characteristics of the non-GSO MSS space stations;

e) that out-of-band emissions, signals due to antenna pattern sidelobes, and in-band unintentional radiation due to Doppler shifts may impact services operating in the same and adjacent or nearby frequency bands,

recognizing further

a) that the use of frequency bands by the MSS in the frequency range 1-3 GHz is subject to existing Resolutions, coordination requirements and country footnotes taking into account, in particular, the protection of safety services and aeronautical mobile-satellite (R) services, and of the Global Maritime Distress and Safety System (GMDSS);

b) that the fixed and mobile services are allocated on a primary basis in the frequency bands 2 483.5-2 500 MHz on a global basis and that the fixed service is also allocated on a primary basis in the frequency band 1 525-1 530 MHz in Regions 1 and 3;

c) that the radionavigation-satellite service is allocated on a primary basis in the frequency band 1 559-1 610 MHz for both space-to-Earth and space-to-space use;

d) that No. **5.356** states that the use of the frequency band 1 544-1 545 MHz by the MSS (space-to-Earth) is limited to distress and safety communications (see Article **31**);

e) that Nos. **5.357A** and **5.362A** provide priority for accommodating the spectrum requirements of the aeronautical mobile-satellite (R) service in the frequency bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz, and 1 555-1 559 MHz and 1 656.5-1 660.5 MHz, respectively;

f) that No. **5.353A** provides priority for distress, urgency and safety communications of the GMDSS in the frequency bands 1 530-1 544 MHz and 1 626.5-1 645.5 MHz;

g) that the radio astronomy service is allocated on a primary basis in the frequency bands 1 610.6-1 613.8 MHz and 1 660-1 670 MHz, and No. **5.149** applies;

h) that according to No. **5.366** the frequency band 1 610-1 626.5 MHz is reserved on a worldwide basis for the use and development of airborne electronic aids to air navigation and any directly associated ground-based or satellite-borne facilities, and such satellite use is subject to agreement obtained under No. **9.21**;

i) that, according to No. **5.368**, the provisions of No. **4.10** do not apply with respect to the radiodetermination-satellite and mobile-satellite services in the frequency band 1 610-1 626.5 MHz; however, No. **4.10** applies in the frequency band 1 610-1 626.5 MHz with respect to the aeronautical radionavigation-satellite service when operating in accordance with No. **5.366**, the aeronautical mobile satellite (R) service when operating in accordance with No. **5.367**, and in the frequency band 1 621.35-1 626.5 MHz with respect to the maritime mobile-satellite service when used for GMDSS;

j) that according to No. **5.343** in Region 2, the frequency band 1 435-1 525 MHz is used by the aeronautical mobile service for telemetry;

k) that, in the frequency band 1 518-1 525 MHz, Nos. **5.348**, **5.348A** and **5.348B** provide that the MSS shall not claim protection from the fixed service, stations in the mobile service in the territory of Japan, and aeronautical mobile telemetry stations in the mobile service in the territory of the United States;

l) that Resolution **744 (Rev.WRC-23)** applies to use of the frequency band 1 670-1 675 MHz by the mobile-satellite service;

m) that the meteorological aids and meteorological-satellite (space-to-Earth) services are allocated on a primary basis in the frequency band 1 670-1 675 MHz,

noting

that section 3.1.3.2 of the Director's Report to WRC-19 highlighted that the Radiocommunication Bureau has received an increased number of Advance Publication Information (API) submissions for non-GSO networks in frequency bands which are not allocated by Article **5** for the type of service foreseen, including satellite network filings for inter-satellite links in frequency bands allocated to MSS only in the Earth-to-space or space-to-Earth directions,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

1 studies of the technical and operational characteristics of different types of non-GSO space stations that operate or plan to operate space-to-space links with GSO networks in the following frequency bands, with the limitation that these space-to-space links only operate in the same direction as the existing MSS allocations:

a) Earth-to-space direction in the frequency bands 1 626.5-1 645.5 MHz and 1 646.5-1 660 MHz; and

b) space-to-Earth direction in the frequency bands 1 525-1 544 MHz and 1 545-1 559 MHz;

2 studies of the technical and operational characteristics of different types of non-GSO space stations that operate or plan to operate space-to-space links with non-GSO systems or GSO networks in the following frequency bands, with the limitation that these space-to-space links only operate in the same direction as the existing MSS allocations:

a) Earth-to-space direction in the frequency bands 1 610-1 626.5 MHz and 1 670-1 675 MHz; and

b) space-to-Earth direction in the frequency bands 1 518-1 525 MHz, 1 613.8-1 626.5 MHz and 2 483.5-2 500 MHz;

3 studies of sharing and compatibility between space-to-space links in the cases described in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* 1 and 2 and

– current and planned stations of the MSS, taking into account, in particular, *recognizing further e)* and *f)*;

– other existing primary services allocated in the same frequency bands;

– other existing primary services allocated in adjacent frequency bands; and

– existing passive services allocated in adjacent frequency bands;

in order to ensure protection of other MSS operations and other services allocated in those frequency bands and in adjacent frequency bands, taking into account *recognizing further a)* to *m)*;

4 development of technical conditions and regulatory provisions for the operation of space-to-space links in these frequency bands, including MSS (space-to-space) allocations or the addition of inter-satellite service (ISS) allocations, in all or parts of the frequency bands identified in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* 1 and 2 above, with the condition that stations operating in an MSS (space-to-space) or ISS allocation shall not cause harmful interference to, or claim protection from, the MSS (space-to-Earth) or MSS (Earth-to-space), while ensuring the protection of other services allocated in those and adjacent frequency bands, taking into account the results of the studies called for in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* 1, 2, and 3 above,

invites administrations

to participate in the studies by submitting contributions to ITU-R,

invites the 2027 world radiocommunication conference

to consider the results of the above studies and take necessary regulatory actions, as appropriate.

MOD

RESOLUTION 251 (REV.WRC-23)

Studies to consider a possible primary allocation in the frequency bands [694-960 MHz, or parts thereof, in Region 1], 890-942 MHz, or parts thereof, in Region 2, and [3 400-3 700 MHz, or parts thereof, in Region 3] to the aeronautical mobile service for the use of International Mobile Telecommunications (IMT) user equipment in terrestrial IMT networks by non-safety applications*

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that there is a demand for greater connectivity for passengers and aeronautical communications of aeronautical vehicles;

b) that current and future International Mobile Telecommunications (IMT) networks can provide connectivity services to helicopters, small aircraft, commercial aircraft and unmanned aircraft systems (UAS);

c) that current and future IMT networks may provide communication functions for the beyond visual line-of-sight operation of UAS;

d) that future IMT networks may provide connectivity services to commercial airplanes with specific equipment on board airplanes;

e) that the IMT network capacities identified in the *considering* paragraphs above have been considered by several studies and are being developed by standards development organizations,

noting

a) that ITU Radiocommunication Sector (ITU-R) 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;

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* The appearance of square brackets around certain frequency bands in this Resolution is understood to mean that WRC-27 will consider and review the inclusion of these frequency bands with square brackets and decide, as appropriate.

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-23)** 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;

i) that the frequency bands under consideration are identified for use by IMT in accordance with No. **5.317A**;

i)bis that, for countries listed in No. **5.318**, the frequency bands 849-851 MHz and 894-896 MHz are also allocated to the aeronautical mobile service (AMS) on a primary basis, for public correspondence with aircraft; the use of the frequency band 894-896 MHz is limited to transmissions from aircraft stations;

i)ter that, for one country listed in No. **5.325**, the frequency bands 890-902 MHz and 928-942 MHz are allocated to the radiolocation service on a primary basis;

j) that the frequency band 3 500-3 600 MHz is identified for use by IMT in some countries in accordance with No. **5.433A**;

k) that the frequency bands 3 400-3 500 MHz, 3 500-3 600 MHz and 3 600-3 700 MHz are also allocated to the fixed, fixed-satellite (space-to-Earth) and mobile, except aeronautical mobile, services on a primary basis and that those allocations are used by a variety of incumbent systems in many administrations;

l) that, under Nos. **5.432** and **5.432B**, the frequency band 3 400-3 500 MHz is allocated on a primary basis to the mobile, except aeronautical mobile, service and identified for use by IMT in some countries in Region 3;

m) that Report ITU-R M.2282 addresses systems for public mobile communications with aircraft,

recognizing

that new primary allocations to the AMS in the frequency bands proposed may enable the unified use of these allocations by airborne user equipment in terrestrial IMT networks throughout the Regions,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference

1 assessment of relevant AMS scenarios for connectivity for airborne user equipment in IMT networks to be addressed in compatibility and sharing studies;

2 identification of the relevant technical parameters associated with the aeronautical mobile systems to be used for studies;

3 sharing and compatibility studies with existing incumbent services, including in-band and adjacent frequency bands and between neighbouring Regions, to determine the suitability of new primary allocations of the following frequency bands to the AMS, in the countries for which there is an IMT identification, for the use of IMT user equipment by non-safety applications:

– [694-960 MHz, or parts thereof, in Region 1];

– 890-942 MHz, or parts thereof, in Region 2;

– [3 400-3 700 MHz, or parts thereof, in Region 3],

invites administrations

to participate actively in the studies and provide the information required for the studies listed under *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference* by submitting contributions to ITU-R,

invites the 2031 world radiocommunication conference

to consider, based on results of studies, possible allocations on a primary basis of all or part of the frequency bands listed in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference* 3 to the AMS, in the countries for which there is an IMT identification, for the use of IMT user equipment in terrestrial IMT networks by non-safety applications, and/or any other regulatory provisions.

Agenda item 1.11

MOD

RESOLUTION 349 (REV.WRC-23)

Operational procedures for cancelling false distress alerts in the Global Maritime Distress and Safety System

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the 1974 International Convention for the Safety of Life at Sea (SOLAS), as amended, prescribes that ships subject to that Convention shall be fitted with Global Maritime Distress and Safety System (GMDSS) equipment as appropriate;

b) that non-SOLAS vessels are also being equipped with GMDSS equipment;

c) that the transmission and relay of false distress alerts is a significant problem within the GMDSS,

noting

that the International Maritime Organization (IMO) refers to this operational procedure for cancelling false distress alerts in its documentation,

resolves

1 to urge administrations to take all necessary measures to avoid false distress alerts and to minimize the unnecessary burden on rescue organizations which occurs;

2 to urge administrations to encourage the correct use of GMDSS equipment, with particular attention to appropriate training;

3 to urge administrations to implement the operational procedures contained in the Annex to this Resolution;

4 that administrations should take any consequential appropriate action in this respect,

instructs the Secretary-General

to bring this Resolution to the attention of IMO.

ANNEX TO RESOLUTION 349 (REV.WRC-23)

Cancelling of false distress alerts

If a distress alert is inadvertently transmitted, the following steps shall be taken to cancel the distress alert.

1 VHF digital selective calling

1) Follow the instructions on the radio screen, if applicable, or

   Switch off and switch on after 10 seconds, and follow the instructions on the radio screen, if applicable;

2) If the DSC equipment is capable of cancellation, start the distress self-cancel operation in accordance with the most recent version of Recommendation ITU-R M.493;

3) Set to channel 16; and

4) Transmit a broadcast message to “All Stations” giving the ship’s name, call sign and maritime mobile service identity (MMSI), and cancel the false distress alert.

   Example of message:

   – the words “ALL STATIONS”, spoken three times;
   – the words “THIS IS”;
   – the name of the vessel, spoken three times;
   – the call sign or other identification;
   – the MMSI;
   – the words “PLEASE CANCEL MY DISTRESS ALERT OF” followed by the time in UTC.

2 MF digital selective calling

1) Follow the instructions on the radio screen, if applicable, or

   Switch off and switch on after 10 seconds, and follow the instructions on the radio screen, if applicable;

2) If the DSC equipment is capable of cancellation, start the distress self-cancel operation in accordance with the most recent version of Recommendation ITU-R M.493;

3) Tune for radiotelephony transmission on 2 182 kHz; and

4) Transmit a broadcast message to “All Stations” giving the ship’s name, call sign and MMSI, and cancel the false alert;

   For example of message see section 1.

3 HF digital selective calling

1) Follow the instructions on the radio screen, if applicable, or

   Switch off and switch on after 10 seconds, and follow the instructions on the radio screen, if applicable;

2) If the DSC equipment is capable of cancellation, start the distress self-cancel operation in accordance with the most recent version of Recommendation ITU-R M.493;

3) Tune for radiotelephony on the distress and safety frequency in each frequency band in which a false distress alert was transmitted (see Appendix **15**); and

4) Transmit a broadcast message to “All Stations” giving the ship’s name, call sign and MMSI, and cancel the false alert on the distress and safety frequency in each frequency band in which the false distress alert was transmitted;

   For example of message see section 1.

4 Ship earth station

Notify the appropriate rescue coordination centre that the alert is cancelled by sending a distress priority message. Provide ship name, call sign and ship earth station identity with the cancelled alert message.

Example of message by telegraphy:

– NAME, CALL SIGN, IDENTITY NUMBER, POSITION;

– Cancel my distress;

– Alert of DATE, TIME UTC;

– =Master+

Example of message by radiotelephony:

– the words “ALL STATIONS”, spoken three times;

– the words “THIS IS”;

– the name of the vessel, spoken three times;

– the call sign or other identification;

– the identity number/MMSI;

– the words “PLEASE CANCEL MY DISTRESS ALERT OF” followed by the time in UTC.

5 Satellite emergency position indicating radiobeacon (EPIRB)

If for any reason an EPIRB is activated inadvertently or accidentally, immediately stop the inadvertent transmission and contact the appropriate rescue coordination centre through a coast station or land earth station and cancel the distress alert.

6 General

Notwithstanding the above, ships may use additional appropriate means available to them to inform the appropriate authorities that a false distress alert has been transmitted and should be cancelled.

No action will normally be taken against any ship or mariner for reporting and cancelling a false distress alert. However, in view of the serious consequences of false alerts, and the strict ban on their transmission, authorities may take actions in cases of repeated violation.

MOD

RESOLUTION 354 (REV.WRC-23)

Distress and safety radiotelephony procedures for 2 182 kHz

The World Radiocommunication Conference (Dubai, 2023),

noting

a) that all ships subject to the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, are required to be fitted for the Global Maritime Distress and Safety System (GMDSS);

b) that some vessels not subject to SOLAS, 1974, as amended, may not be making use of the techniques and frequencies of GMDSS prescribed in Chapter **VII** and may wish to continue using radiotelephony procedures for distress and safety communications on 2 182 kHz until such time as they are able to participate in the GMDSS;

c) that some administrations may have a need to maintain shore-based radiotelephony distress and safety services on 2 182 kHz so that vessels not subject to SOLAS, 1974, as amended, and not yet using the techniques and frequencies of GMDSS will be able to obtain assistance from these services until such time as they are able to participate in GMDSS,

considering

that there needs to be some recognized guidance for the use of radiotelephony on 2 182 kHz for distress and safety communications,

resolves

1 that ships, when in distress or when engaged in urgency or safety-related communications on 2 182 kHz, use the radiotelephony procedures contained in the Annex to this Resolution;

2 that coast stations, in order to maintain communication with non-GMDSS ships that are in distress or engaged in urgency or safety related communications on 2 182 kHz, use the radiotelephony procedures contained in the Annex to this Resolution.

ANNEX TO RESOLUTION 354 (REV.WRC-23)

Distress and safety radiotelephony procedures for 2 182 kHz*

PART A1 − GENERAL

§ 1 The frequencies and techniques specified in this Resolution may be used in the maritime mobile service for stations[1] not required by national or international regulation to fit GMDSS equipment and for communications between those stations and aircraft. However, stations of the maritime mobile service, when additionally fitted with any of the equipment used by stations operating in conformity with the provisions specified in Chapter **VII**, should, when using that equipment, comply with the appropriate provisions of that Chapter.

§ 2 1) No provision of this Resolution prevents the use by a mobile station or mobile earth station in distress of any means at its disposal to attract attention, make known its position, and obtain help.

2) No provision of this Resolution prevents the use by stations on board aircraft or ships engaged in search and rescue operations, in exceptional circumstances, of any means at their disposal to assist a mobile station or mobile earth station in distress.

3) No provision of this Resolution prevents the use by a land station or coast earth station, in exceptional circumstances, of any means at its disposal to assist a mobile station or mobile earth station in distress (see also No. **4.16**).

§ 3 In cases of distress, urgency or safety, communications by radiotelephony should be made slowly and distinctly, each word being clearly pronounced to facilitate transcription.

§ 4 The abbreviations and signals of Recommendation ITU-R M.1172 and the Phonetic Alphabet and Figure Code in Appendix **14** should be used where applicable[2].

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* Distress and safety communications include distress, urgency and safety calls and messages.

[1] These stations may include rescue coordination centres. The term “Rescue Coordination Centre” as defined in the International Convention on Maritime Search and Rescue (1979) refers to a unit responsible for promoting the efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region.

[2] The use of the Standard Marine Communication Phrases (SMCP) and, where language difficulties exist, the International Code of Signals, both published by the International Maritime Organization, is also recommended. It should be noted that the pronunciations for figures in Appendix **14** and IMO SMCP are different. (WRC-23)

§ 5 Distress, urgency and safety communications may also be made using digital selective calling and satellite techniques, in accordance with the provisions specified in Chapter **VII** and relevant ITU-R Recommendations. (WRC-23)

§ 6 Mobile stations[3] of the maritime mobile service may communicate for safety purposes with stations of the aeronautical mobile service. Such communications shall normally be made on the frequencies authorized, and under the conditions specified, in Section I of Part A2 (see also § 2 1)).

§ 7 Mobile stations of the aeronautical mobile service may communicate for distress and safety purposes with stations of the maritime mobile service in conformity with the provisions of this Resolution.

§ 8 Any aircraft required by national or international regulations to communicate for distress, urgency or safety purposes with stations of the maritime mobile service shall be capable of transmitting and receiving class J3E emissions when using the carrier frequency 2 182 kHz or the carrier frequency 4 125 kHz.

PART A2 − FREQUENCIES FOR DISTRESS AND SAFETY

Section I − Availability of frequencies

A − 2 182 kHz

§ 1 1) The carrier frequency 2 182 kHz is an international distress frequency for radiotelephony; it may be used by ship, aircraft and survival craft stations when requesting assistance from the maritime services. It is used for distress calls and distress traffic, for the urgency signal and urgency messages and for the safety signal. Safety messages should be transmitted, when practicable, on a working frequency, after a preliminary announcement on 2 182 kHz. The class of emission to be used for radiotelephony on the frequency 2 182 kHz shall be J3E. Distress traffic on 2 182 kHz following the reception of a distress call using digital selective calling should take into account that some shipping in the vicinity may not be able to receive this traffic.

2) If a distress message on the carrier frequency 2 182 kHz has not been acknowledged, the distress call and message may be transmitted again on a carrier frequency of 4 125 kHz or 6 215 kHz, as appropriate.

3) However, ship stations and aircraft which cannot transmit either on the carrier frequency 2 182 kHz or on the carrier frequencies 4 125 kHz or 6 215 kHz may use any other available frequency on which attention might be attracted.

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[3] Mobile stations communicating with the stations of the aeronautical mobile (R) service in bands allocated to the aeronautical mobile (R) service shall conform to the provisions of the Regulations which relate to that service and, as appropriate, any special arrangements between the governments concerned by which the aeronautical mobile (R) service is regulated.

4) Coast stations using the carrier frequency 2 182 kHz for distress purposes and to send navigational warnings may transmit an audible alarm signal[4] of short duration for the purpose of attracting attention to the message which follows.

B − 4 125 kHz

§ 2 1) The carrier frequency 4 125 kHz is used to supplement the carrier frequency 2 182 kHz for distress and safety purposes and for call and reply. This frequency is also used for distress and safety traffic by radiotelephony.

2) The carrier frequency 4 125 kHz may be used by aircraft to communicate with stations of the maritime mobile service for distress and safety purposes, including search and rescue.

C − 6 215 kHz

§ 3 The carrier frequency 6 215 kHz is used to supplement the carrier frequency 2 182 kHz for distress and safety purposes and for call and reply. This frequency is also used for distress and safety traffic by radiotelephony.

Section II − Protection of distress and safety frequencies

A − General

§ 4 Test transmissions on any of the distress and safety frequencies described above shall be kept to a minimum and, wherever practicable, be carried out on artificial antennas or with reduced power.

§ 5 Before transmitting on any of the frequencies identified for distress and safety communications, a station shall listen on the frequency concerned to make sure that no distress transmission is being sent (see Recommendation ITU-R M.1171). This does not apply to stations in distress.

B − 2 182 kHz

§ 6 1) Except for transmissions authorized on the carrier frequency 2 182 kHz and on the frequencies 2 174.5 kHz, 2 177 kHz, 2 187.5 kHz and 2 189.5 kHz, all transmissions on the frequencies between 2 173.5 kHz and 2 190.5 kHz are forbidden (see also No. **5.110** for 2 174.5 kHz, Nos. **52.130** to **52.136** for 2 177 kHz and 2 189.5 kHz and Appendix **15** for 2 182 kHz and 2 187.5 kHz).

2) To facilitate the reception of distress calls, all transmissions on 2 182 kHz should be kept to a minimum.

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[4] Alarm signals may consist of transmissions of sinusoidal audio frequency tones 1 300 Hz, 2 200 Hz, or both. Different tone generation patterns may be used to signal the type of message which follows, and an alarm signal ending in a 10-second continuous tone could be used to identify a transmission by a coast station.

Section III − Watch on distress frequencies

A − 2 182 kHz

§ 7 1) Coast stations may maintain a watch on the carrier frequency 2 182 kHz if so directed by their Administration. Such assignments should be indicated in the List of Coast Stations and Special Service Stations.

2) Ship stations not fitted with equipment compatible with the GMDSS are encouraged to keep the maximum watch practicable on the carrier frequency 2 182 kHz.

B − 4 125 kHz, 6 215 kHz

§ 8 Coast stations may maintain additional watch, as permitted, on the carrier frequencies 4 125 kHz and 6 215 kHz. Such assignments should be indicated in the List of Coast Stations and Special Service Stations.

PART A3 − DISTRESS COMMUNICATIONS

Section I − General

§ 1 The general provisions for distress communications are found in Section I of Article **32** (see Nos. **32.1**, **32.3**, and **32.4**).

Section II − Distress signal, call and message

§ 2 The radiotelephone distress signal, call and message are described in Section II of Article **32** (see Nos. **32.13BA**, **32.9**, **32.13B**, **32.13C**, and **32.13D**).

Section III − Procedures

§ 3 After the transmission by radiotelephony of its distress message, the mobile station may be requested to transmit suitable signals, followed by its call sign or other identification, to permit direction-finding stations to determine its position. This request may be repeated at frequent intervals if necessary.

§ 4 1) The distress message, preceded by the distress call, shall be repeated at intervals until an answer is received.

2) The intervals shall be sufficiently long to allow time for replying stations, in their preparations, to start their sending apparatus.

§ 5 When the mobile station in distress receives no answer to a distress message sent on the distress frequency, the message may be repeated on any other available frequency on which attention might be attracted.

Section IV − Transmission of a distress relay message by a station not itself in distress

§ 6 The radiotelephone procedures for the transmission of a distress relay message by a station not itself in distress are found in Section II of Article **32** (see Nos. **32.16** to **32.19A** and **32.19D** to **32.19F**).

Section V − Receipt and acknowledgement of a distress message

§ 7 The procedures relating to the receipt and acknowledgement of a distress message are found in Section II of Article **32** (see Nos. **32.23**, **32.26**, **32.28**, **32.29**, **32.30** and **32.35**).

Section VI − Distress traffic

§ 8 The radiotelephone procedures relating to the distress traffic are found in Section III of Article **32** (see Nos. **32.39** to **32.42**, **32.45** to **32.47**, **32.49** to **32.52** and **32.54** to **32.59**).

§ 9 1) Every mobile station acknowledging receipt of a distress message shall, on the order of the person responsible for the ship, aircraft or other vehicle, transmit the following information in the order shown as soon as possible:

– its name;

– its position;

– the speed at which it is proceeding towards, and the approximate time it will take to reach, the mobile station in distress;

– additionally, if the position of the ship in distress appears doubtful, ship stations should also transmit, when available, the true bearing of the ship in distress.

2) Before transmitting the message specified in § 9 1), the station shall ensure that it will not interfere with the emissions of other stations better situated to render immediate assistance to the station in distress.

PART A4 − URGENCY AND SAFETY COMMUNICATIONS

Section I − Urgency communications

§ 1 The radiotelephone procedures for urgency communications are found in Sections I and II of Article **33** (see Nos. **33.1** to **33.7** and **33.8**, **33.8B** to **33.9A** and **33.11** to **33.16**).

Section II − Safety communications

§ 2 The radiotelephone procedures for safety communications are found in Sections I and IV of Article **33** (see Nos. **33.31**, **33.31C**, **33.32**, **33.34** to **33.35** and **33.38B**).

Agenda item 10

MOD

RESOLUTION 363 (REV.WRC-23)

Improving the utilization of the VHF maritime mobile band

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the ITU Radiocommunication Sector (ITU-R) is conducting ongoing studies on improving efficiency in the use of the VHF maritime mobile band, including the use of digital technologies to respond to the emerging demands for new maritime uses and to ease congestion;

b) that transitional arrangements from analogue voice to digital voice VHF radios may take a long time and needs effective transitional solutions;

c) that use of existing maritime mobile service (MMS) allocations, where practicable, for ship and port security and enhanced maritime safety would be preferable, particularly where international interoperability is required;

d) that any changes made in Appendix **18** should not prejudice the future use of these frequencies or the capabilities of systems or new applications required for use by the MMS;

e) that ensuring resilient positioning, navigation and timing (PNT) data is particularly important for safe navigation at sea;

f) that ranging mode (R-Mode), which uses VHF data exchange system (VDES), is a maritime radionavigation system that provides independent resilient terrestrial PNT data,

recognizing

a) that Appendix **18** identifies frequencies to be used for distress and safety communications and other maritime communications on an international basis;

b) that some frequencies in the bands used by the MMS in Appendix **18** are allocated to the fixed and mobile services on a co-primary basis;

c) that a need exists to protect existing and planned in-band and adjacent-band services with no additional regulatory or technical constraints on these co-primary incumbent services when considering any potential modifications to MMS channelling arrangements;

d) that it is desirable to enhance maritime safety and ship and port security via spectrum-dependent systems;

e) that ITU and relevant international organizations have initiated related studies on the use of digital technologies for maritime safety and ship and port security;

f) that studies will be required to provide a basis for considering possible regulatory provisions to improve maritime safety and ship and port security, which may need access to spectrum for experimental use;

g) that administrations' and some relevant international organizations' efforts to continue the development of R-Mode to support the implementation of e-navigation may require a review of the Radio Regulations,

noting

a) that WRC-12, WRC-15 and WRC-19 reviewed Appendix **18** to improve use and efficiency for data communication using digital systems, e.g. for the introduction of VDES;

b) that maritime on-board communication systems have implemented digital technologies for voice communication as described in Recommendation ITU-R M.1174 to improve efficient use of the frequency band 450-470 MHz;

c) that digital systems have been implemented in the land mobile service,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference

1 studies on sharing and compatibility with incumbent services that are allocated on a primary basis in the same and adjacent frequency bands and studies on spectrum needs, transitional arrangements and possible changes to the VHF maritime mobile band, in order to advance digital voice and data technologies in the MMS, taking into account *recognizing b)* and *c)*;

2 compatibility studies, limited to frequencies identified in Appendix **18** for VDES, for a new allocation of the maritime radio navigation service under Article **5** and within the existing MMS to implement R-Mode,

invites administrations

to participate actively in the studies as described in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference* and provide the information required for the studies by submitting contributions to ITU-R,

invites the 2031 world radiocommunication conference

1 to consider, based on the results of studies, and within the Radio Regulations, excluding new allocations under Article **5**, possible regulatory changes to advance digital voice and data technologies in the MMS within the VHF maritime mobile band;

2 to consider, based on the results of studies, possible revisions to the Radio Regulations, including new allocations under Article **5**, limited to frequencies identified in Appendix **18** for VDES, for implementation of R-Mode as a new maritime radionavigation service,

invites relevant international organizations

to participate actively in the studies by providing requirements and information that should be taken into account in ITU-R studies,

instructs the Secretary-General

to bring this Resolution to the attention of the International Maritime Organization, International Association of Marine Aids to Navigation and Lighthouse Authorities, Comité International Radio-Maritime and other concerned international and regional organizations.

Agenda item 4

MOD

RESOLUTION 413 (REV.WRC-23)

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

The World Radiocommunication Conference (Dubai, 2023),

considering

a) the current allocation of the frequency band 108-117.975 MHz to the aeronautical radionavigation service (ARNS);

b) the current requirements of FM broadcasting systems operating in the frequency band 87-108 MHz;

c) that digital sound broadcasting systems are capable of operating in the frequency band at about 87-108 MHz as described in Recommendation ITU-R BS.1114;

d) the need for the aeronautical community to provide additional services by enhancing navigation systems through a radiocommunication data link;

e) the need for the broadcasting community to provide digital terrestrial sound broadcasting services;

f) that this allocation was made by WRC-07 in the knowledge that studies are ongoing with respect to the technical characteristics, sharing criteria and sharing capabilities;

g) the need for the aeronautical community to provide additional services for radiocommunications, relating to safety and regularity of flight, in the band 112-117.975 MHz;

h) that WRC-07 modified the allocation of the band 112-117.975 MHz to the aeronautical mobile (R) service (AM(R)S) in order to make available this frequency band for new AM(R)S systems, and in doing so enabled further technical developments, investments and deployment;

i) that the frequency band 117.975-137 MHz currently allocated to the AM(R)S is reaching saturation in certain areas of the world;

j) that this new allocation is intended to support the introduction of applications and concepts in air traffic management which are data intensive, and which could support data links that carry safety-critical aeronautical data;

k) that additional information is needed about the new technologies which will be used, the amount of spectrum required, the characteristics and sharing capabilities/conditions, and that therefore studies are urgently required on which AM(R)S systems will be used, the amount of spectrum required, the characteristics and the conditions for sharing with ARNS systems,

recognizing

a) that precedence must be given to the ARNS operating in the frequency band 108-117.975 MHz;

b) that, in accordance with Annex 10 to the Convention on International Civil Aviation, all aeronautical systems must meet standards and recommended practices (SARPs) requirements;

c) that within ITU-R, compatibility criteria between FM broadcasting systems operating in the frequency band 87-108 MHz and the ARNS operating in the frequency band 108-117.975 MHz already exist, as indicated in the most recent version of Recommendation ITU-R SM.1009;

d) that all compatibility issues between FM broadcasting systems and International Civil Aviation Organization (ICAO) standard ground-based systems for the transmission of radionavigation-satellite differential correction signals have been addressed,

noting

a) that aeronautical systems are converging towards a radiocommunication data link environment to support aeronautical navigation and surveillance functions, which need to be accommodated in existing radio spectrum;

b) that some administrations are planning to introduce digital sound broadcasting systems in the frequency band at about 87-108 MHz;

c) that no compatibility criteria currently exist between FM broadcasting systems operating in the frequency band 87-108 MHz and the planned additional aeronautical systems in the adjacent band 108-117.975 MHz using aircraft transmission;

d) that no compatibility criteria currently exist between digital sound broadcasting systems capable of operating in the frequency band at about 87-108 MHz and aeronautical services in the band 108-117.975 MHz,

resolves

1 that any aeronautical mobile (R) service systems operating in the band 108-117.975 MHz shall not cause harmful interference to, nor claim protection from ARNS systems operating in accordance with international aeronautical standards;

2 that any AM(R)S systems planned to operate in the frequency band 108-117.975 MHz shall, as a minimum, meet the FM broadcasting immunity requirements contained in Annex 10 to the Convention on International Civil Aviation for existing aeronautical radionavigation systems operating in this frequency band;

3 that AM(R)S systems operating in the band 108-117.975 MHz shall place no additional constraints on the broadcasting service or cause harmful interference to stations operating in the bands allocated to the broadcasting service in the frequency band 87-108 MHz and No. **5.43** does not apply to systems identified in *recognizing d)*;

4 that frequencies below 112 MHz shall not be used for AM(R)S systems excluding the ICAO systems identified in *recognizing d)*;

5 that any AM(R)S operating in the frequency band 108-117.975 MHz shall meet SARPs requirements published in Annex 10 to the Convention on International Civil Aviation,

invites the ITU Radiocommunication Sector

to study any compatibility issues between the broadcasting service and AM(R)S in the frequency 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

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),

considering

a) that aircraft are designed to enhance their efficiency, reliability and safety, as well as to be more environmentally friendly;

b) that Wireless Avionics Intra-Communications (WAIC) systems provide radiocommunications between two or more aircraft stations integrated into or installed on a single aircraft, supporting the safe operation of the aircraft;

c) that WAIC systems do not provide radiocommunications between an aircraft and the ground, another aircraft or a satellite;

d) that WAIC systems operate in a manner that ensures the safe operation of an aircraft;

e) that WAIC systems operate during all phases of flight, including on the ground;

f) that aircraft equipped with WAIC systems operate globally;

g) that WAIC systems operating inside an aircraft receive the benefits of fuselage attenuation to facilitate sharing with other services;

h) that Recommendation ITU-R M.2067 provides technical characteristics and operational objectives for WAIC systems,

recognizing

that Annex 10 to the International Civil Aviation Organization (ICAO) Convention on International Civil Aviation contains Standards and Recommended Practices (SARPs) for safety aeronautical radionavigation and radiocommunication systems used by international civil aviation,

resolves

1 that WAIC is defined as radiocommunication between two or more aircraft stations located on board a single aircraft, supporting the safe operation of the aircraft;

2 that WAIC systems operating in the frequency band 4 200-4 400 MHz shall not cause harmful interference to, nor claim protection from, systems of the aeronautical radionavigation service operating in this frequency band;

3 that WAIC systems operating in the frequency band 4 200-4 400 MHz shall comply with the Standards and Recommended Practices published in Annex 10 to the Convention on International Civil Aviation;

4 that No. **43.1** shall not apply for WAIC systems,

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

RESOLUTION 535 (REV.WRC-23)

Information needed for the application of Article 12 of the Radio Regulations

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that WRC-97 adopted Article **12** as a simple and flexible seasonal planning procedure for high-frequency broadcasting (HFBC) based on coordination;

b) that, for the purpose of the application of Article **12**, the Radiocommunication Bureau developed the software of which administrations were informed through circular letters,

resolves to instruct the Director of the Radiocommunication Bureau

to consider improvements to the established arrangements for the preparation, publication and dissemination of the information relating to the application of Article **12**, in consultation with administrations and regional coordination groups,

invites administrations

to submit their schedules in a common electronic format,

instructs the Secretary-General

to consider provision of the necessary funding to enable developing countries to participate fully in the application of Article **12** and relevant radiocommunication seminars.

ANNEX TO RESOLUTION 535 (REV.WRC-23)

This Annex responds to the need for information in the application of Article **12**; the flowchart in Description 2 provides an overview of the Procedure.

Software modules

Data capture of requirements

A new module will be required that permits the capture of all data elements detailed in Description 3. This module should also contain validation routines that prevent inconsistent data being captured and sent to the Radiocommunication Bureau for processing.

Propagation calculation

This new module should calculate the field strength and other necessary data at all relevant test points as described in Descriptions 1 and 4.

It should also include an option that allows administrations to select the optimum frequency bands for their requirements.

The output format of the data and the medium should be such as to allow easy publication and distribution of the results to all administrations.

The results of these calculations should be displayable in a graphical format.

Compatibility analysis

This module should use the output of the propagation calculation to provide a technical analysis of a requirement both alone and in the presence of other requirements as in Description 4. This analysis would be used in the coordination process.

The values for the parameters given in Description 4 should be user selectable, but in the absence of other values the recommended default values should be used.

The results of this analysis should be capable of being displayed in a graphical format for a defined service area as in Description 4.

Data query

This module should enable the user to perform typical data query functions.

DESCRIPTION 1

Selection of suitable frequency band(s)

General

In order to assist broadcasters and administrations in the preparation of their HF broadcasting requirements, the Bureau will prepare and distribute suitable computer software. This should be easy to use and the output should be easy to understand.

User input data

The user should be able to enter:

– the name of the transmitting station (for reference purposes);
– the geographic coordinates of the transmitting station;
– the transmitter power;
– the frequency bands which are available for use;
– hours of transmission;
– sunspot number;
– months during which a service is required;
– the available antenna types, together with the relevant directions of maximum radiation;
– the required coverage area specified as a set of CIRAF zones and quadrants (or by means of relevant geographic information).

It is desirable that the software should be able to store the above information, once it has been entered correctly, and provide the user with an easy means of recalling any previously entered information.

Methodology and data

The software should use:

– Recommendation ITU-R BS.705 for the calculation of antenna patterns;
– Recommendation ITU-R P.533 for the prediction of wanted field-strength values;
– Recommendation ITU-R P.842 for the calculation of reliability values.

The set of 911 test points (agreed at WARC HFBC-87) should be used, supplemented where necessary with test points based on a geographic grid.

The software should calculate the field-strength values and the fading margins at each test point inside the required service area for each of the frequency bands declared to be available, taking account of the relevant transmitting antenna characteristics for each frequency band. The desired RF signal-to-noise ratio should be user selectable with a default value of 34 dB in the case of double sideband (DSB) or as provided in the most recent version of Recommendation ITU-R BS.1615, as appropriate, in the case of digital emissions.

The dates for which calculations are made should be user selectable, the default values being:

– 0.5 month after the start of the season;

– mid-point of the season;

– 0.5 month before the end of the season.

The times for which calculations are made should be user selectable, the default values being:

– 30 min past the hour in which the requirement starts;

– 30 min past each successive hour until the hour in which the requirement stops.

Software output data

For rapid assessment of suitable frequency bands, the software should calculate:

– the basic service reliability for each available frequency band and for the relevant test points from the set of 911 test points;

– the basic area reliability for each available frequency band and for the relevant test points from the set of 911 test points.

In order to provide information about the geographic distribution of wanted signal values within the required service area, additional results should be available from the software:

– a listing should be available giving, for each of the available frequency bands, the basic circuit reliability (BCR) for each of the test points (from the set of 911 test points) inside the required service area.

In some cases, a graphical display of the BCR values throughout the required service area may be desirable. These values should be calculated at test points at 2° intervals of latitude and longitude throughout the required service area.

The BCR values should be displayed graphically as a set of coloured or hatched “pixels” scaled in steps of 10%. It should be noted that:

– reliability values relate to the use of a single frequency band;

– reliability values are a function of the desired RF signal-to-noise ratio (user selectable);

– the field-strength values should be calculated by the supplied software on the user’s own computer hardware. The software supplied should calculate the relevant reliability values based on these field-strength values and the user-supplied desired RF signal-to-noise values.

DESCRIPTION 2

Time sequence for the Procedure

In the sequence outlined below, the start date for a given schedule period is defined as D and the end date for the same schedule period is defined as E.

Date	Action
D − 4 months	Closing date for administrations to send their schedules[1] to the Radiocommunication Bureau (Bureau), preferably by electronic means. Schedule data will be made available via TIES as soon as it has been processed.
D − 2 months	Bureau to send to administrations a consolidated schedule (the first Tentative Schedule) together with a complete compatibility analysis[2].
D − 6 weeks	Closing date for receipt of amendments from administrations to correct errors and other changes resulting from the coordination process to ensure that this information appears in the second Tentative Schedule for D − 1 month.
D − 1 month	Bureau to send to administrations a consolidated schedule (the second Tentative Schedule) together with a complete compatibility analysis[2].
D − 2 weeks	Closing date for receipt of amendments from administrations to correct errors and other changes resulting from the coordination process to ensure that this information appears in the Schedule for date D.
D	Bureau to issue the High Frequency Broadcasting Schedule and compatibility analysis.
D to E − 3 months	Administrations to correct errors and coordinate in-season changes of requirements, sending information to the Bureau as it becomes available. Bureau to issue updates of the Schedule and compatibility analysis at intervals of two months.
E	Closing date for receipt of final operational schedules from administrations to Bureau. No input is needed if there have been no changes to the information previously sent.
E + 1 month	Bureau to send to administrations the final consolidated schedule (the Final Schedule) together with a compatibility analysis.

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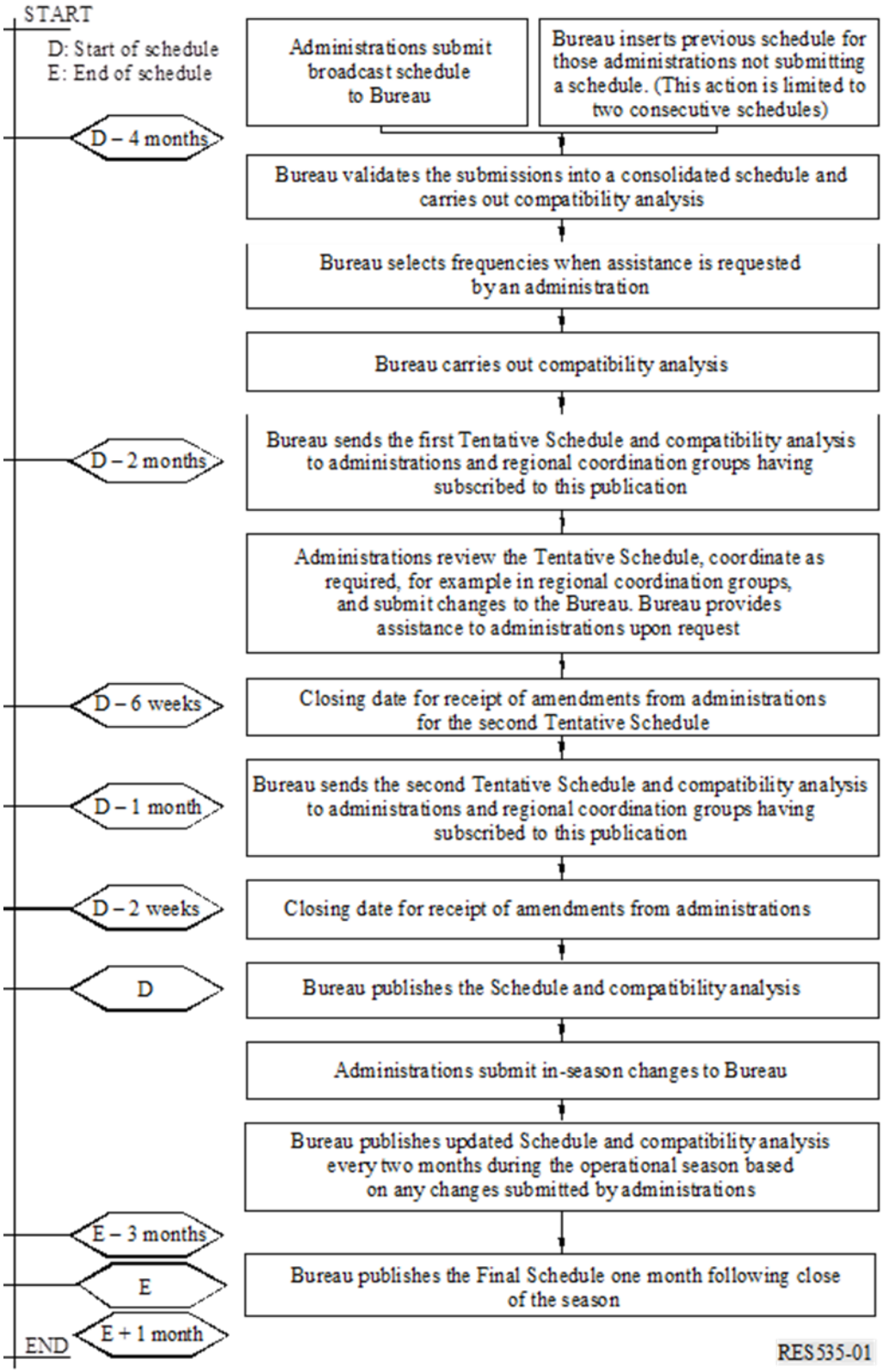
[1] See Description 3.

[2] See Description 4. The schedules and the results of the analyses should be available on CD-ROM and in TIES.

Figure 1 shows, in flow chart form, the time sequence for the Procedure.

FIGURE 1

Time sequence for the Procedure



DESCRIPTION 3

Specification of input data for a requirement

The fields needed for a given requirement and their specifications are:

– frequency in kHz, up to 5-digit integer;

– start time, as 4-digit integer;

– stop time, as 4-digit integer;

– target service area, as a set of up to 12 CIRAF zones and quadrants up to a maximum of 30 characters;

– site code, a 3-character code from a list of codes, or a site name and its geographic coordinates;

– power in kW, up to 4-digit integer;

– azimuth of maximum radiation;

– slew angle, up to 2-digit integer representing the difference between the azimuth of maximum radiation and the direction of unslewed radiation;

– antenna code, up to 3-digit integer from a list of values, or a full antenna description, as given in Recommendation ITU-R BS.705;

– days of operation;

– start date, in the case that the requirement starts after the start of the schedule;

– stop date, in the case that the requirement stops before the end of the schedule;

– modulation choice, to specify if the requirement is to use DSB, single-side band (SSB) or digital emission (for the latter, see Recommendation ITU-R BS.1514). This field may be used to identify any other type of modulation when this has been defined for use by HFBC in an ITU-R Recommendation;

– administration code;

– broadcasting organization code;

– identification number;

– identification of synchronization with other requirements.

DESCRIPTION 4

Compatibility analysis

General

In order to assess the performance of each requirement in the presence of noise and of the potential interference from other requirements using the same or adjacent channels, it is necessary to calculate the relevant reliability values. To this end, the Bureau will prepare suitable software, taking account of user requirements in terms of desired signal-to-noise and signal-to-interference ratios.

Input data

The schedule for a given season − this may be either an initial consolidated schedule (to permit assessment of those requirements which need coordination) or the High Frequency Broadcasting Schedule (to permit assessment of the likely performance of requirements during the relevant season).

Methodology and data

The software should use:

– Recommendation ITU-R BS.705 for the calculation of antenna patterns;

– Recommendation ITU-R P.533 for the prediction of the wanted field-strength values at each test point for each wanted requirement;

– Recommendation ITU-R P.533 for the prediction of the potentially interfering field-strength values from all other co-channel or adjacent channel requirements at each test point for each wanted requirement;

– Recommendation ITU-R BS.560 for adjacent channel RF protection ratios;

– Recommendation ITU-R P.842 for the calculation of reliability values.

The set of 911 test points (agreed at WARC HFBC-87) should be used, supplemented where necessary with test points based on a geographic grid.

The software should calculate the wanted and unwanted field-strength values and the fading margins at each test point inside the required service area.

The desired RF signal-to-noise and RF protection ratios should be user selectable, the default values being 34 dB and 17 dB (DSB-to-DSB co-channel case), respectively. In the case of digital emissions, the desired RF signal-to-noise ratios are as provided in the most recent version of Recommendation ITU-R BS.1615. The default values of RF protection ratio to be used by the Bureau for its compatibility analyses are given in Section 1 of the Annex to Resolution **543 (Rev.WRC-19)**.

The dates for which a compatibility analysis is made should be user selectable, the default values being:

– 0.5 month after the start of the season;

– mid-point of the season;

– 0.5 month before the end of the season.

These default values should be used by the Bureau for its compatibility analyses.

The times for which a compatibility analysis is made should be user selectable, the default values being:

– 30 min past the hour in which the requirement starts;

– 30 min past each successive hour until the hour in which the requirement ends.

These default values should be used by the Bureau for its compatibility analyses.

Software output data

For rapid assessment of the performance of a requirement, the software should calculate:

– the overall service reliability for the relevant test points from the set of 911 test points;

– the overall area reliability for the relevant test points from the set of 911 test points.

In order to provide information about the geographic distribution of wanted and unwanted signal values for a given requirement, additional results should be available from the software:

– a listing should be available giving the overall circuit reliability for each of the relevant test points from the set of 911 test points.

In some cases, a graphical display of the coverage achieved throughout a required service area may be desirable. These values will need to be calculated by the user (with the supplied software and on the user's own computer hardware) at test points at 2° intervals of latitude and longitude throughout the required service area. The values should be displayed graphically as a set of coloured or hatched pixels in steps of 10%. It should be noted that:

– reliability values relate to the use of a single frequency;

– reliability values are a function of the desired RF signal-to-noise and RF protection ratios (both user selectable);

– the field-strength values for the test points (from the set of 911 test points) inside the required service area should be calculated by the Bureau. The software supplied should calculate the relevant reliability values based on these pre-calculated field-strength values and the user-supplied desired signal-to-noise and signal-to-interference values;

– the field-strength values for the test points at 2° intervals should be calculated using the supplied software on the user's own computer hardware. The software supplied should calculate the relevant reliability values based on these field-strength values and the user-supplied desired signal-to-noise and signal-to-interference values.

Agenda item 9.2

MOD

RESOLUTION 552 (REV.WRC-23)

Long-term access to and development in the frequency band 21.4-22 GHz in Regions 1 and 3

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that WARC-92 allocated the frequency band 21.4-22 GHz in Regions 1 and 3 to the broadcasting-satellite service (BSS) to be implemented after 1 April 2007;

b) that the use of the frequency band since 1992 was subject to an interim procedure in accordance with Resolution **525 (WARC-92**, **Rev.WRC-03** and **Rev.WRC-07**)[*, 1];

c) that Article 44 of the ITU Constitution sets out the basic principles for the use of the radio-frequency spectrum and the geostationary-satellite (GSO) and other satellite orbits, taking into account the needs of developing countries;

d) that a due diligence process was first adopted by WRC-97 with a view to providing, as early as possible, information on the industrial project behind a satellite network submitted to ITU;

e) that providing information required under this due diligence process was a prerequisite to qualifying for a two-year extension of the regulatory period to bring into use a satellite network in non-planned bands;

f) that WRC-03 decided to remove the two-year extension by setting the regulatory period to bring into use a satellite network in non-planned bands at seven years;

g) that data concerning the manufacturer, launch service provider and launch date of a satellite will be more accurate and useful if submitted after the launch of the satellite,

resolves

1 that this Resolution applies to GSO networks in the BSS in the frequency band 21.4-22 GHz;

2 that, for frequency assignments to satellite networks as described in *resolves* 1 for which confirmation of the date of bringing into use under the provisions of Article **11** was not received by the Radiocommunication Bureau (BR) before 18 February 2012 or which were suspended under No. **11.49** at that date, the procedure contained in Annex 1 to this Resolution shall be applied at the time of first bringing into use or when resuming use after a suspension, as appropriate;

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[*] *Note by the Secretariat*: This Resolution was abrogated by WRC-12.

[1] Reference to Resolution **525 (WARC-92**, **Rev.WRC-03** and **Rev.WRC-07)** is provided as background information.

3 that, for frequency assignments to satellite networks as described in *resolves* 1 for which confirmation of the date of bringing into use under the provisions of Article **11** was received by BR before 18 February 2012, the provisions of §§ 5 to 8 of Annex 1 to this Resolution shall be applied, as appropriate,

further resolves

that the procedures in this Resolution are in addition to the provisions under Articles **9** and **11** of the Radio Regulations,

instructs the Director of the Radiocommunication Bureau

to include in his report to future competent world radiocommunication conferences the results of the implementation of this Resolution.

ANNEX 1 TO RESOLUTION 552 (REV.WRC-23)

1 Within 30 days after the actual commencement, or resumption, of use of the frequency assignments to a satellite network subject to these procedures, the notifying administration shall send to the Radiocommunication Bureau (BR) the information specified in Annex 2 to this Resolution.

2 The information to be submitted in accordance with § 1 above shall be signed by an authorized official of the notifying administration.

3 If the spacecraft is used for the first time under this Resolution, the due diligence information to be submitted in accordance with § 1 above could be supplemented by a copy of the contract with the launch services provider.

4 On receipt of the information under § 1 above, BR shall promptly examine its completeness. If the information is found to be complete, BR shall publish the complete information in a special section of the International Frequency Information Circular (BR IFIC) within two months. If the information is found to be incomplete, BR shall request the notifying administration to submit the missing information within 30 days.

5 The information submitted in accordance with § 1 above shall be updated and resubmitted to BR by the notifying administration not later than 30 days after the end of life or the relocation of the spacecraft associated with the submission under § 1 above. In case of end of life of a spacecraft, the corresponding ITU ID number associated with such a spacecraft shall no longer be used.

6 On receipt of the information under § 5 above, BR shall promptly examine its completeness. If the information is found to be complete, BR shall publish the complete information in a special section of the BR IFIC within two months. If the information is found to be incomplete, BR shall request the notifying administration to submit the missing information within 30 days.

7 If the complete information specified in § 1 and 5 above is not received by the Bureau within the time-limits specified in § 1, 4, 5 and 6 above, BR shall immediately inform the notifying administration and take appropriate measures under § 8, if required.

8 Within 30 days after the end of the seven-year period following the date of receipt by BR of the relevant complete information under No. **9.30**, and after the end of the three-year period following the date of suspension under No. **11.49**, if the complete information under this Resolution is not yet received by BR, the corresponding frequency assignments shall be cancelled by BR, which subsequently informs the administration accordingly.

ANNEX 2 TO RESOLUTION 552 (REV.WRC-23)

Information to be submitted

1 Identity of the satellite network

a) Identity of the satellite network

b) Name of the notifying administration

c) Orbital characteristics

d) Reference to the request for coordination

e) Reference to the notification, when available

f) Frequency band(s) included in the relevant special sections of the satellite network

g) First date of bringing into use[2]

h) Regulatory status

– Satellite network under operation (only data listed in § 2 shall be provided), or

– Satellite network suspended (only data listed in § 3 shall be provided)

2 Identity of the spacecraft[3] (if satellite network filing is under operation)

a) ITU ID number, or

b) Spacecraft manufacturer

– Name of the spacecraft manufacturer

– Date of execution of the contract

– Delivery date

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[2] This information has already been provided by the administration under the provisions of Article **11** and will be inserted by the Radiocommunication Bureau (BR).

[3] If data about the spacecraft are submitted for the first time under this Resolution, items "Spacecraft manufacturer", "Launch services provider" and "Frequency band(s) present on board the spacecraft" shall be provided. Otherwise, if data about the spacecraft were already submitted under this Resolution, the ID number (based on the ITU filing number) given by BR to this spacecraft at that time shall be indicated.

c) Launch services provider

– Name of the launch vehicle provider

– Date of execution of the contract

– Name of the launch vehicle

– Name and location of the launch facility

– Launch date

d) Frequency band(s) present on board the spacecraft (i.e. frequency bands for each transponder that are able to be transmitted by a transponder located on board the spacecraft within the frequency band 21.4-22 GHz)

3 Suspension information (if satellite network filing is suspended)

a) Date of suspension[4]

b) Reason of suspension:

– Spacecraft moved to another orbital position, or

– In-orbit failure of the spacecraft, or

– Spacecraft de-orbited,

– Other reasons (to be specified).

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[4] This information has already been provided by the administration under the provisions of Article **11** and will be inserted by BR.

Agenda item 7(K)

MOD

RESOLUTION 553 (REV.WRC-23)

Additional regulatory measures for broadcasting-satellite networks in the frequency band 21.4-22 GHz in Regions 1 and 3 for the enhancement of equitable access to this frequency band

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that WARC-92 allocated the frequency band 21.4-22 GHz in Regions 1 and 3 to the broadcasting-satellite service (BSS) to be implemented after 1 April 2007;

b) that the use of the frequency band since 1992 was subject to an interim procedure in accordance with Resolution **525 (WARC-92**, **Rev.WRC-03** and **Rev.WRC-07)**[*];

c) that the frequency band 21.4-22 GHz in Regions 1 and 3 for the BSS was subject to Resolution **507 (Rev.WRC-12**)[**],

considering further

a) that *a priori* planning for BSS networks in the frequency band 21.4-22 GHz in Regions 1 and 3 is not necessary and should be avoided as it freezes access according to technological assumptions at the time of planning and then prevents flexible use taking account of real world demand and technical developments;

b) that WRC-12 established definitive arrangements for the use of the frequency band 21.4-22 GHz;

c) that Articles 12 and 44 of the ITU Constitution lay down the basic principles for the use of the radio-frequency spectrum and the geostationary-satellite and other satellite orbits, taking into account the needs of developing countries;

d) that those principles have been included in the Radio Regulations;

e) that all countries have equal rights in the use of both the radio frequencies allocated to various space radiocommunication services and geostationary-satellite orbit and other satellite orbits for these services;

f) that accordingly, a country or a group of countries having frequency assignments for the BSS in the frequency band 21.4-22 GHz need to take all practical measures to facilitate the use of new space systems by other countries or groups of countries;

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[*] *Note by the Secretariat*: This Resolution was abrogated by WRC-12.

[**] *Note by the Secretariat:* This Resolution was revised by WRC-15 and WRC-19.

g) that according to No. **23.13**, in devising the characteristics of a space station in the BSS, all technical means available shall be used to reduce, to the maximum, the radiation over the territory of other countries unless an agreement has been previously reached with such countries,

recognizing

a) that the "first-come first-served" concept can restrict and sometimes prevents access to and use of certain frequency bands and orbit positions;

b) the relative disadvantage for developing countries in coordination negotiations due to various reasons such as a lack of resources and expertise;

c) the perceived differences in consistency of application of the Radio Regulations,

recognizing further

a) that WRC-12 received information provided by the Bureau or the various submissions received by the Bureau which include assignments in the BSS for Regions 1 or 3 in the frequency band 21.4-22 GHz up until December 2011 and that the table below summarizes the data provided by the Bureau and shows the variations for the number of networks at the various stages;

	Advance publication information	**Coordination request**	**Notification submission**	**Networks in MIFR**	**Resolution 49**	**Confirmed brought into use**
October 2008	605	115	21	2	18	
September 2009	599	158	24	9	22	18
March 2010	558	199	22	11	20	19
June 2010	664	229	22	12	23	19
January 2011	703	242	20	7	18	14
December 2011	890	291	13	8*	16	10*

* Clarification is awaited for one network. One network is suspended under No. **11.49**.

b) that the number of submissions made by some administrations as contained in the above table in this frequency band is large, which may not be realistic and may be difficult to implement within the regulatory time-limit under Article **11**;

c) that the number of submissions as shown in *recognizing further a)* above, is complicating coordination of BSS systems already submitted or planned to be submitted by other administrations,

resolves

that as of 18 February 2012, the special procedure outlined in the Attachment to this Resolution for processing of coordination requests for BSS frequency assignments in Regions 1 and 3 in the frequency band 21.4-22 GHz shall be applied in respect of submissions of administrations meeting the specified requirements in the Attachment.

ATTACHMENT TO RESOLUTION 553 (REV.WRC-23)

Special procedure to be applied for an assignment for a broadcasting-satellite service system in the frequency band 21.4-22 GHz in Regions 1 and 3

1 The special procedure described in this attachment can only be applied to one network at a time (except as described in § 3 below) by an administration or an administration acting on behalf of a group of named administrations when, for the frequency band 21.4-22 GHz, none of those administrations have:

– a network in the MIFR, notified under Article **11**; or

– more than one network successfully examined under No. **9.34** and published under No. **9.38** at the same orbital position as the one of the network subject to this special procedure; or

– a network successfully examined under No. **9.34** and published under No. **9.38** at an orbital position different from the one of the network subject to this special procedure.

In case of countries complying with § 3 below, the special procedure described in this attachment can also be applied[1] by an administration when this administration has networks in the MIFR, notified under Article **11**, or more than one network successfully examined under No. **9.34** and published under No. **9.38** at the same orbital position as the one of the network subject to this special procedure, or a network successfully examined under No. **9.34** and published under No. **9.38** at an orbital position different from the one of the network subject to this special procedure for the frequency band 21.4-22 GHz, but which, combined, do not include its entire territory in the service area. Each one of the administrations in a group will lose its right to apply this special procedure individually or as a member of another group.

2 In the case that an administration that has already made a submission under this special procedure, either individually or as a part of a group (except as described in § 3 below), at a later stage submits a new submission, this new submission cannot benefit from this special procedure except where the network associated with the previous submission under this special procedure has not been notified prior to the regulatory deadline.

2*bis* In order to benefit from the application of this special procedure, the submitting administration may either withdraw or modify its submission previously sent to the Bureau under the normal procedure and successfully examined under No. **9.34** and published under No. **9.38**. In the case of modification, such modification shall remain within the envelope characteristics of the previous submission in order to retain the original date of receipt. If the previous assignment includes several frequency bands, the modification can be applied to the frequency band 21.4-22 GHz to be separated as an independent submission under the special procedure.

3 In order to meet the concerns of some countries with a large territory or dispersed territories that cannot be covered from one orbital location, under this procedure the requirement of such countries having large territory would be met by allowing them to apply this special procedure

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[1] The number of submissions shall not exceed the number of orbital locations for national assignments in the Appendix **30** Plan, reduced by the number of orbit locations of that administration for networks in the MIFR, submissions notified under Article **11** and submissions successfully examined under No. **9.34** and published under No. **9.38**.

for submissions to cover their territories from an absolute minimum number of orbital locations[2] that enable them to cover the entire territory in question.

4 Administrations seeking to apply this special procedure shall submit their request to the Bureau, with the following information:

a) the geographical coordinates of not more than 20 points for determining the minimal ellipse[3] to cover its/their national territory[4];

b) the height above sea level of each of its points;

c) any special requirement which is to be taken into account, to the extent practicable.

5 In submitting their request under § 4 above, administrations may seek the assistance of the Bureau to suggest candidate orbital locations for a submission.

6 Upon receipt of the complete information (mentioned in § 4 above) from an administration seeking the assistance of the Bureau under § 5, the Bureau shall expeditiously generate the minimum coverage ellipse and candidate orbital locations (if requested by the administration) for a prospective submission. The Bureau shall send this information to the requesting administration.

7 Before an administration notifies to the Bureau or brings into use a frequency assignment subject to this special procedure, it shall effect coordination with other administrations as required in § 10 below.

8 Upon receipt of the information under § 6 above, administrations seeking assistance in applying this special procedure shall submit advance publication information and a request for coordination together with the appropriate information listed in Appendix **4** to these Regulations[5].

9 Administrations not seeking the assistance of the Bureau may submit advance publication information and a request for coordination together with the appropriate information listed in Appendix **4** to these Regulations[5] at the same time as submitting the information under § 4.

10 On receipt of the complete information sent under § 8 or § 9 above, the Bureau shall, ahead of submissions not yet processed under No. **9.34**, promptly:

a) examine the information with respect to conformity with Annex 1 and § 1 to 3;

b) examine the information with respect to its conformity with No. **11.31**;

c) identify, in accordance with Annex 2 to this Attachment, any administration with which coordination may need to be effected[6];

d) include their names in the publication under *e)* below;

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[2] The number of orbital locations shall not exceed the number of orbital locations for national assignments in the Appendix **30** Plan.

[3] In some cases, use of composite beams may be necessary to provide required coverage while reducing undesired coverage of adjacent geographical areas.

[4] Countries requiring more than one orbital location to cover their national territory (see § 3 above) shall submit points for different orbital locations such that the polygons drawn between the points do not overlap with those from other orbital locations of the same administration.

[5] For submissions under this special procedure, the coordination information is receivable at the same date as that of the advance publication information.

[6] The Bureau shall also identify the specific satellite networks with which coordination needs to be effected.

e) publish[7], as appropriate, the complete information in the BR IFIC within four months. Where the Bureau is not in a position to comply with the time-limit referred to above, it shall periodically so inform the administrations, giving the reasons therefor;

f) inform the administrations concerned of its actions and communicate the results of its calculations, drawing attention to the relevant BR IFIC.

11 If the information is found to be incomplete, the Bureau shall immediately seek from the administration concerned any clarification required and information not provided.

12 The provisions in this Resolution are in addition to the provisions of Articles **9** and **11** of the Radio Regulations.

ANNEX 1

TO

ATTACHMENT TO RESOLUTION 553 (REV.WRC-23)

Technical parameters to be used for submissions for Regions 1 and 3 broadcasting-satellite service networks under the special procedure of this Resolution

a) The receiving earth station antenna diameter should be in the range 45-120 cm. The radiation pattern of the receiving terminal antenna should comply with Recommendation ITU-R BO.1900.

b) The noise temperature of the receiving earth station should be in the range 145-200 K.

c) The transmitting e.i.r.p. of the space station shall be in the range from 43.2 dBW/MHz to 58.2 dBW/MHz[8].

d) The service area shall be limited by the national borders of the country and the minimum coverage ellipse generated by the Bureau.

e) In the case of an administration with a large territory or dispersed territories, requiring more than one orbit location to cover the territory of their country, the polygons drawn between the points submitted under § 4 above for each submitted orbital location shall not overlap each other and shall not overlap with service areas of networks of this administration successfully examined under No. **9.34** and published under No. **9.38**.

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[7] If the payments are not received in accordance with the provisions of Council Decision 482, as amended, on the implementation of cost recovery for satellite network filings, the Bureau shall cancel the publication, after informing the administration concerned. The Bureau shall inform all administrations of such action and that the network specified in the publication in question no longer has to be taken into consideration by the Bureau and other administrations. The Bureau shall send a reminder to the notifying administration not later than two months prior to the deadline for the payment in accordance with the above-mentioned Council Decision 482 unless the payment has already been received. (WRC-12)

[8] The maximum pfd produced at high elevation angles at the Earth's surface under free-space conditions shall not exceed −105 dB(W/(m^2 · MHz)).

f) The minimum coverage ellipse, generated from not more than 20 points with associated geographical coordinates[9].

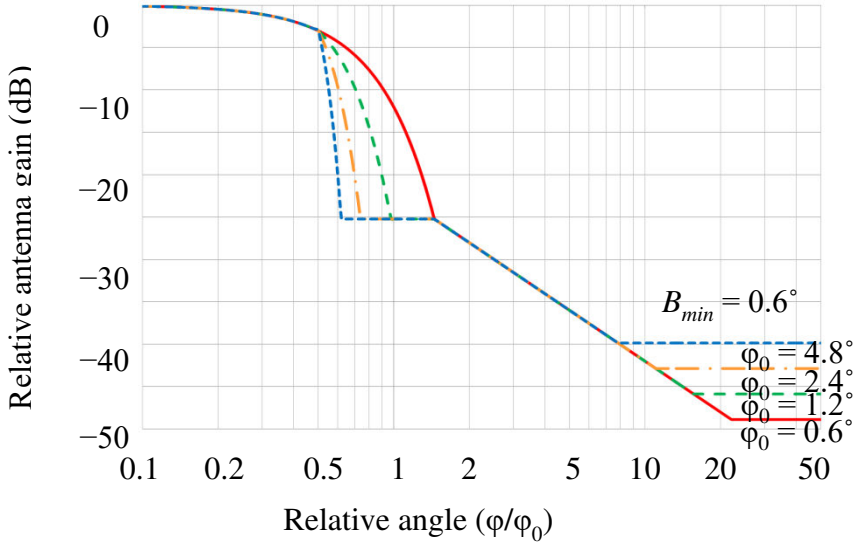
g) The reference pattern of the transmitting space station shall be in compliance with Figure 1 below.

h) The maximum pointing error of the transmitting space station antenna shall be 0.1° in any direction.

i) The maximum rotational error of the transmitting space station antenna shall be ±1°.

FIGURE 1* (WRC-12)

Reference patterns for satellite antennas with fast roll-off in the main beam



$$G_{max} = 44.45 - 10 \log (\varphi_{01} \cdot \varphi_{02}) \quad \text{dBi} \quad \text{(WRC-12)}$$

Curve A: dB relative to main beam gain

$-12\,(\varphi/\varphi_0)^2$	for $0 \le (\varphi/\varphi_0) \le 0.5$
$-12\left[\dfrac{(\varphi/\varphi_0)-x}{B_{min}/\varphi_0}\right]^2$	for $0.5 < (\varphi/\varphi_0) \le \left(\dfrac{1.45B_{min}}{\varphi_0}+x\right)$
-25.23	for $\left(\dfrac{1.45\,B_{min}}{\varphi_0}+x\right) < (\varphi/\varphi_0) \le 1.45$
$-(22 + 20 \log (\varphi/\varphi_0))$	for $(\varphi/\varphi_0) > 1.45$

after intersection with Curve B: Curve B.

Curve B: Minus the on-axis gain (Curve B represents examples of four antennas having different values of φ_0 as labelled in Fig. 1. The on-axis gains of these antennas are approximately 39.9, 42.9, 45.9 and 48.9 dBi, respectively) (WRC-12)

where:

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9 In some cases use of composite beams may be necessary to provide required coverage while reducing undesired coverage of adjacent geographical areas.

* Figure 1 represents patterns for some values of φ_0. (WRC-12)

φ: off-axis angle (degrees)

φ_0: cross-sectional half-power beamwidth in the direction of interest (degrees)

φ_{01}, φ_{02}: major and minor axis half-power beamwidth, respectively, of elliptical beam (degrees) (WRC-12)

$$x = 0.5\left(1 - \frac{B_{min}}{\varphi_0}\right)$$

where:

$B_{min} = 0.6°$

ANNEX 2

TO

ATTACHMENT TO RESOLUTION 553 (REV.WRC-23)

Technical criteria to determine coordination requirements for submissions under the special procedure to be applied for an assignment for a broadcasting-satellite service system in the frequency band 21.4-22 GHz in Regions 1 and 3

Coordination of assignments for a BSS space station with respect to other BSS networks is not required if the pfd produced under assumed free space propagation conditions does not exceed the threshold values shown below, anywhere within the service area of the potentially affected assignment:

a) this mask shall be applied for frequency assignments subject to this Resolution with regard to frequency assignments not subject to this Resolution for which:

– notification is not submitted under Article **11**; and

– complete information under Resolution **552 (Rev.WRC-15)**[*] is not received by the Bureau,

at the date of receipt of complete information under § 8 and 9 of the Attachment to this Resolution,

-146.88	dB(W/(m^2 · MHz))	for	$0° \le \theta < 0.6°$
$-150.2 + 9.3\ \theta^2$	dB(W/(m^2 · MHz))	for	$0.6° \le \theta < 1.05°$
$-140.5 + 27.2 \log \theta$	dB(W/(m^2 · MHz))	for	$1.05° \le \theta < 2.65°$
$-138.1 + 1.3\ \theta^2$	dB(W/(m^2 · MHz))	for	$2.65° \le \theta < 4.35°$
$-130.2 + 26.1 \log \theta$	dB(W/(m^2 · MHz))	for	$4.35° \le \theta < 9.1°$
-105	dB(W/(m^2 · MHz))	for	$9.1° \le \theta$

where θ is the minimum nominal geocentric orbital separation, in degrees, between the wanted and interfering space stations, taking into account the respective East-West station-keeping accuracies;

b) this mask shall be applied for frequency assignment subject to this Resolution with regard to:

– frequency assignments subject to this Resolution; or

– frequency assignments not subject to this Resolution for which:

  – notification is submitted under Article **11**; or

  – complete information under Resolution **552 (Rev.WRC-15)**[*] is received by the Bureau,

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[*] *Note by the Secretariat:* This Resolution was revised by WRC-19.

at the date of receipt of complete information under § 8 and 9 of the Attachment to this Resolution,

-149.88	$dB(W/(m^2 \cdot MHz))$	for	$0° \leq \theta < 0.6°$
$-153.2 + 9.3\ \theta^2$	$dB(W/(m^2 \cdot MHz))$	for	$0.6° \leq \theta < 1.05°$
$-143.5 + 27.2 \log \theta$	$dB(W/(m^2 \cdot MHz))$	for	$1.05° \leq \theta < 2.65°$
$-141.1 + 1.3\ \theta^2$	$dB(W/(m^2 \cdot MHz))$	for	$2.65° \leq \theta < 4.35°$
$-133.2 + 26.1 \log \theta$	$dB(W/(m^2 \cdot MHz))$	for	$4.35° \leq \theta < 12°$
-105	$dB(W/(m^2 \cdot MHz))$	for	$12° \leq \theta$

where θ is the minimum nominal geocentric orbital separation, in degrees, between the wanted and interfering space stations, taking into account the respective East-West station-keeping accuracies.

Agenda item 9.1

MOD

RESOLUTION 655 (REV.WRC-23)

Definition of time scale and dissemination of time signals via radiocommunication systems

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the ITU Radiocommunication Sector (ITU-R) is responsible for setting standards for the content and structure of time signals to be disseminated via radiocommunication systems, including the standard frequency and time signal service (SFTS) and the standard frequency and time signal-satellite service (SFTSS);

b) that the International Bureau of Weights and Measures (BIPM) is responsible for establishing and maintaining the second of the International System of Units (SI) and the reference time scale UTC with the SI second as its scale unit;

c) that the definition of reference time scale and dissemination of time signals via radiocommunication systems are important for applications and equipment that require a time traceable to the reference time,

considering further

a) that ITU-R has a liaison with the Consultative Committee for Time and Frequency (CCTF) and participates in the General Conference on Weights and Measures (CGPM) as an observer;

b) that BIPM is a Sector Member of ITU-R and participates in the relevant activities of ITU-R,

noting

a) that the international reference time scale UTC is the legal basis for timekeeping for many countries and is the time scale used in the majority of countries;

b) that disseminated time signals are used not only in telecommunications but also in many industries and practically all areas of human activities;

c) that time signals are disseminated by both wired communications covered by Recommendations of the ITU Telecommunication Standardization Sector (ITU-T) and by systems of different radiocommunication services (space and terrestrial), including the standard frequency and time signal service for which ITU-R is responsible,

realizing

that, in BIPM, a Task Group has been created to prepare a draft resolution for CGPM in 2026 related to the new maximum value of the difference between UT1 and UTC, and, in the spirit of close collaboration with ITU, the ITU-R group in charge of the subject has been invited to participate in this Task Group,

recognizing

a) that No. **26.1** states that: “Attention should be given to the extension of this service to those areas of the world not adequately served”;

b) that No. **26.6** states that: “In selecting the technical characteristics of standard frequency and time signal transmissions, administrations shall be guided by the relevant ITU-R Recommendations”;

c) that the original definition of the international reference time scale UTC resulted from work completed in 1970 by the International Radio Consultative Committee (CCIR) of ITU, in full cooperation with CGPM;

d) that WARC-79 included UTC in the Radio Regulations, and since then UTC, as “strongly endorsed” in Resolution 5 of CGPM (1975), has been used as the main time scale for telecommunication networks (wired and wireless) and for other time-related applications and equipment;

e) that, in 2020, a Memorandum of Understanding was signed between BIPM and ITU concerning the expertise of each organization;

f) that Resolution 2 of the 26th meeting of the CGPM (2018) provides the definition of UTC and confirms that UTC produced by BIPM is the only recommended time scale for international reference and the basis of civil time in most countries;

g) that, in Resolution 4 on the use and future development of UTC, the 27th meeting of the CGPM (2022) decided that the maximum value for the difference allowed between UT1 and UTC will be increased in, or before, 2035;

h) that the various aspects of current and potential future reference time scales, including their impacts and applications, are covered by Report ITU-R TF.2511;

i) that a change in approach to the formation of the continuous UTC time scale will have positive operational and, consequently, economic implications;

j) that implementing a new tolerance (UT1 – UTC) will require a transitional period of up to 15 years, in accordance with Report ITU-R TF.2511, the length of which shall take into account the planned lifetime of equipment and the implementation of backward compatibility for some categories of user;

k) that the maximum value for the difference between UT1 and UTC should be no less than 100 seconds, taking into account the constraints of the technological systems expected to be used to disseminate this value,

resolves to invite the ITU Radiocommunication Sector

1 to continue the cooperation with BIPM, the International Committee for Weights and Measures (CIPM) and CGPM, as well as other relevant organizations, concerned industries and groups, and to maintain a dialogue concerning the expertise of each organization;

2 to further study the content and structure of time signals to be disseminated by radiocommunication systems, including wired technologies, using the combined expertise of the relevant organizations,

resolves

1 that, until the implementation of continuous UTC (see *recognizing g)*), UTC as described in Recommendation ITU-R TF.460-6 shall continue to apply;

2 that ITU-R cooperate further with BIPM, CIPM and CGPM in response to the consultation in *realizing*, to define a new maximum value for the difference between UT1 and UTC and on the implementation date for continuous UTC, possibly in 2035;

3 that ITU-R conduct studies, as appropriate, related to actions consequential upon *resolves* 1 and 2 to provide new and revised ITU-R Reports and Recommendations, such as, but not limited to, a revision to Recommendation ITU-R TF.460-6;

4 to establish a transition period for implementation and allow for the possibility to disseminate the increased difference between UT1 and UTC via radiocommunication system until 2035, but no later than 2040, in cases where existing equipment cannot be replaced earlier;

5 to maintain the name “UTC” as contained in Recommendation ITU-R TF.460-6 when it is revised,

instructs the Director of the Radiocommunication Bureau

to report on the progress of this Resolution to WRC-27,

invites administrations

to participate in the studies by submitting contributions to ITU-R,

instructs the Secretary-General

to bring this Resolution to the attention of the International Maritime Organization, the International Civil Aviation Organization, CGPM, CCTF, CIPM, BIPM, the International Earth Rotation and Reference Systems Service, the International Union of Geodesy and Geophysics, the International Union of Radio Science (URSI), the International Organization for Standardization (ISO), the World Meteorological Organization, the International Astronomical Union, the Institute of Electrical and Electronics Engineers and the Internet Engineering Task Force.

Agenda item 10

MOD

RESOLUTION 663 (REV.WRC-23)

Studies on possible new additional allocations to the radiolocation service on a primary basis in the frequency range 231.5-275 GHz, and possible new identifications for radiolocation service applications in frequency bands within the frequency range 275-700 GHz

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that all millimetric and sub-millimetric wave systems and applications in the radiolocation service (RLS) to be considered by this Resolution fall under the categories of ranging, imaging (including material analysis) and localization;

b) that those systems and applications are typically designed in two main configurations: active (radars) and receive-only (radiometers);

c) that those RLS systems and applications:

– have been recognized by scientific communities and governmental organizations as well suited for stand-off detection of concealed objects in the imaging category;

– will make a significant contribution to public safety, such as counterterrorism and the security of high-risk/high-value assets or areas in the imaging and localization categories;

– will significantly contribute to improving transportation safety in the near ranges around vehicles and in the Intelligent Transport Systems (ITS) context in general in the ranging, localization and imaging categories;

d) that the RLS systems and applications are divided into:

– active use, which may require a frequency bandwidth up to 30 GHz to achieve range resolutions in the order of half a centimetre;

– receive-only use, which will detect the extremely weak power that is naturally radiated by objects and require a much wider frequency bandwidth than active systems to collect enough power for detection;

e) that globally harmonized spectrum for those millimetric and sub-millimetric wave RLS systems and applications is highly desirable for achieving economies of scale;

f) that the optimal frequency range for the operation of those active millimetric and sub-millimetric wave RLS systems is 231.5-320 GHz, where the atmospheric absorption is relatively low;

g) that there are some narrower existing allocations to the RLS in the frequency range 217-275 GHz in the three ITU Regions, which however may not support the bandwidth required for these millimetric and sub-millimetric wave RLS systems and applications;

h) that those RLS systems and applications in:

– the imaging category will operate at low transmit powers, in ranges up to 300 metres, and are limited in space and in time;

– the ranging category are expected to be ubiquitously deployed specifically in the near ranges around vehicles, while the category localization is used in general in the ITS context;

– all categories may be severely affected by other power sources operating in the same frequency band;

i) that the technical and operational characteristics for those receive-only and active millimetric and sub-millimetric wave systems and applications in the different categories need to be described, including protection criteria in particular for receive-only systems and applications;

j) that the combination of chosen transmitting power and bandwidth for some of the applications listed in *considering c)* within the regulatory framework depends on the operational requirements in the frequency band(s) used,

noting

a) that No. **5.563A** applies in the frequency bands 235-238 GHz, 250-252 GHz and 265-275 GHz, identifying these frequency bands for use by ground-based passive atmospheric sensing;

b) that No. **5.340** applies in the frequency band 250-252 GHz, prohibiting all emissions in this frequency band;

c) that consideration of receive-only imaging systems and the naturally compatible Earth exploration-satellite service (EESS) (passive) and radio astronomy service (RAS) might be possible when making common assignments in order to improve the overall spectrum usage efficiency;

d) that No. **5.565** states that the use of the frequency range 275-1 000 GHz by the passive services does not preclude use of this frequency range by active services;

e) that No. **5.564A** identifies the frequency range 275-450 GHz for the use by administrations for the implementation of land mobile and fixed service applications with certain limitations to protect the EESS (passive) in the frequency bands 296-306 GHz, 313-318 GHz and 333-356 GHz and to protect the RAS in general, in accordance with Resolution **731 (Rev.WRC-23)**,

recognizing

a) that the frequency ranges 231.5-275 GHz and 275-700 GHz are also allocated to other radiocommunication services and that those allocations are used by a variety of incumbent systems in many administrations, and that the protection of these services, including adjacent services, should be studied;

b) that, for the determination of the incumbent services, the relevant provisions of the Radio Regulations in force apply;

c) that administrations wishing to make frequencies available in the frequency range 275-1 000 GHz for active service applications are urged to take all practicable steps to protect the passive services from harmful interference until the date when the Table of Frequency Allocations is established for the relevant frequencies,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

1 the description of the technical and operational characteristics, including required protection criteria, for those receive-only and active millimetric and sub-millimetric wave RLS systems and applications in the categories listed in *recognizing a)*;

2 studies on globally harmonized spectrum for the RLS, in particular for those millimetric and sub-millimetric wave RLS systems and applications above 231.5 GHz;

3 sharing and compatibility studies (in-band and adjacent bands) for active millimetric and sub-millimetric wave RLS systems and applications with other services in the frequency range 231.5-275 GHz, while ensuring protection for the current use and further development of the incumbent services allocated to this frequency range;

4 sharing and compatibility studies (in-band and adjacent bands) for RLS applications with EESS (passive), space research service (passive) and RAS applications in the frequency range 275-700 GHz, while maintaining protection for the passive service applications identified in No. **5.565**;

5 sharing and compatibility studies (in-band and adjacent bands) for RLS applications with fixed service and land mobile service applications in the frequency range 275-450 GHz, as identified in No. **5.564A**,

invites the 2027 world radiocommunication conference

1 to determine, based on the results of the ITU-R studies described in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference,* possible new allocations to the RLS in the frequency range 231.5-275 GHz on a primary basis, considering required regulatory measures, while taking into account and ensuring the protection of the current use and further development of existing services in the frequency bands considered and in adjacent frequency bands;

2 to determine, based on the results of the ITU-R studies described in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference*, possible identifications of frequency bands in the frequency range 275-700 GHz for use by RLS applications, considering required regulatory measures, while ensuring the protection of the applications identified in Nos. **5.564A** and **5.565** in the frequency bands considered and, as appropriate, in adjacent frequency bands.

MOD

RESOLUTION 664 (REV.WRC-23)

Studies on a possible new primary allocation to the Earth exploration-satellite service (Earth-to-space) in the frequency band 22.55-23.15 GHz

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the frequency band 25.5-27 GHz, allocated worldwide to the Earth exploration-satellite service (EESS) (space-to-Earth) on a primary basis currently does not have a paired band for potential associated Earth-to-space links;

b) that an EESS (Earth-to-space) allocation in the frequency band 22.55-23.15 GHz would allow for uplinks and downlinks on the same transponder, increasing efficiency and reducing satellite complexity;

c) that an EESS (Earth-to-space) allocation in the frequency band 22.55-23.15 GHz would allow for its use for satellite tracking, telemetry and command (TT&C) in combination with the existing EESS (space-to-Earth) allocation referred to in *considering a)*,

noting

a) that the frequency band 22.55-23.15 GHz is allocated to the fixed, inter-satellite and mobile services on a primary basis;

b) that the frequency band 22.55-23.15 GHz is also allocated to the space research service (SRS) (Earth-to-space) on a primary basis, paired with the space research service (SRS) (space-to-Earth) allocation in the frequency band 25.5-27 GHz;

c) that the frequency band 22.21-22.5 GHz is allocated to the radio astronomy service (RAS) and EESS (passive) on a primary basis;

d) that, for the RAS in the frequency bands 22.81-22.86 GHz and 23.07-23.12 GHz, No. **5.149** applies;

e) that the frequency band 23.6-24 GHz is allocated to the EESS (passive) and RAS on a primary basis (No. **5.340** applies),

recognizing

a) that the possible development of the EESS (Earth-to-space) in the frequency band 22.55-23.15 GHz should not constrain the use and development of the EESS (passive) operating in the frequency band 23.6-24 GHz;

b) that protection of the RAS sites operating in the frequency bands indicated in *noting c), d)* and *e)* may be achieved through sufficient geographic separation from EESS earth stations,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference

studies on spectrum requirements and studies on sharing and compatibility between EESS (Earth-to-space) and the existing services, taking into account *noting a)* to *e)*, while ensuring the protection of these services, using relevant technical and operational parameters of their current and planned use,

invites administrations

to participate actively in ITU Radiocommunication Sector (ITU-R) studies and provide the technical and operational characteristics of the systems involved by submitting contributions to ITU-R,

invites the 2031 world radiocommunication conference

to consider, based on the results of the studies under *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference*, a new worldwide primary allocation to the EESS (Earth-to-space) in the frequency band 22.55-23.15 GHz,

invites the Secretary-General

to bring this Resolution to the attention of the international and regional organizations concerned.

Agenda item 1.10

MOD

RESOLUTION 673 (REV.WRC-23)

The importance of Earth observation radiocommunication applications

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the collection and exchange of Earth observation data are essential for maintaining and improving the accuracy of weather forecasts, which contribute to the protection of life and preservation of property throughout the world;

b) that Earth observation data are also essential for monitoring and predicting climate changes, for disaster prediction, monitoring and mitigation, for increasing the understanding, modelling and verification of all aspects of climate change, and for related policy-making;

c) that Earth observations are also used to obtain pertinent data regarding natural resources, this being particularly crucial for the benefit of developing countries;

d) that observations of the Earth's surface are also used for a large variety of other applications (e.g. urban developments, utilities deployments, agriculture, security);

e) that many observations are performed over the entire world which require spectrum-related issues to be considered on a worldwide basis;

f) that the importance of Earth observation radiocommunication applications has been stressed by a number of international bodies such as the World Meteorological Organization (WMO), the Intergovernmental Panel on Climate Change and the Group on Earth Observation, and that ITU-R collaboration with these bodies is essential;

g) that, although meteorological and Earth observation satellites are currently operated by only a limited number of countries, the data and/or related analyses resulting from their operation are distributed and used globally, in particular by national weather services in developed and developing countries and by climate change-related organizations;

h) that Earth observations are performed for the benefit of the whole international community and the data are generally made available at no cost,

recalling

a) the Plan of Action of the World Summit on the Information Society (Geneva, 2003), on e-environment, calling for the establishment of monitoring systems, using information and communication technologies (ICTs), to forecast and monitor the impact of natural and man-made disasters, particularly in developing countries, least developed countries and small economies;

b) Resolution 136 (Rev. Bucharest, 2022) of the Plenipotentiary Conference, on the use of telecommunications/ICTs for humanitarian assistance and for monitoring and management in emergency and disaster situations, including health-related emergencies, for early warning, prevention, mitigation and relief;

c) Resolution 182 (Rev. Bucharest, 2022) of the Plenipotentiary Conference, on the role of telecommunications/ICTs in regard to climate change and the protection of the environment,

recognizing

a) Recommendations ITU-R RS.1859, on use of remote sensing systems for data collection to be used in the event of natural disasters and similar emergencies, and ITU-R RS.1883, on use of remote sensing systems in the study of climate change and the effects thereof;

b) the Report on Question ITU-D 22/2, on utilization of ICTs for disaster management, resources and active and passive space-based sensing systems as they apply to disaster and emergency relief situations;

c) the joint WMO-ITU Handbook *Use of Radio Spectrum for Meteorology: Weather, Water and Climate Monitoring and Prediction* and the ITU-R Handbook *Earth Exploration-Satellite Service*,

recognizing further

Report ITU-R RS.2178, on the essential role and global importance of radio spectrum use for Earth observations and for related applications,

noting

a) that *in situ* and remote Earth observation capabilities depend on the availability of radio frequencies under a number of radio services, allowing for a wide range of passive and active applications on satellite- or ground-based platforms (see Report ITU-R RS.2178);

b) that, according to the United Nations Framework Convention on Climate Change, more than 90 per cent of natural disasters are climate- or weather-related;

c) that for certain Earth observation applications, long-term consistency of measurements is essential (e.g. climate change);

d) that certain frequency bands used by Earth observation applications have unique physical characteristics (e.g. spectral lines), so that migration to alternative frequency bands is not possible;

e) that ground-based radiometer measurements at the frequencies of water vapour absorption lines are essential for weather prediction and climate monitoring;

f) that some essential passive frequency bands are covered by No. **5.340** of the Radio Regulations;

g) that some essential passive Earth observation sensors could suffer from interference resulting in erroneous data or even complete loss of data,

resolves

1 to continue to recognize that the use of spectrum by Earth observation applications has a considerable societal and economic value;

2 to urge administrations to take into account Earth observation radio-frequency requirements and in particular protection of the Earth observation systems in the related frequency bands;

3 to encourage administrations to consider the importance of the use and availability of spectrum for Earth observation applications prior to taking decisions that would negatively impact the operation of these applications.

Agenda item 4

MOD

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),

considering

a) that WARC-92 allocated the bands 1 980-2 010 MHz and 2 170-2 200 MHz for the mobile-satellite service (MSS) with a date of entry into force of 1 January 2005, these allocations being co-primary with fixed and mobile service allocations;

b) that the 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 MSS, in accordance with the provisions of Nos. **5.389A** and **5.389C** of the Radio Regulations, as adopted by WRC-95 and WRC-97, is subject to a date of entry into force of 1 January 2000, 1 January 2002 (for Region 2) or 1 January 2005;

c) that these bands are shared with the fixed and mobile[1] services on a primary basis and that they are widely used by the fixed service in many countries;

d) that the studies made have shown that, while sharing of the MSS with the fixed service in the short to medium term would be generally feasible, in the long term sharing will be complex and difficult in both bands, so that it would be advisable to transfer the fixed service stations operating in the bands in question to other segments of the spectrum;

e) that for many developing countries, the use of the 2 GHz band offers a substantial advantage for their radiocommunication networks and that it is not attractive to transfer these systems to higher frequency bands because of the economic consequences that this would entail;

f) that ITU-R has developed a new frequency plan for the fixed service in the 2 GHz band, set out in Recommendation ITU-R F.1098 which will facilitate the introduction of new fixed service systems in band segments that do not overlap with the above-mentioned MSS allocations at 2 GHz;

g) that sharing between fixed service systems using tropospheric scatter and Earth-to-space links in the MSS in the same frequency band segments is generally not feasible;

h) that some countries utilize these bands in application of Article 48 of the ITU Constitution,

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[1] This Resolution does not apply to the mobile service. In this respect, the use of these bands by the MSS is subject to coordination with the mobile service under the provisions of No. **9.11A**, where applicable.

recognizing

a) that the bands 1 885-2 025 MHz and 2 110-2 200 MHz have been identified for worldwide use by International Mobile Telecommunications (IMT), the satellite component being limited to the bands 1 980-2 010 MHz and 2 170-2 200 MHz, and that the development of IMT can offer great potential in helping the developing countries develop more rapidly their telecommunication infrastructure;

b) that WARC-92 resolved to request the Telecommunication Development Bureau, when formulating its immediate plans for assistance to the developing countries, to consider the introduction of specific modifications in the radiocommunication networks of the developing countries and that a future world development conference should examine the needs of developing countries and should assist them with the resources needed to implement the required modifications to their radiocommunication networks,

noting

that in response to Resolution **716 (WRC-95)**[*, 2], ITU-R developed Recommendation ITU-R F.1335, which provides planning tools necessary to assist those administrations considering replanning of their terrestrial networks to accommodate the MSS in the 2 GHz bands,

resolves

1 to request administrations to notify to the Radiocommunication Bureau the basic characteristics of frequency assignments to existing or planned fixed stations requiring protection, or those typical[3] of existing and planned fixed stations brought into use before 1 January 2000 in 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;

2 that administrations proposing to bring an MSS system into service must take account of the fact that, when coordinating their system with administrations having terrestrial services, such administrations may have existing or planned installations covered by Article 48 of the Constitution;

3 that in respect of stations of the fixed service taken into account in the application of No. **9.11A**, administrations responsible for MSS networks operating in the 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 shall ensure that unacceptable interference is not caused to fixed service stations notified and brought into use before 1 January 2000;

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 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 MSS allocations, for example by using the channel plans of the most recent version of Recommendation ITU-R F.1098;

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[*] *Note by the Secretariat:* This Resolution was revised by WRC-12.

[2] Reference to Resolution **716 (WRC-95)** is provided as background information.

[3] With respect to the notification of frequency assignments to stations in the fixed and mobile services, it was possible to notify the characteristics of typical stations in the fixed service in accordance with No. **11.17** without restriction up until 1 January 2000.

4.2 administrations are urged to take all practicable steps to phase out troposcatter systems operating in the band 1 980-2 010 MHz in all three Regions and 2 010-2 025 MHz in Region 2 by 1 January 2000. New troposcatter systems shall not be brought into operation in these bands;

4.3 administrations are encouraged, where practicable, to draw up plans for the gradual transfer of the frequency assignments to their fixed service stations in the 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 to non-overlapping bands, giving priority to the transfer of their frequency assignments in the band 1 980-2 010 MHz in all three Regions and 2 010-2 025 MHz in Region 2, considering the technical, operational and economical aspects;

5 that administrations responsible for the introduction of mobile-satellite systems should take into account and address the concerns of affected countries, especially developing countries, to minimize the possible economic impact of transition measures in respect to existing systems;

6 to invite the Telecommunication Development Bureau to provide assistance to developing countries requesting it for the introduction of specific modifications to their radiocommunication networks that will facilitate their access to the new technologies being developed in the 2 GHz band as well as in all coordination activities;

7 that administrations responsible for the introduction of mobile-satellite systems urge their mobile-satellite system operators to participate in the protection of terrestrial fixed services especially in the least developed countries,

invites the ITU Radiocommunication Sector

to conduct, as a matter of urgency, further studies, in conjunction with the Bureau, to develop and provide to administrations the necessary tools in a timely manner to assess the impact of interference in the detailed coordination of mobile-satellite systems,

invites the ITU Telecommunication Development Sector

to evaluate, as a matter of urgency, the financial and economic impact on the developing countries of the transfer of fixed services, and to present its results to a future competent world radiocommunication conference and/or world telecommunication development conference,

invites the Director of the Telecommunication Development Bureau

to implement *invites the ITU Telecommunication Development Sector* by encouraging joint activities between the relevant study groups of both ITU-D and ITU-R,

instructs the Director of the Radiocommunication Bureau

to submit a report on the implementation of this Resolution to world radiocommunication conferences.

MOD

RESOLUTION 731 (REV.WRC-23)

Consideration of sharing and adjacent-band compatibility between passive and active services above 71 GHz

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the changes made to the Table of Frequency Allocations by WRC-2000 in frequency bands above 71 GHz were based on the requirements known at the time of that conference;

b) that the passive service spectrum requirements above 71 GHz are based on physical phenomena and therefore are well known, and are reflected in the changes made to the Table of Frequency Allocations by that conference;

c) that several frequency bands above 71 GHz are already used by the Earth exploration-satellite service (EESS) (passive) and space research service (passive) because they are unique bands for the measurement of specific atmospheric parameters;

d) that frequency bands in the frequency range 275-1 000 GHz are identified for use by administrations for passive service applications in No. **5.565**, without precluding the use of this frequency range by active service applications, and urging administrations to take all practicable steps to protect the passive service applications from harmful interference;

e) that there is currently only limited knowledge of requirements and implementation plans for the active services that will operate in frequency bands above 71 GHz;

f) that, in the past, technological developments have led to viable communication systems operating at increasingly higher frequencies, and that this can be expected to continue so as to make communication technology available in the future in the frequency bands above 71 GHz;

g) that, in the future, alternative spectrum needs for the active and passive services should be accommodated when the new technologies become available;

h) that, following the revisions to the Table of Frequency Allocations by WRC-2000, sharing studies may still be required for services in some frequency bands above 71 GHz;

i) that interference criteria for passive sensors have been developed and are given in Recommendation ITU-R RS.2017;

j) that protection criteria for radio astronomy have been developed and are given in Recommendations ITU-R RA.769 and ITU-R RA.1513 and Report ITU-R RA.2189;

k) that several satellite downlink allocations have been made in frequency bands adjacent to those allocated to the radio astronomy service;

l) that sharing criteria for active and passive services in frequency bands above 71 GHz have not yet been fully developed within the ITU Radiocommunication Sector (ITU-R),

recognizing

a) that several frequency bands above 71 GHz are subject to No. **5.340**, and all emissions are prohibited in these bands;

b) that, to the extent practicable, the burden of sharing among active and passive services should be equitably distributed among the services to which allocations are made,

resolves

to invite a future competent world radiocommunication conference to consider the results of ITU-R studies referred to in *invites the ITU Radiocommunication Sector* below with a view to taking the necessary action, as appropriate, in order to accommodate the emerging requirements of active services, taking into account the requirements of the passive services, in frequency bands above 71 GHz,

urges administrations

to note the possibility of changes to Article **5** to accommodate emerging requirements for active services, as indicated in this Resolution, and to take this into account in the development of national policies and regulations,

invites the ITU Radiocommunication Sector

1 to continue its studies to determine if and under what conditions sharing is possible between active and passive services in the frequency bands above 71 GHz, such as, but not limited to, 116-122.25 GHz, 174.8-182 GHz, 185-190 GHz and 235-238 GHz;

2 to study under what conditions passive services operating in allocated frequency bands 100-102 GHz, 148.5-151.5 GHz, 182-185 GHz, 190-191.8 GHz and 226-231.5 GHz are compatible with active services allocated to adjacent bands;

3 to conduct studies to determine the specific conditions to be applied to the land-mobile and fixed-service applications to ensure the protection of EESS (passive) applications in the frequency bands 296-306 GHz, 313-318 GHz and 333-356 GHz;

4 to study means of avoiding adjacent-band interference from space services (downlinks) into radio astronomy frequency bands above 71 GHz;

5 to take into account the principles of burden-sharing to the extent practicable in their studies;

6 to complete the necessary studies when the technical characteristics of the active services in these frequency bands are known;

7 to develop Recommendations specifying sharing criteria for those frequency bands where sharing is feasible,

instructs the Secretary-General

to bring this Resolution to the attention of the international and regional organizations concerned.

MOD

RESOLUTION 744 (REV.WRC-23)

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

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that WRC-03 made a global allocation to the mobile-satellite service (MSS) (Earth-to-space) in the band 1 668-1 675 MHz and a global allocation to the MSS (space-to-Earth) in the band 1 518-1 525 MHz;

b) that the band 1 668.4-1 675 MHz is also allocated to the fixed and mobile services;

c) that due to sharing conditions between MSS (space-to-Earth) and the aeronautical mobile service for telemetry in the band 1 518-1 525 MHz (see No. **5.348B**), MSS operation in the United States of America is unlikely to be feasible;

d) that the above constraints on the MSS in the band 1 518-1 525 MHz therefore limit the possible use of the band 1 668-1 675 MHz by the MSS in the United States of America;

e) that the band 1 670-1 675 MHz is used in Canada and the United States of America for the fixed and mobile services;

f) that some administrations operate transportable radio-relay systems in the band 1 668.4-1 675 MHz which could operate as part of the fixed or mobile service allocations;

g) that sharing between the mobile service and the mobile-satellite service (Earth-to-space) in the band 1 668.4-1 675 MHz has been studied in Recommendation ITU-R M.1799,

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 frequency 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

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),

considering

a) that the favourable propagation characteristics of the frequency band 470-862 MHz are beneficial in providing cost-effective solutions for coverage, including of large areas of low population density;

b) that the operation of broadcasting stations and base stations of the mobile service in the same geographical area may create incompatibility issues;

c) that many communities are particularly underserved compared to urban centres;

d) that applications ancillary to broadcasting are sharing the frequency band 470-862 MHz with the broadcasting service in all three Regions, and are expected to continue their operations in this frequency band;

e) that it is necessary to adequately protect, *inter alia*, terrestrial television broadcasting and other systems in this frequency band,

recognizing

a) that, in Article **5**, the frequency band 790-862 MHz, or parts thereof, is allocated, and is used on a primary basis, for various services including broadcasting;

b) that the GE06 Agreement applies in all Region 1 countries except Mongolia and in the Islamic Republic of Iran in the frequency bands 174-230/470-862 MHz;

c) that the transition from analogue to digital television is expected to result in situations where the frequency band 790-862 MHz will be used for both analogue and digital terrestrial transmission; and the demand for spectrum during the transition period may be even greater than the standalone usage of analogue broadcasting systems;

d) that the switchover to digital may result in spectrum opportunities for new applications;

e) that the timing of the switchover to digital is likely to vary from country to country;

f) that the use of spectrum for different services should take into account the need for sharing studies;

g) that the Radio Regulations provide that the identification of a given frequency band for International Mobile Telecommunications (IMT) does not preclude the use of that frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations;

h) that the GE06 Agreement contains provisions for the terrestrial broadcasting service and other terrestrial services, a Plan for digital TV, and the List of other primary terrestrial services;

i) that the GE06 Agreement established, for the frequency band 470-862 MHz, 16 June 2015 as the date when the transition period ended, meaning that the assignments that were in the analogue Plan are no longer protected and shall not cause unacceptable interference in countries which are Contracting Members to the Agreement;

j) that the studies carried out by the ITU Radiocommunication Sector (ITU-R) pursuant to Resolution **749 (WRC-07)**[*, 1] showed that the potential impact of the cumulative effect of interference from base stations, which individually did not trigger the need for coordination with broadcasting, could be significant; on the other hand, the potential impact of cumulative interference might be less significant in practice;

k) that ITU-R initiated studies with a view to developing and completing comprehensive Recommendations and Reports, in accordance with Resolution **224 (Rev.WRC-19)**, which need to take into account the cumulative effect of interference,

recognizing further

a) that the frequency band 790-862 MHz, as part of a wider frequency band, has been allocated to the mobile service in Region 3 (including the Islamic Republic of Iran) since 1971 (prior to WRC-07);

b) that the GE06 Agreement, in its relevant Annexes, establishes the relationship between digital terrestrial broadcasting, on the one hand, and other primary terrestrial services, including the aeronautical radionavigation service (ARNS) in the countries mentioned in No. **5.312**, on the other;

c) that WRC-07, under No. **5.316B**, allocated the frequency band 790-862 MHz in Region 1 to the mobile, except aeronautical mobile, service on a primary basis, and that this allocation shall come into effect as of 17 June 2015 and shall be subject to agreement obtained under No. **9.21** with respect to the ARNS in countries mentioned in No. **5.312**;

d) that the frequency band 790-862 MHz in Region 1 and the frequency band 790-806 MHz in Region 3 were identified by WRC-07 for use by administrations wishing to implement IMT, whereas the frequency band 806-960 MHz in Region 3 was identified for IMT in WRC-2000;

e) that for Contracting Members to the GE06 Agreement, the use of stations of the mobile service in relation to the broadcasting service is also subject to successful application of the procedures of the GE06 Agreement;

f) that the coordination between terrestrial services (fixed, mobile and broadcasting) in the frequency band 790-862 MHz between the Islamic Republic of Iran, on the one hand, and the other countries of Region 3, on the other, is a matter to be left to the administrations concerned, based on bilateral or multilateral negotiations, if it is mutually agreed by those administrations,

noting

a) that Resolution ITU-R 57 provides principles for the process of development of IMT-Advanced and that this process had already started after WRC-07;

b) that in the frequency band 790-862 MHz, Resolution **224 (Rev.WRC-19)** applies,

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[*] *Note by the Secretariat:* This Resolution was revised by WRC-12, WRC-15 and WRC-19.

[1] Reference to Resolution **749 (WRC-07)** is provided as background information.

emphasizing

a) that the use of the frequency band 470-862 MHz by broadcasting and other primary services is also covered by the GE06 Agreement;

b) that the requirements of the different services to which the frequency band is allocated, including the mobile service, the ARNS (in accordance with No. **5.312**), the fixed service and the broadcasting service, shall be taken into account,

taking into account

that the results of the studies carried out by ITU-R pursuant to Resolution **749 (WRC-07)**[*, 2] indicate that there is a need to protect other primary terrestrial services from the mobile service in Region 1,

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 version 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];

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;

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[*] *Note by the Secretariat:* This Resolution was revised by WRC-12, WRC-15 and WRC-19.

[2] Reference to Resolution **749 (WRC-07)** is provided as background information.

[3] Reference to Resolution **749 (WRC-07)** is provided as background information.

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,

invites administrations

to contribute further to the studies conducted by ITU-R in accordance with *recognizing k)* above,

instructs the Director of the Radiocommunication Bureau

to implement this Resolution and to take appropriate actions.

ANNEX TO RESOLUTION 749 (REV.WRC-23)

Criteria for identifying potentially affected administrations with respect to the aeronautical radionavigation service in countries listed in No. 5.312

To identify potentially affected administrations when applying the procedure for seeking agreement under No. **9.21** by the mobile service with respect to the aeronautical radionavigation service (ARNS) operating in countries mentioned in No. **5.312**, as stipulated in No. **5.316B**, the coordination distances (between a base station in the mobile service and a potentially affected ARNS station) indicated below should be used.

When applying No. **5.316B**, notifying administrations may indicate in the notice sent to the Radiocommunication Bureau (BR) the list of administrations with which bilateral agreement has already been reached. BR shall take this into account in determining the administrations with which coordination under No. **9.21** is required.

1 Case where the mobile service is operated according to the frequency arrangement where the base stations transmit only in the frequency band 791-821 MHz and receive only in the frequency band 832-862 MHz

ARNS station	System type code	Coordination distances for receiving MS base stations (km)	Coordination distances for transmitting MS base stations (km)
RSBN (ground receiver)	AA8	–	70/125/175**
RLS 2 (Type 2) (aircraft receiver)	BC	70/150*	–
RLS 1 (Types 1 and 2) (ground receiver)	AB	70/125/175**	–

* The first value should be used when the notifying administration indicates in the notice form that the aggregate equivalent isotropically radiated power (e.i.r.p.) value of all user equipment operating simultaneously with the notified base station is assumed not to exceed 21 dBm in 1 MHz. The second value should be used in other cases.

** 90% ≤ land path ≤ 100% / 50% ≤ land path < 90% / 0% ≤ land path < 50%.

2 Other cases

ARNS station	System type code	Coordination distances for MS receiving base stations (km)	Coordination distances for MS transmitting base stations (km)
RSBN	AA8	50	125/175*
RLS 2 (Type 1) (aircraft receiver)	BD	410	432
RLS 2 (Type 1) (ground receiver)	BA	50	250/275*
RLS 2 (Type 2) (aircraft receiver)	BC	150	432
RLS 2 (Type 2) (ground receiver)	AA2	50/75*	300/325*
RLS 1 (Types 1 and 2) (ground receiver)	AB	125/175*	400/450*
Other types of ARNS terrestrial station	Not applicable	125/175*	400/450*
Other types of ARNS airborne station	Not applicable	410	432

* 50% ≤ land path ≤ 100% / 0% ≤ land path < 50%.

MOD

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),

considering

a) that the favourable propagation characteristics of the frequency band 694-790 MHz are beneficial in providing cost-effective solutions for coverage;

b) that the ITU Radiocommunication Sector (ITU-R) carried out studies, in accordance with Resolution **232 (WRC-12)**[*, 1], on compatibility between the mobile service and other services currently allocated in the frequency band 694-790 MHz;

c) that it is necessary to adequately protect all primary services in the frequency band 694-790 MHz and in adjacent frequency bands;

d) that Report ITU-R BT.2339 provides elements on co-channel sharing and compatibility between digital terrestrial television broadcasting and International Mobile Telecommunications (IMT) in the frequency band 694-790 MHz in the GE06 planning area, which administrations can use in the development of their bilateral agreements;

e) that the frequency band 645-862 MHz is allocated on a primary basis to the aeronautical radionavigation service (ARNS) in the countries listed in No. **5.312**;

f) that, in some countries, applications ancillary to broadcasting and programme-making are operating in the frequency band 470-862 MHz or in parts of that frequency band and are expected to continue such operations;

g) that, in some countries, the implementation of IMT in the frequency band 694-790 MHz may affect the availability of frequencies for applications ancillary to broadcasting and programme-making,

recognizing

a) that, in Article **5**, the frequency band 694-790 MHz, or parts of that frequency band, is allocated, and is used on a primary basis, for various services;

b) that the GE06 Agreement applies in all Region 1 countries except Mongolia and in the Islamic Republic of Iran in the frequency bands 174-230/470-862 MHz;

c) that, in the frequency band 694-790 MHz, Resolution **224 (Rev.WRC-19/23)** applies;

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[*] *Note by the Secretariat:* This Resolution was abrogated by WRC-15.

[1] Reference to Resolution **232 (WRC-12)** is provided as background information.

d) that WRC-12, through Resolution **232 (WRC-12)**[*, 2], allocated the frequency band 694-790 MHz in Region 1 to the mobile, except aeronautical mobile, service on a primary basis, subject to agreement obtained under No. **9.21** with respect to the ARNS in countries listed in No. **5.312**, and requested WRC-15 to specify technical and regulatory conditions applicable to the mobile-service allocation, as appropriate, taking into account the ITU-R studies;

e) that the identification of a given frequency band for IMT in the Radio Regulations does not preclude the use of that band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations;

f) that interference generated and received within a given country is a national matter and needs to be dealt with by each administration as a national matter;

g) that adjacent-channel interference generated in one country and affecting a neighbouring country needs to be mutually considered;

h) that Recommendation ITU-R M.2090 provides specific unwanted emission limits of IMT mobile stations operating in the frequency band 694-790 MHz in order to facilitate protection of existing services in the frequency band 470-694 MHz in Region 1;

i) that Recommendation ITU-R M.1036 provides frequency arrangements for implementation of the terrestrial component of IMT in the frequency bands identified for IMT in the Radio Regulations, and provides frequency arrangements in the frequency band 694-960 MHz;

j) that the studies carried out by ITU-R pursuant to Resolution **232 (WRC-12)**[*, 3] showed that the potential impact of the cumulative effect of interference from base stations, which individually did not trigger the need for coordination with broadcasting, could be significant; on the other hand, the potential impact of cumulative interference might be less significant in practice;

k) that bilateral coordination agreements have already been reached and will be used by administrations as an agreement obtained under No. **9.21** with respect to ARNS in countries listed in No. **5.312**;

l) that, in Region 1, a number of countries have deployments of applications ancillary to broadcasting and programme-making which provide tools for daily content production for the broadcasting service,

noting

a) that, while some administrations may decide to use all or part of the frequency band 694-790 MHz for IMT, other countries may continue to operate other services to which the frequency band is also allocated;

b) that the timing of the deployment of IMT in the frequency band 694-790 MHz is likely to vary from country to country;

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[*] *Note by the Secretariat:* This Resolution was abrogated by WRC-15.

[2] Reference to Resolution **232 (WRC-12)** is provided as background information.

[3] Reference to Resolution **232 (WRC-12)** is provided as background information.

c) that parts of Region 1 have successfully completed or committed to completing modification of the GE06 Digital Plan in the frequency band 470-790 MHz in order to harmonize the use of the frequency band 694-790 MHz for IMT, while other parts of Region 1 have not started;

d) that a digital entry in the GE06 Plan may also be used for transmissions in the mobile service under the conditions set out in § 5.1.3 of the GE06 Agreement;

e) that, in some countries, applications ancillary to broadcasting and programme-making may be operated in parts of the frequency band 694-790 MHz;

f) that ITU-R studies regarding possible solutions for global/regional harmonization of frequency bands and tuning ranges for electronic news gathering (ENG)[4] are needed and Resolution ITU-R 59 provides the framework for such studies,

resolves

1 that use of the frequency band 694-790 MHz in Region 1 by the mobile, except aeronautical mobile, service is subject 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;

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,

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[4] ENG within Resolution ITU-R 59 represents all applications ancillary to broadcasting, such as terrestrial electronic news gathering, electronic field production, TV outside broadcast, wireless radio microphones and radio outside production and broadcast.

invites the ITU Radiocommunication Sector

1 to consider the information received about the implementation of IMT in the frequency band 694-790 MHz and develop ITU-R Reports, as appropriate;

2 to pursue studies on the implementation of applications ancillary to broadcasting and programme-making on the basis of Resolution ITU-R 59,

invites the Director of the Radiocommunication Bureau

to work, in cooperation with the Director of the Telecommunication Development Bureau, to bring assistance to developing countries wishing to implement the new mobile allocation in order to help these administrations to determine the modifications of the GE06 entries according to their needs,

invites administrations

1 to provide information to ITU-R about the implementation of IMT in the frequency band 694-790 MHz, including, for example, implementation of measures for interference mitigation;

2 to communicate on a bilateral basis in order to eliminate possible cumulative interference, as appropriate;

3 to consider the use of applications ancillary to broadcasting and programme-making in those parts of the frequency band 694-790 MHz that are not used for other applications in the mobile service or other primary services,

instructs the Director of the Radiocommunication Bureau

to implement this Resolution and to take appropriate actions.

ANNEX TO RESOLUTION 760 (REV.WRC-23)

Criteria for identifying potentially affected administrations in the frequency band 694-790 MHz with respect to the aeronautical radionavigation service for countries listed in No. 5.312

To identify affected administrations when applying the procedure for seeking agreement under No. **9.21** by the mobile service with respect to the aeronautical radionavigation service (ARNS) operating in countries mentioned in No. **5.312**, the coordination distances (between a base station in the mobile service and a potentially affected ARNS station) indicated below should be used.

Notifying administrations may indicate in the notice sent to the Radiocommunication Bureau (BR) the list of administrations with which bilateral agreement has already been reached. BR shall take this into account in determining the administrations with which coordination under No. **9.21** is required.

1 Case of mobile-service usage under the frequency allocation plans when base stations transmit only in the frequency band 758-788 MHz and receive signals only in the frequency band 703-733 MHz

TABLE 1

ARNS station	System type code	Coordination distances for the receiving MS base stations (km)	Coordination distances for the transmitting MS base stations (km)
RSBN (ground receiver)	AA8	-	70/125/175*

* 90% ≤ land path ≤ 100% / 50% ≤ land path < 90% / 0% ≤ land path < 50%.

2 Other cases

TABLE 2

ARNS station	System type code	Coordination distances for the receiving MS base stations (km)**	Coordination distances for the transmitting MS base stations (km)
RSBN	AA8	50	125/175*
RLS 2 (type 1) (airborne receiver)	BD	410	432
RLS 2 (type 1) (ground receiver)	BA	50	250/275*
RLS 2 (type 2) (airborne receiver)	BC	150	432
RLS 2 (type 2) (ground receiver)	AA2	50/75*	300/325*
RLS 1 (types 1 and 2) (ground receiver)	AB	125/175*	400/450*
Other ARNS ground stations	Not applied	125/175*	400/450*
Other ARNS airborne stations	Not applied	410	432

* 50% ≤ land path ≤ 100% / 0% ≤ land path < 50%.

** Coordination distances for the receiving MS base stations are based on protection of ARNS stations from the stations in the mobile service and do not ensure protection for receiving MS base stations from ARNS stations.

Agenda item 7(G)

MOD

RESOLUTION 770 (REV.WRC-23)

Application of Article 22 of the Radio Regulations to the protection of geostationary fixed-satellite service and broadcasting-satellite service networks from non-geostationary fixed-satellite service systems in the frequency bands 37.5-39.5 GHz, 39.5-42.5 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that geostationary-satellite (GSO) and non-geostationary-satellite (non-GSO) fixed-satellite service (FSS) networks may operate in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space);

b) that the World Radiocommunication Conference (Sharm el-Sheikh, 2019) adopted Nos. **22.5L** and **22.5M**, which contain single-entry and aggregate limits for non-GSO FSS systems in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) to protect GSO networks operating in the same frequency bands;

c) that the ITU Radiocommunication Sector (ITU-R) has developed a methodology, contained in Recommendation ITU-R S.1503, that results in the equivalent power flux-density (epfd) generated by any one non-GSO FSS system considered and a GSO location that corresponds to the worst-case geometry that generates the highest levels of epfd into potentially affected GSO earth stations and satellites,

recognizing

a) that, in accordance with calculations utilizing Recommendation ITU-R S.1503, verification of the worldwide epfd interference of any one non-GSO system can be carried out by a set of generic GSO reference link budgets having characteristics that encompass global GSO network deployments that are independent of any specific geographic locations;

b) that Resolution **769 (WRC-19)** addresses the protection of GSO networks from aggregate emissions from non-GSO systems,

resolves

1 that during the examination under Nos. **9.35** and **11.31**, as applicable, of a non-GSO FSS satellite system with frequency assignments in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space), compliance with No. **22.5L** shall be verified using the technical characteristics of generic GSO reference links contained in Annex 1 to this Resolution and Recommendation ITU-R S.2157-0;

2 that frequency assignments to non-GSO FSS systems referred to in *resolves* 1 shall receive a favourable finding with respect to the single-entry provision given in No. **22.5L** if compliance with No. **22.5L** is established under *resolves* 1, otherwise the assignments shall receive an unfavourable finding;

3 that, if the Radiocommunication Bureau (BR) is unable to examine non-GSO FSS systems subject to the single-entry provision given in No. **22.5L** due to a lack of available software, the notifying administration shall provide all necessary information sufficient to demonstrate compliance with No. **22.5L** and send BR a commitment that the non-GSO FSS system complies with the limits given in No. **22.5L**;

4 that frequency assignments to non-GSO FSS systems that cannot be assessed under *resolves* 1 shall receive a qualified favourable finding under Nos. **9.35** and **11.31** with respect to No. **22.5L** if *resolves* 3 is satisfied, otherwise the assignments shall receive an unfavourable finding;

5 that, if an administration believes that a non-GSO FSS system for which the commitment referred to in *resolves* 3 was sent has the potential to exceed the limits given in No. **22.5L**, it may request additional information from the notifying administration with regard to compliance with these limits and No. **22.2**, and both administrations shall cooperate to resolve any difficulties, with the assistance of BR, if so requested by either of the parties;

6 that *resolves* 3, 4 and 5 shall no longer be applied after BR has communicated to all administrations via a circular letter that validation software is available and BR is able to verify compliance with the limits in No. **22.5L**,

invites the ITU Radiocommunication Sector

1 to study and, as appropriate, develop a functional description that could be used to develop software for the procedures outlined in *resolves* 1 above;

2 to review and, as appropriate, provide updates to the generic GSO reference links in Annex 1 to this Resolution under Resolution **86 (Rev.WRC-07)**,

instructs the Director of the Radiocommunication Bureau

1 to take all necessary measures to facilitate the implementation of this Resolution, in particular to accelerate the development of the validation software;

2 to send, once the validation software as described in *resolves* 3 above is available, a letter to administrations having submitted coordination requests and/or notification information for frequency assignments to non-GSO FSS satellite systems for which a qualified favourable finding has been issued under *resolves* 4, to offer the possibility to modify, within 90 days of the publication of the Circular Letter referred to in *resolves* 6, their associated Appendix **4** parameters, limited to items listed under A.4.b.6*bis*, A.4.b.6.a, A.4.b.7 and A.14, and to retain the protection date of the initial frequency assignments provided that the modified frequency assignments receive a favourable finding under No. **9.35** or No. **11.31**, as applicable, with respect to No. **22.5L**;

3 to review, once the validation software as described in *resolves* 3 is available, BR's findings made in accordance with Nos. **9.35** and **11.31** under *resolves* 4.

ANNEX 1 TO RESOLUTION 770 (REV.WRC-23)

Generic GSO reference links for evaluation of compliance with single-entry requirements for non-GSO systems

The data in this Annex are to be regarded as a generic range of representative technical characteristics of GSO network deployments that are independent of any specific geographic location, to be used only for establishing the interference impact of a non-GSO system into GSO networks and not as a basis for coordination between satellite networks.

TABLE 1

Parameters of generic GSO reference links to be used in examination of the downlink (space-to-Earth) impact from any one non-GSO system

1	**Generic GSO reference link parameters - service**					**Parameters**
	Link type	User #1	User #2	User #3	Gateway	
1.1	E.i.r.p. density (dBW/MHz)	44	44	40	36	*eirp*
1.2	Equivalent antenna diameter (m)	0.45	0.6	2	9	D_m
1.3	Bandwidth (MHz)	1	1	1	1	B_{MHz}
1.4	ES antenna gain pattern	S.1428	S.1428	S.1428	S.1428	
1.5	Additional link losses (dB) This field includes non-precipitation impairments	3	3	3	3	L_o
1.6	Additional noise contribution including margin for inter-system interference (dB)	2	2	2	2	M_{0inter}
1.7	Additional noise contribution including margin for intra-system interference (dB) and non-time varying sources	1	1	1	1	M_{0intra}

2	**Generic GSO reference link parameters - parametric analysis**	**Parametric cases for evaluation**						
2.1	E.i.r.p. density variation	−3, 0, +3 dB from value in 1.1						Δ*eirp*
2.2	Elevation angle (deg)	20			55		90	ε
2.3	Rain height (m) for specified latitude in item 2.4	5 000	3 950	1 650	5 000	3 950	5 000	h_{rain}
2.4	Latitude* (deg. *N*)	0	± 30	± 61.8	0	± 30	0	Lat
2.5	ES noise temperature (K)	340						*T*
2.6	0.01% rain rate (mm/hr)	10, 50, 100						$R_{0.01}$
2.7	Height of ES above mean sea level (m)	0, 500, 1 000						h_{ES}

2.8	Threshold *C*/*N* (dB)	−2.5, 2.5, 5, 10	$\left(\frac{C}{N}\right)_{Thr,i}$
2.9	Probability of non-zero rain attenuation	10	p_{max} (%)

NOTE – For items 2.2, 2.3 and 2.4, these three groups of data are be considered as unique sets of data to be used in the larger, overall set of total possible permutations. For example, 20 degrees of elevation angle will consider three different latitudes of 0, 30 and 61.8 degrees while 90 degrees of elevation will only consider a latitude of 0 degrees and one possible rain height 5 km. The above parameters are chosen as representative propagation parameters for purposes of calculations of precipitation fade statistics. These precipitation fades are representative of other geographic locations.

* Latitude is evaluated as a single value representing the absolute value of the latitude

TABLE 2

Parameters of generic GSO reference links to be used in examination of the uplink (Earth-to-space) impact from any one non-GSO system

1	**Generic GSO reference link parameters - service**					
	Link type	Link #1	Link #2	Link #3	Gateway	
1.1	ES e.i.r.p. density (dBW/MHz)	49	49	49	60	*eirp*
1.2	Bandwidth (MHz)	1	1	1	1	B_{MHz}
1.3	Half-power beamwidth (deg)	0.2	0.3	1.5	0.3	
1.4	ITU-R S.672 sidelobe level (dB)	−25	−25	−25	−25	
1.5	Satellite antenna peak gain (dBi)	58.5	54.9	38.5	54.9	G_{max}
1.6	Additional link losses (dB) This field includes non-precipitation impairments	4.5	4.5	4.5	4.5	L_o
1.7	Additional noise contribution including margin for inter-system interference (dB)	2	2	2	2	M_{0inter}
1.8	Additional noise contribution including margin for intra-system interference (dB) and non-time varying sources	1	1	1	1	M_{0intra}

2	**Generic GSO reference link parameters - parametric analysis**	**Parametric cases for evaluation**						
2.1	E.i.r.p. density variation	−6, 0, +6 dB from value in 1.1						$\Delta eirp$
2.2	Elevation angle (deg)	20			55		90	ε
2.3	Rain height (m) for specified latitude in item 2.4	5 000	3 950	1 650	5 000	3 950	5 000	h_{rain}
2.4	Latitude* (deg. *N*)	0	± 30	± 61.8	0	± 30	0	Lat
2.5	0.01% rain rate (mm/hr)	10, 50, 100						$R_{0.01}$
2.6	Height of ES above mean sea level (m)	0, 500, 1 000						h_{ES}
2.7	Satellite noise temperature (K)	500, 1 600						T
2.8	Threshold *C*/*N* (dB)	−2.5, 2.5, 5, 10						$\left(\frac{C}{N}\right)_{Thr,i}$
2.9	Probability of non-zero rain attenuation	10						p_{max} (%)

NOTE – For items 2.2, 2.3 and 2.4, these three groups of data are be considered as unique sets of data to be used in the larger, overall set of total possible permutations. For example, 20 degrees of elevation angle will consider three different latitudes of 0, 30 and 61.8 degrees while 90 degrees of elevation will only consider a latitude of 0 degrees and one possible rain height 5 km. The above parameters are chosen as representative propagation parameters for purposes of calculations of precipitation fade statistics. These precipitation fades are representative of other geographic locations.

* Latitude is evaluated as a single value representing the absolute value of the latitude

Agenda item 10

MOD

RESOLUTION 775 (REV.WRC-23)

Power flux-density and equivalent isotropically radiated power limits for inclusion in Article 21 for the fixed-satellite, mobile-satellite and broadcasting-satellite services to protect the fixed and mobile services in the frequency bands 71-76 GHz and 81-86 GHz

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that WRC-2000 made a number of different allocation changes to the frequency bands 71-76 GHz and 81-86 GHz based on the requirements known at the time;

b) that sharing conditions between the fixed service, mobile service and satellite services in the frequency bands 71-76 GHz and 81-86 GHz could not be fully developed at WRC-2000 due to lack of available information on these services at the time;

c) that, in the last two decades, there have been a number of significant technology advances and changes in network requirements in the fixed and mobile services, and the frequency bands 71-76 GHz and 81-86 GHz have become strategically important frequency bands for high-capacity fixed-service links, including backhaul for future mobile networks;

d) that there is now much more information available in the ITU Radiocommunication Sector (ITU-R) on the characteristics and deployment of fixed-service systems;

e) that there are an increasing number of satellite filings in the frequency bands 71-76 GHz and 81-86 GHz and some satellites are equipped with payload ready to utilize these bands,

noting

a) that the frequency band 81-86 GHz is allocated to the radio astronomy service on a primary basis, and that No. **5.149** applies;

b) that WRC-12 already addressed sharing and compatibility issues between the fixed and passive services in the frequency bands 71-76 GHz and 81-86 GHz and relevant adjacent frequency bands,

recognizing

a) that the frequency bands 71-76 GHz and 81-86 GHz are also allocated to other radiocommunication services and that those allocations are used by a variety of incumbent systems in many administrations, and that the protection of these services should be studied;

b) that for the determination of the incumbent services, the relevant provisions of the Radio Regulations in force apply;

c) that Article **21** and other provisions of the Radio Regulations currently do not contain the necessary technical and regulatory provisions to protect fixed and mobile service use in the frequency bands 71-76 GHz and 81-86 GHz;

d) that Resolution **750 (Rev.WRC-19)** already contains necessary provisions to protect passive services in the frequency bands and adjacent frequency bands from emissions of the fixed service in the frequency bands 71-76 GHz and 81-86 GHz, and there is no intention to change these provisions;

e) that there is no intention to remove the existing allocations or change the primary status of those allocations in Article **5** for the frequency bands 71-76 GHz and 81-86 GHz,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

the appropriate studies to determine power flux-density (pfd) and equivalent isotropically radiated power (e.i.r.p.) limits to be included in Article **21** for satellite services (fixed-satellite service (FSS), mobile-satellite service (MSS) and broadcasting-satellite service (BSS)) to protect the current and planned fixed and mobile services in the frequency bands 71-76 GHz and 81-86 GHz,

invites administrations

to participate actively in the studies by submitting contributions to ITU-R,

invites the 2027 world radiocommunication conference

to consider, based on the results of studies, the inclusion of pfd and e.i.r.p. limits in Article **21** for the FSS, MSS and BSS to protect the current and planned fixed and mobile services in the frequency bands 71-76 GHz and 81-86 GHz.

MOD

RESOLUTION 804 (REV.WRC-23)

Principles for establishing agendas for world radiocommunication conferences

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that, in accordance with No. 118 of the ITU Convention, the general scope of the agendas for world radiocommunication conferences (WRCs) should be established four to six years in advance;

b) Article 13 of the ITU Constitution relating to the competence and scheduling of WRCs and Article 7 of the Convention relating to their agendas;

c) that No. 92 of the Constitution and Nos. 488 and 489 of the Convention require conferences to be fiscally responsible;

d) that, in Resolution 71 (Rev. Marrakesh, 2002), concerning the strategic plan of the Union, the Plenipotentiary Conference noted the increasingly complex and lengthy agendas for WRCs;

e) that Resolution 80 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference and Resolution **72 (Rev.WRC-19)** recognize the positive contribution of regional telecommunication organizations and informal groups and the need for improved efficiency and fiscal prudence;

f) the relevant Resolutions of previous WRCs;

g) that Resolution ITU-R 2-8 describes the principles of the organization of the work of the Conference Preparatory Meeting (CPM), including the reporting of contributions concerning future agenda items for information,

recognizing

a) that the number of issues addressed in agendas for future WRCs has been growing, and that, in the past, several issues could not be addressed adequately in the time allotted to WRCs, including WRC preparations;

b) that some agenda items may have a greater impact on the future of radiocommunications than others;

c) that the human and financial resources of administrations, Sector Members and ITU are limited;

d) that agendas of future WRCs include standing items, some of which could be addressed under more than one regular agenda item;

e) that there is a need to limit the agenda of WRCs and the amount of preparatory work to a manageable level for administrations and the ITU Radiocommunication Sector (ITU-R), taking account of the needs of developing countries, in a manner that allows the issues to be dealt with equitably and efficiently;

f) that, in accordance with No. 90 of the Constitution, the interval between WRCs should normally be three to four years, to ensure that changes in technology and requirements of Member States are adequately reflected in WRC agendas;

g) that administrations and regional telecommunication organizations need sufficient time to coordinate, evaluate and examine the potential consequences of proposed new items for inclusion in the agendas of future WRCs;

h) that during the study cycle for preparation of a WRC, the ITU-R studies identified in Resolutions associated with the agenda of that WRC should be carried out within ITU-R, and not by other international organizations,

resolves

1 that recommended agendas for future WRCs shall include a standing agenda item for the establishment of preliminary agendas for subsequent WRCs;

2 that the course of action outlined in this Resolution needs to be taken into account in the preparation of and decision on the agenda of future WRCs;

3 that the principles in Annex 1 to this Resolution need to be taken into account when developing agendas for future WRCs;

4 that the guidance given in Annex 2 to this Resolution needs to be used in developing agenda items for future WRCs and their supporting resolutions;

5 to encourage administrations and regional telecommunication organizations to submit, to the extent practicable, information on possible items/topics for the agenda of future WRCs under the WRC standing agenda item mentioned in *resolves* 1 to the second session of CPM,

invites administrations

1 to use the guidance in Annex 2 to this Resolution in developing agenda items for future WRCs and their supporting resolutions;

2 to use the template in Annex 3 to this Resolution in proposing agenda items for future WRCs,

further invites administrations

to participate in regional activities for the preparation of agendas for future WRCs,

invites the Radiocommunication Bureau

to review and provide feedback, to the extent possible, when consulted by administrations on the development of items for the agendas of future WRCs, seeking consistency with relevant provisions of the Radio Regulations and practices of the Bureau.

ANNEX 1 TO RESOLUTION 804 (REV.WRC-23)

Principles for establishing agendas for future radiocommunication conferences

1 An agenda of a world radiocommunication conference (WRC) shall include:

1.1 items assigned to it by the ITU Plenipotentiary Conference;

1.2 items on which the Director of the Radiocommunication Bureau (BR) has been requested to report;

1.3 items concerning instructions to the Radio Regulations Board and BR regarding their activities and concerning the review of those activities.

2 In general, a WRC may decide to include on the agenda of a future WRC an item proposed by a group of administrations or an administration, if all the following conditions are met:

2.1 it addresses issues of a worldwide or regional character;

2.2 it is expected that changes in the Radio Regulations, including WRC Resolutions and Recommendations, may be necessary;

2.3 it addresses issues that cannot be resolved through the regular activities of the ITU Radiocommunication Sector (ITU-R) or under WRC standing agenda items;

2.4 it is expected that required studies can be completed (e.g. that appropriate ITU-R Recommendations will be approved) prior to that WRC;

2.5 resources associated with the subject are kept within a range which is manageable for Member States and Sector Members, BR and ITU-R study groups and the Conference Preparatory Meeting;

3 Items that meet the requirements specified in section 2 of this Annex shall be included in the future WRC agenda as standalone items, and shall not be included as separate issues under the agenda item on which the Director of BR reports on ITU-R activities since the last WRC.

4 To the extent possible, agenda items arising from previous WRCs, normally reflected in Resolutions, and which have been considered by two successive WRCs, should not be considered, unless justified.

5 Inclusion of an identical topic on the agenda of two future subsequent WRCs shall strictly be avoided.

6 Issues that could be addressed through actions undertaken by a radiocommunication assembly, particularly those not involving amendments to the Radio Regulations, shall not be included in the agenda.

7 In developing agenda items for future WRCs, efforts need to be made to:

a) encourage regional and interregional coordination on the subjects to be considered in the preparatory process for WRCs, in accordance with Resolution **72 (Rev.WRC-19)** and Resolution 80 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, with a view to addressing potentially difficult issues well before a WRC;

b) include, to the extent possible, agenda items that are prepared within regional telecommunication organizations, taking into account the equal right of individual administrations to submit proposals for agenda items;

c) ensure that proposals are submitted with an indication of priority and any accompanying reasons for the indicated priority (see also Annex 3 to this Resolution);

d) include in proposals an assessment of their financial and other resource implications (with the assistance of BR) to ensure that they are within the agreed budgetary limits for ITU-R (see also Annex 3 to this Resolution);

e) ensure that the objectives and scope of proposed agenda items are complete and unambiguous (see guidance in Annex 2 to this Resolution);

f) take into account the status of ITU-R studies related to the potential agenda items before considering them as possible candidates for future agendas;

g) distinguish between items intended to result in changes to the Radio Regulations and those dealing solely with the progress of studies;

h) arrange items on the agenda by subject to the extent possible.

ANNEX 2 TO RESOLUTION 804 (REV.WRC-23)

Guidance for the development of Resolutions related to agenda items of world radiocommunication conferences

The guidance in this Annex is provided for developing the text of an agenda item of a future world radiocommunication conference (WRC) and a related supporting resolution which should contain the following sections:

– Preambular part (information/background)
  - *considering*
  - *noting*
  - *recognizing*
– Operative part (actions/tasks)
  - *resolves*
  - *instructs*
  - *invites.*

In developing the text of an agenda item of a future WRC and its supporting resolution, the following should be taken into account:

a) the text of the agenda item, the title of its supporting resolution and the operative part of that resolution should be unambiguous and consistent;

b) in selecting the terms and wording of the supporting resolution, in particular the operative part, efforts need to be made to be unambiguous, meaningful and clear;

c) in developing a supporting resolution, terms such as “constraints”, “due constraints”, “undue constraints”, “additional constraints” and “regulatory actions” and the ambiguous use of “as appropriate”, which are not quantifiable and have no regulatory consequence in the ITU Radio Regulations, should be avoided;

d) there needs to be conformity between the subject issue referred to in the preambular part of the supporting resolution and the actions required in the operative part of that resolution;

e) the preambular part of the supporting resolution needs to be kept to the minimum necessary to justify the operative part;

f) reference to the protection of incumbent services needs to be clearly specified in the supporting resolution;

g) repetition of text across different sections of the supporting resolution should be kept to a minimum, while references to existing provisions of the Radio Regulations and/or other sections of the supporting resolution should be used to the extent possible.

The below guidance in the form of a draft new Resolution provides an example addressing the study of the introduction of new service allocations and/or systems. In order to address different situations, variations of the guidance should be considered.

Below, guidance is provided in the form of NOTES for each section.

DRAFT NEW RESOLUTION [A10-Y.YY] (WRC-ZZ)

Title of the Resolution(NOTES 1 and 2)

The World Radiocommunication Conference (PLACE, YEAR),

considering(NOTES 3, 5 and 7)

(…),

considering further(NOTES 4, 5 and 7)

(…),

noting(NOTES 6, 7 and 9)

(…),

noting further(NOTES 7, 8 and 9)

(…),

recognizing(NOTES 7, 10 and 12)

a) that {the frequency bands/ranges under consideration} are also allocated to other radiocommunication services {on a primary basis} and that those allocations are used by a variety of incumbent systems in many administrations {throughout Region X}, {and that the protection of these services should be studied};

b) that for the determination of the incumbent services, the relevant provisions of the Radio Regulations in force apply;

c) (…),

recognizing further(NOTES 7, 11 and 12)

(…),

resolves to invite the ITU Radiocommunication Sector to complete in time for the ZZZZ world radiocommunication conference(NOTE 15)

1 studies on {relevant} spectrum requirements and technical and operational characteristics, for the {new entrant};

2 (…),(NOTES 13 and 14)

invites administrations

to participate actively in the studies and provide the information required for the studies listed under *resolves to invite the ITU Radiocommunication Sector to complete in time for the ZZZZ world radiocommunication conference* by submitting contributions to ITU-R,

invites the ZZZZ world radiocommunication conference(NOTE 16)

to …, based on results of studies, …,

invites relevant international organizations(NOTES 17 and 20)

to participate actively in the relevant ITU-R studies by providing information that should be taken into account in ITU-R studies,

instructs the Director of the Radiocommunication Bureau(NOTES 17, 18, 20 and 21)

(…),

instructs the Secretary-General(NOTES 17, 19, 20 and 21)

(…).(NOTE 22)

NOTE 1 The title of the Resolution related to an agenda item Y.YY should refer to the desired objective of that WRC-ZZ agenda item, with the same wording as listed in section Y.YY of the Resolution containing the agenda of that future WRC-ZZ.

NOTE 2 The title may start “Studies on/Consideration of ...” to bridge to the objective of the agenda item, emphasizing that the Resolution primarily relates to the studies to be provided by ITU-R to the competent WRC as a basis for the relevant decision.

NOTE 3 The content of the considering section should primarily aim to qualify the demand/objective under consideration and thus provide the baseline justification for approving a WRC agenda item and tasking ITU-R to perform the studies under resolves to invite the ITU Radiocommunication Sector to complete in time for the ZZZZ world radiocommunication conference. This may include an indication of the need for studies to support addressing the demand, the description of the {new entrant/revised service} or its applications. The section should also contain various general background information giving the reasons for the agenda item, including the allocations in the frequency band(s)/range(s) under consideration. Specific factual elements on current and planned usage may also be included here, as requested by the interested administrations.

NOTE 4 If there is a need to highlight any content of the considering section, that content could be listed in this section.

NOTE 5 Each considering should start with “that” and end with a semicolon “;” and be numbered a),…z), aa)…; the last considering ends with a comma “,”.

NOTE 6 The content of the noting section should aim to provide factual/relevant regulatory information through statement of existing RR Article 5 frequency allocations, regulatory references (RR No., WRC Resolution, etc.), as well as ITU-R deliverables (Recommendation, Report, Question, etc.) of relevance to the topic, including information on any relevant sharing and compatibility studies so far carried out in previous cycles, to avoid repeating studies previously performed and specific usages and use cases (e.g. secondary services and/or identification/designations in RR footnotes) in the frequency bands/ranges under consideration, as requested by administrations.

NOTE 7 The information in this section cannot be expected to be exhaustive; an omission should not have an impact on proceedings.

NOTE 8 If there is a need to highlight any content of the noting section, that content could be listed in this section.

NOTE 9 Each noting should start with “that” and end with a semicolon “;” and be numbered a),…z), aa)…; the last noting ends with a comma “,”.

NOTE 10 The content of the recognizing section should aim to set a framework for studies/future use, through recognizing assumptions or objectives for the studies to be performed by ITU-R under resolves to invite the ITU Radiocommunication Sector to complete in time for the ZZZZ world radiocommunication conference.

NOTE 11 If there is a need to highlight any content of the recognizing section, that content could be listed in this section.

NOTE 12 Each recognizing should start with “that” and end with a semicolon “;” and be numbered a),…z), aa)…; the last recognizing ends with a comma “,”.

NOTE 13 This section should indicate study tasks for ITU-R – regulatory, technical, operational and/or procedural, including the necessary sharing and compatibility studies, as required, to ensure the protection of incumbent primary services. This section should be complete and provide the fundamental elements necessary for WRC action.

NOTE 14 The development of the Resolution should consider, on request by administrations, the following:
– passive services,
– secondary services,
– services and their specific conditions of use as outlined in footnotes to the Table of Frequency Allocations and/or designation of specific frequency bands for specific applications.

NOTE 15 Each resolves to invite etc. should end with a semicolon ";" and be numbered 1, 2, 3, etc.; the last resolves to invite etc. ends with a comma ",".

NOTE 16 The invites the ZZZZ world radiocommunication conference section shall express the desired objective of the relevant agenda item in concise and unambiguous wording – the same wording shall be listed in section Y.YY of the Resolution containing the agenda of WRC-ZZ.

NOTE 17 This section is optional.

NOTE 18 This section contains instructions for performing any further required ITU-R internal actions or steps or addressing non-self-standing issues for a WRC.

NOTE 19 This section may contain instructions on the presentation of the agenda item or a related topic in the framework of the United Nations principal organs, related organizations or specialized agencies, within the United Nations system, as necessary.

NOTE 20 The instructions should be limited to the minimum necessary and are considered an optional, non-standing part of the Resolution.

NOTE 21 Each item in this section should start with "to" and end with a semicolon ";" and be numbered 1, 2, 3, etc. the last item ends with a comma ",".

NOTE 22 The Resolution ends with a full stop ".".

ANNEX 3 TO RESOLUTION 804 (REV.WRC-23)

Template for the submission of proposals for agenda items of future world radiocommunication conferences

Subject: {The main purpose/objective/topic of the proposed new agenda item needs to be provided here with clear concise wording.}

Origin:

***Proposal*:** {The exact text of the proposed agenda item for future WRCs should be provided here in a clear and unambiguous wording with a reference to its supporting resolution(s).}

***Supporting resolution*:** {The title of the draft supporting resolution for the proposed agenda item needs to be provided here.}

***Background/reason*:**

{The reason and justification for the proposal should be clearly provided, taking into account 7*c)* of Annex 1 to this Resolution.}

***Radiocommunication services concerned*:**

***Indication of possible difficulties*:**

***Previous/ongoing studies on the issue*:**

***Studies to be carried out by*:**	***with the participation of*:**

***ITU-R study groups concerned*:**

***ITU resource implications, including financial implications (refer to CV126)*:**

***Common regional proposal*:** Yes/No	***Multicountry proposal*:** Yes/No ***Number of countries*:**

Remarks

Agenda item 4

MOD

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),

considering

a) that there is a demand for global wideband satellite communication services on vessels;

b) that the technology exists that enables earth stations on board vessels (ESVs) to use fixed-satellite service (FSS) networks operating in the uplink bands 5 925-6 425 MHz and 14-14.5 GHz;

c) that ESVs are currently operating through FSS networks in the bands 3 700-4 200 MHz, 5 925-6 425 MHz, 10.7-12.75 GHz and 14-14.5 GHz under No. **4.4**;

d) that ESVs have the potential to cause unacceptable interference to other services in the bands 5 925-6 425 MHz and 14-14.5 GHz;

e) that, with respect to the bands considered in this Resolution, global coverage is only available in the band 5 925-6 425 MHz and that only a limited number of geostationary FSS systems can provide such global coverage;

f) that, without special regulatory provisions, ESVs could place a heavy coordination burden on some administrations, especially those in developing countries;

g) that, in order to ensure the protection and future growth of other services, ESVs need to operate under certain technical and operational limitations;

h) that, within ITU-R studies, based on agreed technical assumptions, minimum distances from the low-water mark as officially recognized by the coastal State have been calculated, beyond which an ESV will not have the potential to cause unacceptable interference to other services in the bands 5 925-6 425 MHz and 14-14.5 GHz;

i) that, in order to limit the interference into other networks in the FSS, it is necessary to establish maximum off-axis e.i.r.p. density limits on ESV emissions;

j) that establishing a minimum antenna diameter for ESVs has an impact on the number of ESVs that will ultimately be deployed, hence it will reduce interference into the fixed service,

noting

a) that ESVs may be assigned frequencies to operate in FSS networks in the bands 3 700-4 200 MHz, 5 925-6 425 MHz, 10.7-12.75 GHz and 14-14.5 GHz pursuant to No. **4.4** and shall not claim protection from, nor cause interference to, other services having allocations in these bands;

b) that the regulatory procedures of Article **9** apply for ESVs operating at specified fixed points,

resolves

that ESVs transmitting in the 5 925-6 425 MHz and 14-14.5 GHz bands shall operate under the regulatory and operational provisions contained in Annex 1 and the technical limitations in Annex 2 of this Resolution,

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)**,

instructs the Secretary-General

to bring this Resolution to the attention of the Secretary-General of the International Maritime Organization.

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

1 The administration that issues the licence for the use of ESVs in these bands (licensing administration) shall ensure that such stations follow the provisions of this Annex and thus do not present any potential to cause unacceptable interference to the services of other concerned administrations.

2 ESV service providers shall comply with the technical limitations listed in Annex 2 and, when operating within the minimum distances as identified in item 4 below, with the additional limitations agreed by the licensing and other concerned administrations.

3 In the 3 700-4 200 MHz band and 10.7-12.75 GHz range, ESVs in motion shall not claim protection from transmissions of terrestrial services operating in accordance with the Radio Regulations.

4 The minimum distances from the low-water mark as officially recognized by the coastal State beyond which ESVs can operate without the prior agreement of any administration are 300 km in the 5 925-6 425 MHz band and 125 km in the 14-14.5 GHz band, taking into account the technical limitations in Annex 2. Any transmissions from ESVs within the minimum distances shall be subject to the prior agreement of the concerned administration(s).

5 The potentially concerned administrations referred to in the previous item 4 are those where fixed or mobile services are allocated on a primary basis in the Table of Frequency Allocations of the Radio Regulations:

Frequency bands	Potentially concerned administrations
5 925-6 425 MHz	All three Regions
14-14.25 GHz	Countries listed in No. **5.505**, except those listed in No. **5.506B**
14.25-14.3 GHz	Countries listed in Nos. **5.505**, **5.508** and **5.509**, except those listed in No. **5.506B**
14.3-14.4 GHz	Regions 1 and 3, except countries listed in No. **5.506B**
14.4-14.5 GHz	All three Regions, except countries listed in No. **5.506B**

6 The ESV system shall include means of identification and mechanisms to immediately cease emissions, whenever the station does not operate in compliance with the provisions of items 2 and 4 above.

7 Cessation of emissions as referred to in item 6 above shall be implemented in such a way that the corresponding mechanisms cannot be bypassed on board the vessel, except under the provisions of No. **4.9**.

8 ESVs shall be equipped so as to:

– enable the licensing administration under the provisions of Article **18** to verify earth station performance; and

– enable the cessation of ESV emissions immediately upon request by an administration whose services may be affected.

9 Each licence-holder shall provide a point of contact to the administration with which agreements have been reached for the purpose of reporting unacceptable interference caused by the ESV.

10 When ESVs operating beyond the territorial sea but within the minimum distance (as referred to in item 4 above) fail to comply with the terms required by the concerned administration pursuant to items 2 and 4, then that administration may:

– request the ESV to comply with such terms or cease operation immediately; or

– request the licensing administration to require such compliance or immediate cessation of the operation.

ANNEX 2 TO RESOLUTION 902 (REV.WRC-23)

Technical limitations applicable to ESVs transmitting in the frequency 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 m[1]
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. density[2]	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.

Off-axis limits

For earth stations on board vessels operating in the 5 925-6 425 MHz band, at any angle φ specified below, off the main-lobe axis of an earth-station antenna, the maximum e.i.r.p. in any direction within 3° of the GSO shall not exceed the following values:

5 925-6 425 MHz

Angle off-axis	*Maximum e.i.r.p. per 4 kHz band*
$2.5° \leq \varphi \leq 7°$	$(32 - 25 \log \varphi)$ dB(W/4 kHz)
$7° < \varphi \leq 9.2°$	11 dB(W/4 kHz)
$9.2° < \varphi \leq 48°$	$(35 - 25 \log \varphi)$ dB(W/4 kHz)
$48° < \varphi \leq 180°$	−7 dB(W/4 kHz)

For ESV operating in the 14-14.5 GHz band, at any angle φ specified below, off the main-lobe axis of an earth station antenna, the maximum e.i.r.p. in any direction within 3° of the GSO shall not exceed the following values:

14.0-14.5 GHz

Angle off-axis	*Maximum e.i.r.p. per 40 kHz band*
$2° \leq \varphi \leq 7°$	$(33 - 25 \log \varphi)$ dB(W/40 kHz)
$7° < \varphi \leq 9.2°$	12 dB(W/40 kHz)
$9.2° < \varphi \leq 48°$	$(36 - 25 \log \varphi)$ dB(W/40 kHz)
$48° < \varphi \leq 180°$	−6 dB(W/40 kHz)

Agenda item 1.11

ADD

RESOLUTION COM4/1 (WRC-23)

Coordination of services provided by the NAVDAT system

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the International Maritime Organization (IMO) coordinates the operational aspects of services provided by the NAVDAT system, such as allocation of transmitter identification and time schedules, in the planning stages for transmissions on the frequencies 500 kHz and/or 4 226 kHz and other frequencies which are specified in No. **5.79** and Appendix **15**;

b) that coordination in the frequencies 500 kHz and/or 4 226 kHz, and other frequencies which are specified in No. **5.79** and Appendix **15**, is essentially operational,

resolves

to invite administrations to apply the procedures established by IMO, taking into account the IMO NAVDAT manual, for coordinating the use of the frequencies 500 kHz and/or 4 226 kHz, and other frequencies which are specified in No. **5.79** and Appendix **15**,

instructs the Secretary-General

to invite IMO to provide ITU with information on a regular basis on operational coordination for services provided by the NAVDAT system on the frequencies 500 kHz and/or 4 226 kHz, and other frequencies which are specified in No. **5.79** and Appendix **15**,

instructs the Director of the Radiocommunication Bureau

to publish this information in the *List of Coast Stations and Special Service Stations* (List IV) (see No. **20.7**).

Agenda item 1.7

ADD

RESOLUTION COM4/2 (WRC-23)

Use of the frequency band 117.975-137 MHz by the aeronautical mobile-satellite (R) service

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the optimization of air traffic management (ATM) over oceanic and remote areas necessitates appropriate aeronautical surveillance and communication means, in order to meet the required communication performance for reduced separation minima;

b) that the allocation of the frequency band 117.975-137 MHz to the aeronautical mobile-satellite (R) service (AMS(R)S) is intended for the relay via satellite of VHF communications under the aeronautical mobile (R) service (AM(R)S), in order to complement terrestrial communication infrastructures when aircraft are operating in oceanic and remote areas;

c) that the AM(R)S VHF channels have become congested in some areas and AMS(R)S systems need to operate in such a manner as not to constrain AM(R)S VHF systems, without modification to aircraft equipment,

noting

a) that there are Standards and Recommended Practices (SARPs) developed by the International Civil Aviation Organization (ICAO) detailing frequency assignment planning criteria for AM(R)S VHF communication systems;

b) that frequency assignment planning between stations operated under the AM(R)S allocation in the frequency band 117.975-137 MHz is performed by competent organizations under ICAO provisions;

c) that the development of compatibility criteria between AMS(R)S systems proposed for operations under *considering b)* and ICAO-standardized aeronautical systems in the frequency band 117.975-137 MHz is the responsibility of ICAO;

d) that feeder links of AMS(R)S systems are not planned to be operated in the frequency band 117.975-137 MHz,

recognizing

a) that the frequency band 117.975-137 MHz is allocated on a primary basis to the AM(R)S and is used by air-ground, air-air and ground-air systems operated in accordance with ICAO SARPs, providing critical voice and data communications for ATM on a global basis;

b) that Annex 10 to the Convention on International Civil Aviation contains SARPs for safety aeronautical radionavigation and radiocommunication systems used by international civil aviation,

resolves

1 that the notifying administration for the AMS(R)S satellite system authorizing the use of the frequency band 117.975-137 MHz by this system shall take into account relevant ICAO

frequency assignment planning procedures in relation to *noting b)*;

2 that, taking into account *resolves* 1, the frequency band 117.975-137 MHz may also be used by AMS(R)S experimental systems during the period of time that the relevant SARPs are being developed and before operational deployment;

3 that the interference from out-of-band emissions of the AMS(R)S space station operating in the frequency band 117.975-137 MHz to adjacent channels of the AM(R)S airborne receiving stations shall not be more than the interference from out-of-band emissions of AM(R)S aircraft stations;

4 that, in accordance with ICAO frequency assignment planning procedures the identification or selection of channels for use by AMS(R)S shall:

– take into account the operational deployment of stations operating in the AM(R)S and, when available, the aeronautical mobile (OR) service (AM(OR)S);

– not adversely affect the potential future modifications of AM(R)S channel planning when required;

5 that in assigning frequencies to stations in the AM(OR)S, the administration needs to take into account the frequencies assigned to the AMS(R)S for which coordination under Nos. **9.14** and **9.15** has been agreed to between both administrations involved in the coordination process;

6 that, space stations operating in the frequency band 117.975-137 MHz in the AMS(R)S shall not have out-of-band emissions into the frequency band 137-138 MHz that exceed a power flux-density of −170 dB(W/(m² · 14 kHz)) at the Earth's surface;

7 that, in the frequency band 136.8-137 MHz, AMS(R)S space station receivers shall be designed to be resilient to the interference environment resulting from satellite systems operating in the frequency band 137-138 MHz; the power level(s) contained in the Annex to this Resolution and associated percentage(s) of time are to be taken into account in the development of relevant ICAO SARPs,

instructs the Secretary-General

to bring this Resolution to the attention of ICAO and the International Maritime Organization,

invites the International Civil Aviation Organization

to take into account this Resolution in the course of developing SARPs for the AMS(R)S and planning the AM(R)S and AMS(R)S in the frequency band 117.975-137 MHz.

ANNEX TO RESOLUTION COM4/2 (WRC-23)

The following table provides the power levels for several percentages of time for the AMS(R)S space station channel centre frequency between 136.8 and 136.975 MHz:

Power level (dBW/25 kHz)		**AMS(R)S space station channel centre frequency (MHz)**							
		136.8	**136.825**	**136.85**	**136.875**	**136.9**	**136.925**	**136.95**	**136.975**
% of time	50	−207	−205	−203	−201	−195.75	−190.5	−185.25	−180
	10	−184	−182	−180	−178	−172.75	−167.5	−162.25	−157
	1	−175	−173	−171	−169	−163.75	−158.5	−153.25	−148
	0.1	−167	−165	−163	−161	−155.75	−150.5	−145.25	−140
	0.01	−161	−159	−157	−155	−149.75	−144.5	−139.25	−134
	0.001	−155	−153	−151	−149	−143.75	−138.5	−133.25	−128

	0.0001	−152	−150	−148	−146	−140.75	−135.5	−130.25	−125

Agenda item 1.4

ADD

RESOLUTION COM4/3 (WRC-23)

Use of high-altitude platform stations as International Mobile Telecommunications base stations in the frequency band 694-960 MHz, or portions thereof[1]

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the favourable propagation characteristics of the frequency band 694-960 MHz are beneficial to provide cost-effective solutions for coverage, including for large areas of low population density;

b) that the operation of high-altitude platform stations (HAPS) as International Mobile Telecommunications (IMT) base stations (HIBS) in the same geographical area with existing services may create compatibility issues;

c) that it is necessary to adequately protect existing services in this frequency band;

d) that there is growing demand for access to mobile broadband, requiring more flexibility in approaches to expanding the capacity and coverage provided by IMT systems;

e) that HIBS would be used as part of terrestrial IMT networks and may use the same frequency bands as ground-based IMT base stations in order to provide mobile-broadband connectivity to underserved communities, and in rural and remote areas;

f) that HIBS would 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;

g) that the use of HIBS is optional for administrations, and that such use should not have any priority over other terrestrial IMT use;

h) that the mobile station to be served, whether by HIBS or ground-based IMT base stations, is the same, and currently supports a variety of the frequency bands identified for IMT;

i) that, under certain deployment scenarios, platform transmissions in the frequency band 694-960 MHz may occur at altitudes down to 18 km, and some sensitivity studies have shown that the difference of interference at this altitude would be negligible;

j) that the ITU Radiocommunication Sector (ITU-R) has addressed sharing and compatibility between HIBS and existing systems of primary allocated services in the frequency band 694-960 MHz, and services in the adjacent bands,

recognizing

a) that, in Article **5**, the frequency band 694-960 MHz, or parts thereof, is allocated on a primary basis to various services;

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[1] HIBS: High-altitude platform station as IMT base station. The conditions in this Resolution refer to these platforms operating between 18 km and 25 km.

b) that the use of the frequency band 470-862 MHz by the broadcasting service and other primary services in Region 1 (except Mongolia) and the Islamic Republic of Iran is covered by the GE06 Agreement;

c) that a 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;

d) that the frequency band 694-960 MHz, or parts thereof, are identified for IMT in accordance with Nos. **5.313A** and **5.317A**;

e) that these frequency bands are allocated to the fixed and mobile services on a co-primary basis,

emphasizing

that the requirements of the different services to which the frequency band is allocated, including the mobile, aeronautical radionavigation (in accordance with Nos. **5.312** and **5.323**), fixed and broadcasting services, shall be taken into account,

resolves

1 that use of the frequency band 694-960 MHz in accordance with Nos. **5.14A** and **5.14B**, is subject to agreement obtained under No. **9.21** with respect to the affected aeronautical radionavigation service (ARNS) in countries listed in Nos. **5.312** and **5.323** based on the criteria contained in Annex 1 to this Resolution;

2 that HIBS operating in the frequency band 694/698-862 MHz shall not cause harmful interference to, nor claim protection from, the broadcasting service; where the GE06 Agreement applies, the power flux-density (pfd) level per HIBS shall not exceed −135.8 dB(W/(m^2 · MHz)), produced in the territory of other administrations, at a height of 10 metres unless explicit agreement of the affected administration is provided at the time of the notification of HIBS;

3 that, where the GE06 Agreement does not apply, the use of the frequency band 694/698-862 MHz by HIBS is subject to agreement obtained under No. **9.21** with respect to the broadcasting service in the territory of other administrations; the coordination threshold of the pfd level of −135.8 dB(W/(m^2 · MHz)), produced in the territory of other administrations, per HIBS shall be used at a height of 10 metres;

4 that administrations wishing to implement HIBS shall comply with the following:

4.1 for the purpose of protecting the mobile service, including IMT terrestrial systems, in the territory of neighbouring administrations in the frequency band 694-960 MHz, the following limits shall apply:

– the pfd level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit for the protection of IMT mobile stations, unless explicit agreement of the affected administration is provided:

-114 dB(W/(m^2 · MHz)) for $0° < \theta \leq 90°$

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

– the pfd level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit for the protection of IMT base stations, unless explicit agreement of the affected administration is provided:

$-136 + 0.21\ (\theta)^2$ dB(W/(m^2 · MHz)) for $0° \leq \theta \leq 8.3°$

$-121.8 + 0.08\ (\theta)$ dB(W/(m^2 · MHz)) for $8.3° < \theta \leq 90°$

where θ is the angle of arrival of the incident wave above the horizontal plane, in degrees[2];

4.2 for the purpose of protecting mobile services including IMT terrestrial systems in the territory of Armenia, Azerbaijan, Belarus, the Russian Federation, Kazakhstan, Mongolia, Uzbekistan, Kyrgyzstan, the Democratic People's Republic of Korea, Tajikistan and Turkmenistan in the frequency band 694-960 MHz, the pfd level per HIBS produced at the surface of the Earth in the territory of the countries listed above in this *resolves* shall not exceed the following limits, unless explicit agreement of the affected administration is provided:

−150	dB(W/(m^2 · MHz))	for	0° ≤ θ < 11°
−150 + 0.3912 (θ-11)	dB(W/(m^2 · MHz))	for	11° ≤ θ < 80°
−123	dB(W/(m^2 · MHz))	for	80° ≤ θ ≤ 90°

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

4.3 for the purpose of protecting fixed services in the territory of Armenia, Azerbaijan, Belarus, the Russian Federation, Kazakhstan, Mongolia, Uzbekistan, Kyrgyzstan, the Democratic People's Republic of Korea, Tajikistan and Turkmenistan in the frequency band 694-960 MHz, the pfd level per HIBS produced at the surface of the Earth in the territory of the countries listed above in this *resolves* shall not exceed the following limits, unless explicit agreement of the affected administration is provided:

−150	dB(W/(m^2 · MHz))	for	0° ≤ θ < 11°
−150 + 0.3912 (θ-11)	dB(W/(m^2 · MHz))	for	11° ≤ θ < 80°
−123	dB(W/(m^2 · MHz))	for	80° ≤ θ ≤ 90°

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

5 that administrations intending to implement HIBS systems shall notify, in accordance with Article **11**, the frequency assignments to transmitting and receiving HIBS by submitting all mandatory elements of Appendix **4** to the Radiocommunication Bureau for the examination of compliance with the conditions specified in the *resolves* above;

6 that the notifying administration of HIBS at the time of submission of the Appendix **4** information shall provide a firm, objective, actionable, measurable and enforceable commitment to the Bureau to immediately eliminate unacceptable interference to existing primary services or reduce it to an acceptable level should such interference occur,

invites administrations

1 to adopt appropriate frequency arrangements for HIBS in order to consider the benefits of harmonized utilization of the spectrum for HIBS and protection of existing services and systems operating on a primary basis taking into account the *resolves* above and the relevant ITU-R Recommendations and Reports;

2 to review their entries for the broadcasting service in the Master International Frequency Register in the frequency band above 694 MHz and to remove those no longer required according to Article **8**,

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[2] The pfd levels to protect IMT base stations will apply unless the affected administration informs the Radiocommunication Bureau that only terminal stations need to be protected.

instructs the Director of the Radiocommunication Bureau

to take all necessary measures to implement this Resolution.

ANNEX 1 TO RESOLUTION COM4/3 (WRC-23)

Criteria for identifying potentially affected administrations with respect to the aeronautical radionavigation service in countries listed in Nos. 5.312 and 5.323

To identify potentially affected administrations when applying the procedure for seeking agreement under No. **9.21** for HIBS in the mobile service with respect to the aeronautical radionavigation service (ARNS) station operating in countries mentioned in Nos. **5.312** and **5.323**, the coordination distances (between a HIBS in the mobile service and a potentially affected ARNS station) indicated below should be used.

When applying the procedure for seeking agreement under No. **9.21**, notifying administrations may indicate in the notice sent to the Radiocommunication Bureau the list of administrations with which a bilateral agreement has already been reached. The Bureau shall take this into account in determining the administrations with which coordination under No. **9.21** is required.

Coordination distances for transmitting HIBS of MS (km)	**Coordination distances for receiving HIBS of MS (km)**
$4.1\left(\sqrt{h_1}+\sqrt{h_2}\right)$	$4.1\left(\sqrt{h_1}+\sqrt{h_3}\right)+R$

h_1 is ARNS stations height (10 000 m).

h_2 is HIBS stations height (between 18 000 and 25 000 m).

h_3 is IMT mobile stations height (1.5 m).

R is radius of HIBS service area in km.

ADD

RESOLUTION COM4/4 (WRC-23)

Use of high-altitude platform stations as International Mobile Telecommunications base stations in the frequency band 2 500-2 690 MHz, or portions thereof[1]

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that there is growing demand for access to mobile broadband, requiring more flexibility in the approaches to expand the capacity and coverage provided by International Mobile Telecommunications (IMT) systems;

b) that high-altitude platform stations (HAPS) as IMT base stations (HIBS) would be used as part of terrestrial IMT networks and may use the same frequency bands as ground-based IMT base stations in order to provide mobile-broadband connectivity to underserved communities, and in rural and remote areas;

c) that HIBS would 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 HIBS is optional for administrations, and that such use should not have any priority over other terrestrial IMT use;

e) that the mobile station to be served, whether by HIBS or ground-based IMT base stations, is the same, and currently supports a variety of the frequency bands identified for IMT;

f) that, under certain deployment scenarios, platform transmissions in the frequency band 2 500-2 690 MHz may occur at altitudes down to 18 km, and some sensitivity studies have shown that the difference of interference at this altitude would be negligible;

g) that the ITU Radiocommunication Sector (ITU-R) has addressed sharing and compatibility between HIBS and existing systems of primary allocated services in the frequency band 2 500-2 690 MHz and services in the adjacent bands;

h) that the frequency band 2 690-2 700 MHz is allocated to the Earth exploration-satellite service (passive), the space research service (passive) and the radio astronomy service, and that No. **5.340** applies in this frequency band,

recognizing

a) that a 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;

b) that, in Regions 1 and 2, the frequency band 2 500-2 690 MHz (the frequency band 2 500-2 510 MHz is limited to reception by HIBS in Regions 1 and 2), and, in Region 3, the frequency band 2 500-2 655 MHz (the frequency band 2 500-2 535 MHz is limited to reception by HIBS in Region 3) are included in No. **5.14C** for the use of HIBS;

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[1] HIBS: High-altitude platform station as IMT base station. The conditions in this Resolution refer to these platforms operating between 18 km and 25 km.

c) that the frequency band 2 500-2 690 MHz, or parts thereof, is identified for IMT in accordance with No. **5.384A**;

d) that this frequency band is allocated to the fixed and mobile services on a co-primary basis;

e) that, in the frequency band 2 700-2 900 MHz, ground-based meteorological radar stations under the radiolocation service are authorized to operate on a basis of equality with stations of the aeronautical radionavigation service, according to No. **5.423**,

resolves

1 that administrations wishing to implement HIBS shall comply with the following:

1.1 for the purpose of protecting the mobile service, including IMT terrestrial systems in the territory of other administrations in the frequency band 2 500-2 690 MHz, the power flux-density (pfd) level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limits:

– the pfd level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit for the protection of IMT mobile stations, unless explicit agreement of the affected administration is provided:

-109 dB(W/(m2 · MHz)) for $0° < \theta \leq 90°$

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

– the pfd level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit for the protection of IMT base stations, unless explicit agreement of the affected administration is provided:

-144.55 dB(W/(m2 · MHz)) for $0° \leq \theta < 11°$

$-144.55 + 0.45\ (\theta - 11)$ dB(W/(m2 · MHz)) for $11° \leq \theta < 80°$

-113.55 dB(W/(m2 · MHz)) for $80° \leq \theta \leq 90°$

where θ is the angle of arrival of the incident wave above the horizontal plane, in degrees2;

1.2 for the purpose of protecting the mobile service including IMT terrestrial systems in the territories of Armenia, Azerbaijan, Belarus, the Russian Federation, Kazakhstan, Mongolia, Uzbekistan, Kyrgyzstan, the Democratic People's Republic of Korea, Tajikistan and Turkmenistan in the frequency band 2 500-2 690 MHz, the pfd level per HIBS produced at the surface of the Earth in the territories of the countries listed above in this *resolves* shall not exceed the following limit, unless explicit agreement is received from the administration affected:

-147 dB(W/(m^2 · MHz)) for $0° \leq \theta < 11°$

$-147 + 0.45\ (\theta - 11)$ dB(W/(m^2 · MHz)) for $11° \leq \theta < 80°$

-116 dB(W/(m^2 · MHz)) for $80° \leq \theta < 90°$

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

1.3 for the purpose of protecting fixed-service systems in the territory of other administrations in the frequency band 2 500-2 690 MHz, the pfd level per HIBS produced at the

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2 The pfd levels to protect IMT base stations will apply unless the affected administration informs the Radiocommunication Bureau that only terminal stations need to be protected.

surface of the Earth in the territory of other administrations shall not exceed the following limits, unless explicit agreement of the affected administration is provided:

-148	dB(W/(m^2 · MHz))	for	$0° < \theta \leq 2°$
$-148 + 0.71\ (\theta - 2)$	dB(W/(m^2 · MHz))	for	$2° < \theta \leq 47°$
-116	dB(W/(m^2 · MHz))	for	$47° < \theta \leq 90°$

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

1.4 for the purpose of protecting the broadcasting-satellite service (BSS) in the territory of other administrations in the frequency band 2 520-2 630 MHz, the pfd level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit, unless explicit agreement is received from the administration affected:

-130.5	dB(W/(m^2 · MHz))	for	$0° < \theta \leq 20°$
-139.8	dB(W/(m^2 · MHz))	for	$20° < \theta < 90°$

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

1.4.1 in addition, in Region 3, in the frequency band 2 520-2 630 MHz, the use of HIBS shall not cause unacceptable interference to, nor claim protection from, the BSS operating in Region 3;

1.5 for the purpose of protecting aeronautical-radionavigation service systems in the territory of other administrations in the frequency band 2 700-2 900 MHz, the pfd level per HIBS operating in the frequency band 2 500-2 690 MHz produced at the surface of the Earth in the territory of other administrations shall not exceed the following unwanted emissions limit, unless explicit agreement of the affected administration is provided:

-156.2	dB(W/(m^2 · MHz))	for	$\theta \leq 7°$
$-163 + 15 \cdot \log_{10}(\theta - 4)$	dB(W/(m^2 · MHz))	for	$7° < \theta < 30.5°$
$-141 + 2.7 \cdot \log_{10}(\theta - 4)$	dB(W/(m^2 · MHz))	for	$\theta = 30.5°$
$-157 + 14 \cdot \log_{10}(\theta - 4)$	dB(W/(m^2 · MHz))	for	$30.5° < \theta \leq 40.5°$
-101.5	dB(W/(m^2 · MHz))	for	$\theta > 40.5°$

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

1.6 for the purpose of protecting radiolocation service systems in the territory of other administrations, in particular those systems operating in accordance with No. **5.423** in the frequency band 2 700-2 900 MHz, the pfd level per HIBS operating in the frequency band 2 500-2 690 MHz produced at the surface of the Earth in the territory of other administrations shall not exceed the following unwanted emissions limit, unless explicit agreement of the affected administration is provided:

-165.6	dB(W/(m^2 · MHz))	for	$\theta \leq 37°$
$-165.6 + 5.5\ (\theta - 37)$	dB(W/(m^2 · MHz))	for	$37° < \theta < 45°$
$-121.6 + (\theta - 45) / 3$	dB(W/(m^2 · MHz))	for	$45° < \theta \leq 90°$

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

1.7 for the purpose of protecting radio astronomy service stations in the frequency band 2 690-2 700 MHz, the pfd level of HIBS operating in the frequency band 2 500-2 690 MHz produced at any radio astronomy observatory site shall not exceed the following unwanted emissions limit, unless explicit agreement of the affected administration is provided:

-177	dB(W/(m^2 · 10 MHz));

1.8 *resolves* 1.7 applies at any radio astronomy station that was in operation prior to 15 December 2023 and has been notified to the Radiocommunication Bureau in the frequency band 2 690-2 700 MHz before 17 May 2024, or at any radio astronomy station that was notified before the date of receipt of the complete Appendix **4** information for notification, for the HIBS system to which *resolves* 1.6 applies; for radio astronomy stations notified after these dates an agreement needs to be sought with administrations that have notified HIBS;

1.9 for the purpose of protecting the mobile-satellite service (MSS) (space-to-Earth) and radiodetermination-satellite service (space-to-Earth) in the frequency band 2 483.5-2 500 MHz, the use of HIBS in the frequency band 2 500-2 690 MHz shall comply with an unwanted emission limit of −30 dBm/MHz in the frequency band 2 483.5-2 500 MHz;

1.10 for the purpose of protecting MSS (Earth-to-space) in the frequency band 2 655-2 690 MHz in Region 3, the notifying administration of HIBS shall ensure an enforceable commitment that, in case of causing unacceptable interference, it undertakes to immediately cease emission or reduce the interference to an acceptable level;

2 that administrations intending to implement HIBS systems shall notify, in accordance with Article **11**, the frequency assignments to transmitting and receiving HIBS stations by submitting all mandatory elements of Appendix **4** to the Bureau for the examination of compliance with the conditions specified in the *resolves* above;

3 that the notifying administration of HIBS at the time of submission of the Appendix **4** information shall provide a firm, objective, actionable, measurable and enforceable commitment to the Bureau to immediately eliminate unacceptable interference to existing primary services or reduce it to an acceptable level should such interference occur,

invites administrations

to adopt appropriate frequency arrangements for HIBS in order to consider the benefits of harmonized utilization of the spectrum for HIBS and protection of existing services and systems operating on a primary basis taking into account the *resolves* above and the relevant ITU-R Recommendations and Reports,

instructs the Director of the Radiocommunication Bureau

to take all necessary measures to implement this Resolution.

Agenda item 1.11

ADD

RESOLUTION COM4/5 (WRC-23)

Provisional application of the Radio Regulations for the introduction of new geostationary satellite networks into the global maritime distress and safety system

The World Radiocommunication Conference (Dubai, 2023),

considering

a) the growing demand for Global Maritime Distress and Safety System (GMDSS) communications capabilities to enhance maritime safety;

b) that the Maritime Safety Committee (MSC) of the International Maritime Organization (IMO), in its resolution MSC.529(106), recognized a new geostationary (GSO) mobile satellite communication system[1] for the use of a regional messaging system in the GMDSS limited to the service area within 75°E to 135°E longitude and 10°N to 55°N latitude, hereinafter referred to as "the GSO Networks"; and that it is necessary for the coordination process to be completed before the GSO system commences GMDSS services;

c) that this conference considered a revised radio regulatory framework for reflecting the frequencies for GMDSS on a provisional basis in Appendix **15** and Articles **5** and **33** of the Radio Regulations,

considering further

a) that the GSO Networks currently operate using frequency assignments recorded in the Master International Frequency Register under No. **11.41** (see Annex 1);

b) that the primary mobile-satellite service (MSS) allocations in the frequency bands 1 614.4225-1 618.725 MHz or 1 616.3-1 620.38 MHz and 2 483.59-2 499.91 MHz are also used by non-GSO MSS systems and radiodetermination-satellite service (RDSS) systems operating in the same recognized service area, and that further coordination is required with these notified satellite systems and networks as identified in accordance with No. **9.27**;

c) the potential impact of coordination outcomes and technological advancements on the identification of frequencies for GMDSS safety services by the GSO Networks,

noting

a) that regulatory provisions for the frequency coordination and notification of any satellite network and system are contained in Articles **9** and **11**;

b) that several other satellite systems have satisfied the provisions of Articles **9** and **11** and operate in the same frequency bands;

c) the ongoing coordination being conducted by the GSO Networks and relevant non-GSO systems, in accordance with Article **9** and relevant Rules of Procedure;

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[1] The system described here refers to BeiDou Message Service System as recognized by IMO for use in GMDSS.

d) that it is necessary for the notifying administration of the GSO Networks to address issues with respect to related assignments identified under No. **9.27** before the commencement of the GMDSS service (i.e. to achieve compatibility between relevant systems and resolve identified harmful interference issues),

recognizing

a) that the GSO Networks need to be coordinated under Nos. **9.7** and **9.11A**;

b) that the GSO Networks shall not cause harmful interference to or claim protection from the frequency assignments which are the basis of unfavourable findings until frequency coordination and notification is completed;

c) that non-GSO systems with an earlier date of protection and operating in the same frequency bands as the GSO Networks are experiencing harmful interference as reported in ITU2023-63161 (received on 17.08.2023), USA2023-63567 (received on 14.09.2023), F2023-63644 (received on 25.09.2023), USA2023-64675 (received on 15.11.2023), F2023-64822 (received on 23.11.2023), and F2023-64912 (received on 30.11.2023),

recognizing further

a) that successful completion of coordination with all necessary satellite systems ensures reliable operation of a GMDSS service;

b) that systems in the GMDSS should be protected from harmful interference to ensure safety of life at sea,

resolves

1 that the provisions of this Resolution apply only to the GSO Networks as recognized for use in the GMDSS system identified in *considering b)*;

2 that any identified harmful interference shall be eliminated;

3 that the GSO Networks shall successfully complete coordination of their frequency assignments with the relevant non-GSO systems in *considering further b)* in accordance with Articles **9** and **11** prior to the commencement of GMDSS services;

4 that the coordination of frequency assignments used for GMDSS services by the GSO Networks shall only be considered as completed after the corresponding remarks and indication relating to assignments for which an unfavourable finding had led to its recording under No. **11.41** are removed according to No. **11.41B**;

5 that a review of the frequency bands in Nos. **5.111Z**, **5.368**, Article **33** and Appendix **15** in the Earth-to-space direction for GMDSS shall be conducted at the first world radiocommunication conference following the completion of coordination as referenced in *resolves* 3 to determine the relevant frequency band;

6 that the regulatory provisions referred to in *considering c)* shall enter into force as of the date of successful completion and fulfilment of *resolves* 1 to 5 above,

urges the administrations responsible for the respective satellite filings

1 to make the utmost effort to eliminate any harmful interference and engage in frequency coordination with other administrations concerned, in order to complete coordination before WRC-27;

2 to submit reports on the resolution of any identified harmful interference and on frequency coordination progress to the Radiocommunication Bureau before WRC-27;

3 to cooperate to address any potential issues related to the coordination of RDSS in the frequency band 2 483.5-2 500 MHz,

instructs the Director of the Radiocommunication Bureau

1 to report to WRC-27 the status of the implementation of this Resolution and any potential difficulties;

2 to follow, to the extent practical, the progress of frequency coordination between the administrations involved and to take appropriate measures within the mandate of the Bureau in order to assist in the implementation of this Resolution;

3 to publish ITU circular letters to confirm that frequency coordination has completed between all relevant administrations in accordance with *resolves* 3,

instructs the Secretary-General

to bring this Resolution to the attention of the IMO and other relevant international and regional organizations.

ANNEX 1 TO RESOLUTION COM4/5 (WRC-23)

List of geostationary satellite network filings associated with the GSO networks

Orbital position	Satellite network	Special section (the service link of BDMSS)
58.75° E	COMPASS-58.75E	CR/C/798 MOD-1 CR/C/798 MOD-2 Part II-S
80° E	CHINASAT-31	AR11/C/2674 Part II-S
	COMPASS-80E	CR/C/799 MOD-5 Part II-S
110.5° E	CHINASAT-33	AR11/C/2676 Part II-S
	COMPASS-110.5E	CR/C/800 MOD-1 CR/C/800 MOD-2 Part II-S
140° E	CHINASAT-32	AR11/C/2675 Part II-S
	COMPASS-140E	CR/C/801 MOD-1 CR/C/801 MOD-2 Part II-S
160° E	COMPASS-160E	CR/C/1526 MOD-1 CR/C/1526 MOD-2 Part II-S

Agenda item 1.2

ADD

RESOLUTION COM4/6 (WRC-23)

Terrestrial component of International Mobile Telecommunications in the frequency band 10-10.5 GHz in Region 2

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that International Mobile Telecommunications (IMT), including IMT-2000, IMT-Advanced and IMT-2020, is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;

b) that adequate and timely availability of spectrum and supporting regulatory provisions are essential to realize the objectives set out in Recommendation ITU-R M.2083;

c) that there is a need to continually take advantage of technological developments in order to increase the efficient use of spectrum and facilitate spectrum access;

d) that IMT systems are now evolving to cover diverse usage scenarios and applications, such as enhanced mobile broadband, massive machine-type communications and ultra-reliable and low-latency communications,

recognizing

a) that timely availability of wide and contiguous blocks of spectrum is important to support the development of IMT;

b) that the frequency band 10.6-10.68 GHz is allocated on a primary basis to both active and passive services with the specific conditions outlined in Resolution **751 (WRC-07)**, based on the conclusions of the studies contained in Report ITU-R RS.2096, which allow for sharing with the Earth exploration-satellite service (EESS) (passive);

c) that the frequency band 10.68-10.7 GHz is globally allocated to passive services, including the radio astronomy service, and No. **5.340** applies;

d) that the frequency band 10-10.4 GHz is allocated to the EESS (active) service, whose capability to perform very high-resolution cloud-free imaging offers a multitude of benefits to society, such as topographic and cadastral mapping, urban planning, emergency management, climate change monitoring and enhanced maritime monitoring;

e) that the use of the frequency band 10-10.5 GHz for IMT is only intended for microcell base stations,

resolves

1 that administrations wishing to implement IMT consider use of the frequency band 10-10.5 GHz identified for IMT in No. **5.10B12** in countries in Region 2, taking into account the most recent versions of relevant ITU-R Recommendations;

2 that administrations shall take practical measures to ensure that transmitting antennas of outdoor base stations are normally pointing below the horizon when deploying IMT base stations within the frequency band 10-10.5 GHz; the mechanical pointing needs to be at or below the horizon;

3 that the maximum equivalent isotropically radiated power (e.i.r.p.) per base station shall not exceed 30 dB(W/100 MHz) and that the maximum e.i.r.p. per base station for elevation angles higher than 34 degrees shall not exceed 0.5 dB(W/100 MHz);

4 that, for the purposes of protecting the EESS (passive), and considering the conditions under *resolves* 3, the total radiated power (TRP)[1] produced per IMT base station operating in the frequency band 10-10.5 GHz shall not exceed −37.9 dB(W/100 MHz) in the frequency band 10.6-10.7 GHz;

5 that, for the purposes of protecting the EESS (passive), the TRP produced by IMT user equipment operating in the frequency band 10-10.5 GHz shall not exceed −39 dB(W/100 MHz) in the frequency band 10.6-10.7 GHz;

6 that IMT stations within the frequency range 10-10.5 GHz shall be used only for applications of the land mobile service,

invites the ITU Radiocommunication Sector

1 to develop harmonized frequency arrangements to facilitate IMT deployment in the frequency band 10-10.5 GHz, taking into account the results of sharing and compatibility studies conducted in preparation for WRC-23;

2 to continue providing guidance to ensure that IMT can meet the telecommunication needs of developing countries;

3 to develop an ITU Radiocommunication Sector (ITU-R) Report and/or Recommendation on methodologies for calculating coordination zones around radio astronomy stations operating in the frequency band 10.6-10.7 GHz in order to avoid harmful interference from IMT systems operating in the frequency band 10-10.5 GHz;

4 to review existing ITU-R Recommendations/Reports and, as appropriate, to update them or develop new ITU-R Recommendations to provide information and assistance to the administrations concerned regarding possible coordination measures for fixed-service stations with IMT stations in the frequency band 10-10.5 GHz,

instructs the Director of the Radiocommunication Bureau

to bring this Resolution to the attention of relevant international organizations.

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[1] The TRP is to be understood here as the integral of the power transmitted from all antenna elements in different directions over the entire radiation sphere.

ADD

RESOLUTION COM4/7 (WRC-23)

Terrestrial component of International Mobile Telecommunications (IMT) within the frequency band 6 425-7 125 MHz

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that International Mobile Telecommunications (IMT), including IMT-2000, IMT-Advanced and IMT-2020, is the ITU vision for global mobile access, and is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;

b) that harmonized worldwide frequency bands for IMT are desirable in order to achieve global roaming and the benefits of economies of scale;

c) that identification of frequency bands allocated to the mobile service for IMT may change the sharing situation regarding applications of services to which the frequency band is already allocated, and may require regulatory actions;

d) that it is assumed that only a very limited number of IMT base stations will be communicating with a positive elevation angle towards IMT indoor mobile stations;

e) that the frequency band 6 425-7 125 MHz, or parts thereof, is allocated on a primary basis to the fixed, mobile, fixed-satellite (Earth-to-space) (space-to-Earth) and space operation services (Earth-to-space);

f) that, in the frequency band 6 650-6 675.2 MHz, radio astronomy observations are carried out under No. **5.149** for measurement of methanol spectral lines;

f bis) that No. **5.458** states that, in the band 6 425-7 075 MHz, "passive microwave sensor measurements are carried out over the oceans. In the band 7 075-7 250 MHz, passive microwave sensor measurements are carried out. Administrations should bear in mind the needs of the Earth exploration-satellite (passive) and space research (passive) services in their future planning of the bands 6 425-7 075 MHz and 7 075-7 250 MHz";

g) that existing satellite networks of the fixed-satellite service (FSS) (Earth-to-space) are used within the frequency band 6 425-7 075 MHz, or parts thereof, and their characteristics may evolve in the future;

h) that the frequency band 6 425-7 125 MHz, or parts thereof, is also used by other applications in the mobile service;

i) that the frequency band 7 100-7 155 MHz is allocated on a primary basis to the space operation services (Earth-to-space) in the Russian Federation, in accordance with No. **5.459**;

j) that the frequency band 7 145-7 190 MHz is allocated on a primary basis to the space research service (SRS) (deep space);

k) that the frequency band 6 725-7 025 MHz is included in Appendix **30B** and used to provide a plan to guarantee in practice, for all countries, equitable access to the geostationary satellite orbit (GSO) in the frequency bands of the FSS;

l) that expected equivalent isotropically radiated power (e.i.r.p.) limits have been established which require assessment for compliance in equipment conformance tests;

m) that the frequency band 6 700-7 075 MHz (space-to-Earth) is used for feeder links of non-geostationary satellite systems of the mobile-satellite service (MSS), in accordance with No. **5.458B**;

n) that the frequency band 6 425-7 075 MHz in the FSS can be used to provide feeder links in the MSS;

o) that the FSS is currently used to provide feeder links in the MSS to enhance maritime services within the frequency band 6 425-6 575 MHz,

noting

a) Resolutions **223 (Rev.WRC-23)**, **224 (Rev.WRC-23)**, **225 (Rev.WRC-23)**, **241 (Rev.WRC-23)**, **242 (Rev.WRC-23)** and **243 (Rev.WRC-23)**, which also relate to IMT;

b) that the IMT terrestrial radio interfaces as defined in Recommendations ITU-R M.1457, ITU-R M.2012 and ITU-R M.2150 are expected to evolve within the framework of the ITU Radiocommunication Sector (ITU-R) beyond those initially specified, to provide enhanced services and services beyond those envisaged in the initial implementation;

c) that Recommendation ITU-R M.2160 outlines the framework and overall objectives of the future development of IMT for 2030 and beyond;

d) that Recommendation ITU-R M.2083 provides the IMT Vision – Framework and overall objectives of the future development of IMT for 2020 and beyond,

recognizing

a) that the identification of a frequency band for IMT does not establish priority in the Radio Regulations and does not preclude the use of the frequency band by any application of the services to which it is allocated;

b) that studies have shown that the protection of feeder links for the non-GSO FSS (space-to-Earth) requires the determination of protection distances ranging between a few kilometres to tens of kilometres; these protection distances are site-specific and depend on several elements, such as the propagation parameters, local terrain topography, and station and orbital parameters of the feeder links for the non-GSO FSS (space-to-Earth);

c) that studies have shown that co-channel coexistence between IMT and the fixed service can be achieved but may require cross-border coordination between countries;

d) that studies have shown that co-channel coexistence between IMT and the fixed service can be achieved but would require site-by-site coordination if IMT and the fixed service are deployed in the same or adjacent geographical areas;

e) that a later deployment of IMT may be considered by those administrations wishing to migrate the fixed service to other frequency bands,

resolves

1 that administrations wishing to implement IMT in accordance with Nos. **5.6A12**, **5.6B12**, and **5.6C12** consider use of the frequency bands referred to in those footnotes, taking into account the most recent versions of the relevant ITU-R Recommendations;

2 that, in order to ensure protection for the FSS (Earth-to-space), and taking into account *considering d)*, the level of expected e.i.r.p. spectral density emitted by an IMT base station as a function of the vertical angle above the horizon shall not exceed the following values (No. **21.5** does not apply):

Vertical angle range $\theta_L \leq \theta < \theta_H$ (vertical angle θ above horizon)	Expected e.i.r.p. (dBm/MHz) (See NOTES 1, 2 and 3)
0° ≤ θ < 5°	27
5° ≤ θ < 10°	23
10°≤ θ < 15°	19
15°≤ θ < 20°	18
20°≤ θ <30°	16
30°≤ θ < 60°	15
60°≤ θ ≤ 90°	15

NOTE 1: The expected e.i.r.p. is defined as the average value of the e.i.r.p., with the averaging being performed:

– over horizontal angles from −180° to +180°, with the IMT base station beamforming in a specific direction within its horizontal and vertical steering range,

– over different beamforming directions within the IMT base station horizontal and vertical steering range, and

– over the specified vertical angle range $\theta_L \leq \theta < \theta_H$.

NOTE 2: An IMT base station shall comply with the specified limits on expected e.i.r.p. spectral density for all mechanical tilts with which it can be deployed, taking into account *considering m)*.

NOTE 3: See the Annex to this Resolution for additional details on how the expected e.i.r.p. can be calculated for this frequency band.

3 that administrations wishing to implement IMT in the frequency band 6 700-7 075 MHz shall ensure the protection, continued use and future development of FSS (space-to-Earth) stations through the adoption of site-specific coordination,

invites administrations

1 to take into account the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT;

2 to ensure that provisions for the implementation of IMT do not adversely affect the operation of FSS earth stations and their future development;

3 to take all practical steps to protect the radio astronomy service (RAS) from harmful interference in the frequency band 6 650-6 675.2 MHz, which covers spectral lines of importance for current astronomical investigations, in accordance with No. **5.149**,

invites the ITU Radiocommunication Sector

1 to develop harmonized frequency arrangements to facilitate IMT deployment within the frequency band 6 425-7 125 MHz;

2 to continue providing guidance to ensure that IMT can meet the telecommunication needs of developing countries;

3 to develop a Recommendation to address methods for the determination of the protection area around a non-GSO earth station in the frequency band 6 700-7 075 MHz from an IMT base station;

4 to update existing ITU-R Recommendations/Reports or develop new ITU-R Recommendations/Reports, as appropriate, to provide information and assistance to the administrations concerned on possible coordination of stations in the fixed service with IMT stations in the frequency band 6 425-7 125 MHz;

5 to regularly review, as appropriate, the impact of evolving technical and operational characteristics of IMT systems (including base-station density) on sharing and compatibility with space services, and to take into account the results of these reviews in the development and/or revision of ITU-R Recommendations/Reports addressing, *inter alia*, if necessary, applicable measures to mitigate the risk of interference into space services;

6 to develop an ITU-R Recommendation to address methods for the determination of the protection area around existing RAS stations from IMT stations in the frequency band 6 650-6 675.2 MHz;

7 to update existing ITU-R Recommendations/Reports or develop new ITU-R Recommendations/Reports, as appropriate, to provide information and assistance to the administrations concerned on possible coordination of SRS (deep space) stations operating in the band 7 145-7 190 MHz with IMT stations operating in the frequency band 6 425-7 125 MHz,

instructs the Director of the Radiocommunication Bureau

to bring this Resolution to the attention of relevant international organizations.

ANNEX TO RESOLUTION COM4/7 (WRC-23)

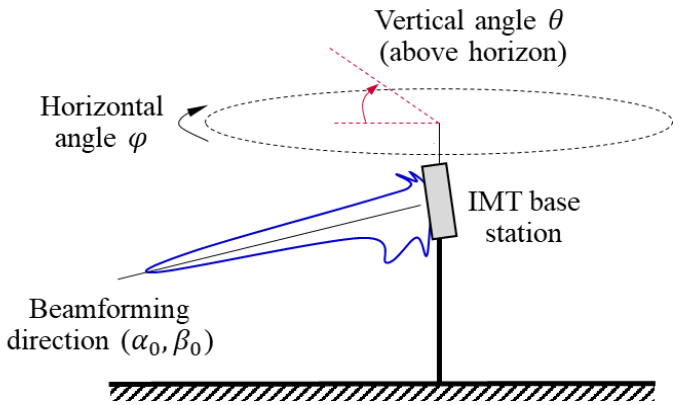
Details for the calculation of the expected equivalent isotropically radicated power of an International Mobile Telecommunications base station operating within the frequency band 6 425-7 125 MHz

This annex outlines the theoretical calculation of the expected equivalent isotropically radiated power (e.i.r.p.) of an International Mobile Telecommunications (IMT) base station for assessing the compliance of IMT base station equipment with the limit on expected e.i.r.p.

The e.i.r.p. of an IMT base station in the horizontal (azimuth) direction $-\pi \le \varphi \le \pi$ and vertical (elevation) direction $0 \le \theta \le \pi/2$ above the horizon can be written as $P(\theta, \varphi; \alpha, \beta)$. The parameters α and β are the horizontal and vertical beamforming directions, i.e. the angles towards which the base station electronically steers a beam. These are illustrated in Figure 1 below.

FIGURE 1

Illustration of horizontal (azimuth) angle, vertical (elevation) angle and beamforming directions



The expected e.i.r.p. $\bar{P}_{\theta_L \theta_H}$ of an IMT base station within a vertical angle range $\theta_L \le \theta < \theta_H$ can be calculated by averaging the e.i.r.p. $P(\theta, \varphi; \alpha, \beta)$ of the base station as follows:

1) **Averaging over beamforming directions for a given vertical angle θ_0 and horizontal angle φ_0: for an AAS base station within a given horizontal and vertical steering range,** a sufficient sampling of N beamforming directions (α_n, β_n) $n = 1 \ldots N$ is necessary to allow an accurate averaging of the expected e.i.r.p.

The beamforming directions (α_n, β_n) have a uniform statistical angular distribution within the steering range of the IMT base station. In other words:

$$P_1(\theta_0, \varphi_0) = \sum_{n=1}^{N} w_n P(\theta_0, \varphi_0; \alpha_n, \beta_n)$$

where w_n refers to the weight for the nth beamforming direction, i.e. the fraction of the steering range represented by the nth beamforming direction. For example, $w_n = 1/N$ in the case that N uniform equispaced beams are assumed in the azimuth and elevation, respectively, and where each beam covers an equal range of angles.

The set of base station configurations over which the base station complies with the limits on expected e.i.r.p. (for example, power of steering range as one of the parameters) shall be declared and the BS shall be used within one of these configurations.

The set of e.i.r.p. values used to calculate the expected e.i.r.p. for each vertical angle range shall be a mathematical summation of both polarization states of the IMT base station antenna with no polarization discrimination.

For a non-AAS base station, $P_1(\theta_0, \varphi_0) = P(\theta_0, \varphi_0; \alpha_1, \beta_1)$ where $\alpha_1 = 0$ and β_1 is the electrical tilt.

It is noted that the compliance with the limits on expected e.i.r.p. should be limited to a defined range of electrical tilts.

2) **Averaging over horizontal and vertical angles**: the expected e.i.r.p. is then calculated by averaging the results of step 1 over horizontal angles φ from $-\pi$ to $+\pi$ with respect to the base station horizontal boresight, and vertical angles θ within vertical angle measurement window $\theta_L \le \theta < \theta_H$ with respect to the horizon. In other words:

$$\bar{P}_{\theta_L \theta_H} = \frac{1}{2\pi(\sin\theta_H - \sin\theta_L)} \int_{\theta_L}^{\theta_H} \int_{-\pi}^{\pi} P_1(\theta, \varphi) \cos(\theta) d\varphi d\theta$$

The averaging processes in steps 1 and 2 shall allow for accurate averaging of the expected e.i.r.p (e.g. to the confidence interval of 95%).

ADD

RESOLUTION COM4/8 (WRC-23)

Studies on possible allocations to the Earth exploration-satellite service (passive) in the bands 4 200-4 400 MHz and 8 400-8 500 MHz

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the frequency band 6 425-7 250 MHz has been used by the Earth exploration-satellite service (EESS) (passive) to perform sea surface temperature (SST) measurements;

b) that SST measurements are important for detecting and forecasting meteorological events that drastically impact the safety and security of administrations and the populations of their countries;

c) that SST data sets are an essential resource for monitoring and understanding climate variability and climate change;

d) that SST measurement by satellite, in the microwave domain, remains the only measurement enabling daily and global measurement of SST, independently of meteorological conditions (i.e. the presence of clouds);

e) that SST measurement over different frequency channels might improve radio-frequency interference mitigation;

f) that certain frequency bands used for SST measurement have unique physical characteristics, so complementary frequency bands need to be carefully studied,

noting

that, under No. **5.458**, passive microwave sensor measurements are carried out over the oceans in the frequency band 6 425-7 075 MHz and planned to be carried out over the oceans in the frequency band 8 400-8 500 MHz, and passive microwave sensor measurements are carried out in the frequency band 7 075-7 250 MHz,

recognizing

a) that some complementary bands need to be determined in order to ensure continuity of SST measurement by the EESS (passive);

b) that, due to the sensitivity of the brightness temperature of the sea surface with regard to frequency, it is appropriate to perform SST measurements in frequency bands within the range 4-9 GHz,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

sharing and compatibility studies to determine the possibility of a future allocation to the EESS (passive) in the frequency bands 4 200-4 400 MHz and 8 400-8 500 MHz,

invites administrations

to participate actively in the studies and provide the information required for the studies listed in *resolves to invite ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* by submitting contributions to ITU-R,

invites the 2027 world radiocommunication conference

to examine the results of these studies with a view to considering a new primary allocation in all Regions to the EESS (passive) in the frequency bands 4 200-4 400 MHz and 8 400-8 500 MHz, without protection from existing services in these frequency bands and in adjacent bands.

Agenda item 9.1(9.1-a)

ADD

RESOLUTION COM5/1 (WRC-23)

Importance of meteorological aids service (space weather) applications

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the collection and exchange of space weather data are important for detecting solar activity events, including solar flares and high energetic particles and their relevant consequences for the Earth's geomagnetic and ionospheric conditions, and other space weather phenomena that impact services critical to the economy, safety and security of administrations and the populations of their countries;

b) that space weather data is critical for forecasting and providing alerts of space weather events and important to understanding the physical processes to develop prediction models for space weather events and their impacts on societal-infrastructure services;

c) that space weather data is important in understanding the physical process to provide prediction models for space weather events and their impacts;

d) that spectrum-reliant space weather sensor technology has been developed and operational systems have been deployed without much regard for domestic or international spectrum regulations, or for the potential need for protection from interference;

e) that spectrum-reliant space weather sensors may be vulnerable to interference from both terrestrial and spaceborne systems;

f) that some space weather sensors operate by receiving signals of low-level natural phenomena, mainly originating from solar activity and occurring beyond the major portion of the Earth's atmosphere, that impact the Earth's environment, and that they may therefore suffer harmful interference at levels which could be tolerated by other radiocommunication applications;

g) that the importance of space weather radiocommunication applications has been stressed by a number of international bodies, such as the World Meteorological Organization, the Intergovernmental Panel on Climate Change, the United Nations Office for Disaster Risk Reduction (UNDRR), the International Civil Aviation Organization (ICAO) and the United Nations Committee on the Peaceful Uses of Outer Space, and that ITU Radiocommunication Sector (ITU-R) collaboration with these bodies is essential;

h) that space weather data collection is performed for the benefit of the whole international community and the data is generally made freely available to users,

recalling

a) the Plan of Action of the World Summit on the Information Society (Geneva, 2003), on e-environment, calling for the establishment of monitoring systems, using information and communication technologies (ICTs), to forecast and monitor the impact of natural and man-made disasters, particularly in developing countries, least developed countries and small economies;

b) Resolution 136 (Rev. Bucharest, 2022) of the ITU Plenipotentiary Conference, on the use of telecommunications/ICTs for humanitarian assistance and for monitoring and management in

emergency and disaster situations, including health-related emergencies, for early warning, prevention, mitigation and relief;

c) Resolution 182 (Rev. Bucharest, 2022) of the Plenipotentiary Conference, on the role of telecommunications/ICTs in regard to climate change and the protection of the environment;

d) the Global Framework for Climate Services as identified at the eighteenth session of the World Meteorological Congress (Geneva, June 2019), which provides information to help society adapt to climate variability and change;

e) that UNDRR and the International Science Council identified hazards related to space weather in the initial list of the hazards for disaster risk management in 2021 under the Sendai Framework for Disaster Risk Reduction 2015-2030;

f) United Nations General Assembly Resolution 76/3 of 25 October 2021, "The 'Space2030' Agenda: space as a driver of sustainable development", objective 3.8: increase awareness of the risks of adverse space weather and mitigate those risks, in order to ensure increased global resilience against space weather effects, and improve the international coordination of space weather-related activities, including outreach, communication and capacity-building, as well as the establishment of an international mechanism to promote increased high-level coordination in relation to space weather and increased global resilience against space weather effects;

g) Amendment 78 to Annex 3 to the Convention on International Civil Aviation (International Standards and Recommended Practices, Meteorological Service for International Air Navigation), adopted on 7 March 2018 at the 213th session of the ICAO Council, which has introduced space weather advisory information services on space weather phenomena expected to affect aeronautical radiocommunication and radionavigation systems,

recognizing

a) that Report ITU-R RS.2456, on space weather sensor systems using radio spectrum, contains:

– a summary of spectrum-reliant space weather sensors; and

– the documentation of the systems used for operational space weather monitoring, prediction and early warning deployed globally;

b) that the ITU-R Handbook on Radio Astronomy contains further information on space weather observations;

c) that existing services and their systems and applications should be protected in the bands used for space weather observations and no undue constraints should be imposed on the future development of these services,

noting

a) that *in situ* (local) and remote-sensing space weather observation capabilities depend on the availability of radio frequencies;

b) that, according to the United Nations Office for Outer Space Affairs, society is becoming increasingly dependent on space-based systems and it is vital to understand how space weather could affect space systems and human space flight, electric power transmission, high-frequency radiocommunications, and global navigation satellite system (GNSS) signals;

c) that certain frequency bands used by space weather applications have unique physical characteristics, so that migration to alternative frequency bands is not possible;

d) the need to include within the agenda of a world radiocommunication conference (WRC) an item for studies to be conducted on compatibility and frequency sharing for space

weather sensors with incumbent radiocommunication services and for possible allocations for the meteorological aids service (MetAids) (space weather), on the basis of the outcomes of ITU-R studies,

resolves

1 that the following definition for space weather shall be used:

space weather: natural phenomena, mainly originating from solar activity and occurring beyond the major portion of the Earth's atmosphere, that impact Earth's environment and human activities;

2 that space weather sensor systems may operate under MetAids (space weather) allocations;

3 that an active space weather sensor is a system in the MetAids (space weather) by means of which information is obtained by transmission and reception of radio waves;

4 that a receive-only space weather sensor is a system in the MetAids (space weather) by means of which information is obtained by reception of radio waves of natural origin, or by the opportunistic reception of transmissions of other specific radiocommunication services;

5 to recognize the importance of the spectrum usage by space weather applications for monitoring space weather phenomena and events that impact services critical to the economy, safety and security of administrations and the populations of their countries;

6 to urge administrations to take into account space weather radio-frequency requirements and in particular protection of the related frequency bands;

7 to encourage administrations to consider the importance of the use and availability of spectrum for space weather applications prior to taking decisions that would negatively impact their operations;

8 that no notification of frequency assignments to a station used for space weather observation be made by administrations under the existing MetAids allocations until a future competent WRC introduces the corresponding allocations to MetAids (space weather) in Article **5** of the Radio Regulations,

instructs the Director of the Radiocommunication Bureau

to consider any frequency assignments to space weather sensors that are notified within existing MetAids allocations prior to such a decision being taken by a competent WRC in accordance with *resolves* 8 above as being not in conformity with No. **11.31**.

Agenda item 1.15

ADD

RESOLUTION COM5/2 (WRC-23)

Use of the frequency band 12.75-13.25 GHz by earth stations in motion on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that WARC Orb-88 established an Allotment Plan for the use of the frequency bands 4 500-4 800 MHz, 6 725-7 025 MHz, 10.70-10.95 GHz, 11.20-11.45 GHz and 12.75-13.25 GHz by the fixed-satellite service (FSS);

b) that WRC-07 revised the regulatory regime governing the use of the frequency bands referred to in *considering a)* above;

c) that the objective of providing broadband mobile satellite communications may also be met by allowing earth stations in motion (ESIMs), on aircraft (A-ESIMs) and vessels (M-ESIMs) to communicate with geostationary space stations of an FSS network in the frequency bands 12.75-13.25 GHz (Earth-to-space) and the associated downlink frequency bands of that satellite; thus, for example, the frequency bands 10.70-10.95 GHz and 11.20-11.45 GHz of Appendix **30B** may be used;

d) that the frequency band 12.75-13.25 GHz is currently allocated on a primary basis to the FSS (Earth-to-space), fixed and mobile services and on a secondary basis to the space research service (deep space) (space-to-Earth);

e) that the operation of services to which the frequency band 12.75-13.25 GHz is allocated and of services in adjacent bands needs to be protected from A-ESIMs and M-ESIMs;

f) that the frequency band 12.75-13.25 GHz (Earth-to-space) is used in the geostationary-satellite orbit (GSO) by FSS networks in accordance with the provisions of Appendix **30B** (No. **5.441**) and that there are many existing GSO FSS satellite networks operating in this frequency band;

g) that the objective of the procedures in Appendix **30B** is to guarantee, for all countries, equitable access to the GSO in the frequency bands of the FSS covered by this Appendix;

h) that regulatory provisions and interference-management mechanisms, including necessary mitigation measures and associated techniques, are required for the operation of A-ESIMs and M-ESIMs in the frequency band 12.75-13.25 GHz (Earth-to-space) to protect other services with allocations in this frequency band and adjacent frequency bands and without adversely affecting those services and their future development, taking into account the provisions of Appendix **30B** (see also *further resolves* 2 on responsibilities);

i) that, in Appendix **30B**, the frequency bands in the space-to-Earth direction corresponding to the frequency band 12.75-13.25 GHz (Earth-to-space) are 10.7-10.95 GHz and 11.2-11.45 GHz, which may be used by A-ESIMs and M-ESIMs, subject to not claiming protection from other services and applications of the FSS and other radiocommunication services to which the frequency band is allocated;

j) that there is no publicly available information on coordination agreements reached among administrations regarding GSO FSS satellite networks, except on whether coordination has been completed, which is provided to the Radiocommunication Bureau;

k) that the operation of A-ESIMs and M-ESIMs requires the establishment of one or more gateway earth station facilities in one or several countries that are within the service area of the associated satellite network and that are authorized by the administration of the territory where such earth stations are located,

considering further

a) that A-ESIMs and M-ESIMs operating within the agreed service area of the satellite network with which they communicate may provide services within the territories under the jurisdiction of multiple administrations;

b) that the operation of ESIMs within the territory under the jurisdiction of administrations mentioned in *considering further a)* above is subject to obtaining authorization from those administrations,

recognizing

a) that Article 44 of the ITU Constitution contains the basic principles for the use of the radio-frequency spectrum and the GSO and other satellite orbits, taking into account the needs of developing countries;

b) that administrations intending to authorize A-ESIMs and M-ESIMs, when establishing national licensing rules, may consider adopting other interference management procedures and/or mitigation measures than those contained in this Resolution, as long as the provisions in Annex 2 are unchanged in cross border applications;

c) that, pursuant to the relevant provisions in Appendix **30B**, the operation of ESIMs in the frequency band 12.75-13.25 GHz may only be within the service area of the Appendix **30B** network for which the explicit agreement of any administration whose territory is partially or wholly included in this service area has been obtained;

c bis) that § 6.16 of Article 6 of Appendix **30B** provides the opportunity to any administration at any time to request that its territory be excluded from the service area of any assignment governed by Appendix **30B**;

d) that the operation of an A-ESIM and M-ESIM associated and communicating with a space station of a given satellite network needs the earth station to be within the coordinated and agreed service area of the satellite network under the relevant provisions of Appendix **30B**;

e) that, based on the available information in the Bureau’s database in May 2022, there is no contiguous regional or worldwide coordinated and agreed service area for any satellite network using the Appendix **30B** frequency band 12.75-13.25 GHz recorded in the Master International Frequency Register (MIFR);

f) that, in order for A-ESIMs and M-ESIMs to operate in the Appendix **30B** frequency band 12.75-13.25 GHz (Earth-to-space) in an efficient and operationally viable manner, having a contiguous regional or worldwide coordinated and agreed service area is an important issue to be taken into account;

g) that the administration authorizing ESIMs on the territory under its jurisdiction has the right to require that the ESIMs referred to above only use those assignments associated with GSO FSS networks which have been successfully coordinated, notified, brought into use and recorded in the MIFR with a favourable finding under § 8.11 of Article 8 of Appendix **30B**, except those arising from the application of § 6.25 of Appendix **30B**;

h) that Resolution **170 (Rev.WRC-23)** provides the procedure to enhance equitable access to frequency bands under Appendix **30B** by developing countries;

i) that the protection of current usage and future development of Appendix **30B** in the frequency band 12.75-13.25 GHz (Earth-to-space) is a fundamental issue without any adverse effect thereto;

j) that the availability of the methodology to examine conformity with the power flux-density (pfd) limit as contained in Annex 2 to this Resolution is a fundamental and crucial element;

k) that there is a need to establish regulatory, technical and recording procedures for the usage of these types of ESIM that may differ from the current FSS Appendix **30B** Plan and List recording procedures;

l) that successful implementation of this Resolution does not oblige any administration to authorize/license A-ESIMs and M-ESIMs communicating with geostationary space stations in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space) to operate on the territory under its jurisdiction (see *resolves* 7);

m) that, in accordance with Appendix **30B**, the examination by the Bureau of the frequency assignments in the frequency band 12.75-13.25 GHz (Earth-to-space) is limited to the test-points on land; it is necessary to examine the compatibility of A-ESIMs and M-ESIMs using grid points generated within the entire service area of A-ESIMs and M-ESIMs submitted under Appendix **4** (see Annex 1 to this Resolution);

n) that any administration retains its right to regulate and exercise its authority within its jurisdiction, recalling the Preamble to the Constitution,

recognizing further

a) that, under *resolves* 1.1.3 below, frequency assignments to GSO A-ESIMs and M-ESIMs need to be notified to the Bureau;

b) that, for the operation of GSO A-ESIMs and M-ESIMs, notification of any frequency assignment under Annex 1 to this Resolution shall only be made by one single administration, which is the notifying administration for the GSO FSS network with which the ESIMs communicate;

c) that an administration authorizing the operation of GSO A-ESIMs and M-ESIMs within the territory under its jurisdiction may modify and/or withdraw that authorization at any time;

d) that the three elements consisting of the interference management mechanism, switching facility for on/off function and the function of network control and monitoring centre (NCMC) and their relations with each other and sequence of actions, together with estimated time for that action/function, are needed for the proper and effective operation of GSO A-ESIMs and M-ESIMs;

e) that the operation of A-ESIMs and M-ESIMs shall comply with the provisions of No. **5.340**;

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

resolves

1 that, for any A-ESIM or M-ESIM communicating with a GSO FSS space station within the frequency band 12.75-13.25 GHz (Earth-to-space) or parts thereof, the following conditions shall apply:

1.1 with respect to space services in the frequency band 12.75-13.25 GHz and adjacent bands, A-ESIMs and M-ESIMs shall comply with the following conditions:

1.1.1 the use of the frequency band 12.75-13.25 GHz (Earth-to-space) by A-ESIMs and M-ESIMs shall not result in any changes or restrictions to allotments in the Plan, assignments in the List of Appendix **30B**, and assignments recorded in the MIFR, including the assignments arising from the implementation of Resolution **170 (Rev.WRC-23)**;

1.1.2 with respect to satellite networks of other administrations, the characteristics of A-ESIMs and M-ESIMs shall remain within the envelope of typical characteristics of notified earth stations associated with the satellite networks with which these earth stations communicate, as published by the Bureau and included in relevant Radiocommunication Bureau International Frequency Information Circular (BR IFIC), and Annex 1 to this Resolution applies;

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

1.1.3 for the implementation of *resolves* 1.1.1, 1.1.2 and 1.1.2*bis* above, the notifying administration for the GSO FSS network with which the above-mentioned A-ESIMs and M-ESIMs communicate shall follow the procedure in Annex 1 to this Resolution, together with the commitment that the operation of ESIMs shall be in conformity with the Radio Regulations, including this Resolution;

1.1.4 upon receipt of the notification information referred to in *resolves* 1.1.3 above, the Bureau shall process the submission in accordance with Annex 1 to this Resolution;

1.1.5 for the protection of non-GSO FSS systems operating in the frequency band 12.75-13.25 GHz, the above-mentioned A-ESIMs and M-ESIMs communicating with GSO FSS networks referred to above shall comply with the provisions contained in Annex 3 to this Resolution;

1.1.6 the notifying administration for the GSO FSS network with which the above-mentioned A-ESIMs and M-ESIMs communicate shall ensure that the operation of the A-ESIMs and M-ESIMs complies with the coordination agreements for the frequency assignments to the earth station of this GSO FSS satellite network of Appendix **30B** obtained under the relevant provisions of that Appendix;

1.1.7 the receiving part of the above-mentioned A-ESIMs and M-ESIMs in their associated frequency band shall not adversely affect the allotments in the Plan or the assignments in the List and shall not claim protection from other applications of the FSS or other radiocommunication services to which the frequency band is allocated;

1.2 with respect to the protection of terrestrial services to which the frequency band 12.75-13.25 GHz is allocated and that operate in accordance with the Radio Regulations, A-ESIMs and M-ESIMs shall comply with the following conditions:

1.2.1 transmitting GSO A-ESIMs and M-ESIMs in the frequency band 12.75-13.25 GHz (Earth-to-space) shall not cause unacceptable interference to terrestrial services to which

this frequency band is allocated and that operate in accordance with the Radio Regulations, and Annex 2 to this Resolution shall apply;

1.2.2 the receiving part of the above-mentioned GSO A-ESIMs and M-ESIMs operating in the frequency bands mentioned in *recognizing further f)* shall not claim protection from terrestrial services to which those frequency bands are allocated and that operate in accordance with the Radio Regulations;

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

1.2.4 for the application of Part II of Annex 2 as referred to in *resolves* 1.2.1 above, the Bureau shall examine the characteristics of A-ESIMs with respect to conformity with the pfd limits at any point on the Earth's surface specified in Part II of Annex 2, in accordance with the methodology described in Annex 4 to this Resolution, and publish the results of such examination in a BR IFIC; in the event of non-compliance with the pfd limits set out in Part II of Annex 2, the Bureau shall formulate an unfavourable finding and return the notice to the notifying administration;

1.2.5 if an administration authorizing A-ESIMs agrees to pfd levels higher than the limits contained in Part II of Annex 2 within the territory under its jurisdiction, such agreement shall in no way affect other administrations that are not party to that agreement;

1.3 A-ESIMs and M-ESIMs communicating with GSO FSS networks shall not cause unacceptable interference to the aeronautical radionavigation service (ARNS) operating in accordance with the Radio Regulations in the frequency band 13.25-13.40 GHz;

2 that only frequency assignments of Appendix **30B** recorded in the List may be used as supporting assignments for A-ESIMs and M-ESIMs communicating with GSO FSS networks in the frequency band 12.75-13.25 GHz (Earth-to-space), if those assignments are recorded in the MIFR with a favourable finding under § 8.11 of Article 8 of Appendix **30B**;

2.1 if assignments to GSO FSS networks notified under § 6.25 of Appendix **30B** are used for the operation of the above-mentioned A-ESIMs and M-ESIMs, those assignments may be used for GSO A-ESIMs and M-ESIMs only in accordance with §§ 6.26 and 6.29 of Appendix **30B**;

2.2 for the implementation of *resolves* 2.1 above, the notifying administration for the GSO FSS network with which GSO A-ESIMs and M-ESIMs communicate shall send the Bureau a commitment that the operation shall be in conformity with *resolves* 2.1 and *further resolves* 2, 2.1 and 2.2 below;

3 that the operation of A-ESIMs and M-ESIMs communicating with GSO FSS space stations in the frequency band 12.75-13.25 GHz (Earth-to-space) shall be within the coordinated and notified service area of the GSO FSS network;

4 that, for the implementation of *resolves* 3 above, the notifying administration for the GSO FSS network with which the A-ESIMs and M-ESIMs communicate shall ensure that the necessary arrangements and switching facilities are built into the A-ESIMs and M-ESIMs to cease emissions once approaching the territory under the jurisdiction of those administrations which either are not within the notified and coordinated service area of the subject space station or have not authorized the operation over their territories;

5 that any course of action taken under this Resolution have no impact on the original date of receipt of the frequency assignments of the GSO FSS satellite network with which A-ESIMs and M-ESIMs communicate, or on the coordination requirements of that satellite network;

6 that A-ESIMs and M-ESIMs shall not be used or relied upon for safety-of-life applications;

7 that the operation of A-ESIMs and M-ESIMs within territorial waters and/or airspace under the jurisdiction of another administration shall be carried out only if a licence under No. **18.1** of the Radio Regulations, or the authorization of that administration, is obtained;

8 that gateway earth station facilities for A-ESIMs and M-ESIMs shall be within the service area of the satellite network associated to that gateway;

9 in the event that unacceptable interference caused by A-ESIMs and/or M-ESIMs is reported:

9.1 that the notifying administration for the GSO FSS network with which the A-ESIMs and M-ESIMs communicate be responsible for eliminating the case of unacceptable interference; consequently, no other administration shall be held responsible for eliminating cases of unacceptable interference (see also *resolves* 9.2 below);

9.2 that any authorizing administration, subject to its explicit agreement and to the extent of its ability, provide any available information that may help eliminate the case of unacceptable interference;

9.3 that the administration responsible for the aircraft or vessel on which the ESIM operates shall provide, when requested, the affected administration with a point of contact to assist in identifying the notifying administration for the satellite with which the ESIM communicates, which is responsible for eliminating the case of unacceptable interference (see *resolves* 9.1 and 9.2);

10 that the notifying administration for the GSO FSS satellite network with which the GSO A-ESIMs and M-ESIMs communicate shall ensure that:

10.1 A-ESIMs and M-ESIMs employ the minimum requirements specified in Annex 5 to this Resolution;

10.2 for the operation of A-ESIMs and M-ESIMs, techniques are employed to maintain adequate pointing accuracy of the antenna towards the associated GSO FSS satellite to avoid inadvertently tracking an adjacent GSO satellite;

10.3 all necessary measures shall be taken so that A-ESIMs and M-ESIMs are subject to permanent monitoring and control by an NCMC or equivalent facility in order to comply with the provisions of this Resolution, and are capable of receiving and immediately acting upon, *inter alia*, “enable transmission” and “disable transmission” commands from the NCMC;

10.4 measures are taken so that the A-ESIMs and/or M-ESIMs do not transmit on territory under the jurisdiction of an administration, including its territorial waters and national airspace, that either is not in the coordinated and notified service area of the GSO satellite network or has not authorized their use on its territory;

10.5 a permanent point of contact shall be provided in the Appendix **4** submission under Annex 1 of this Resolution and published in the special section by the notifying administration for the GSO FSS network for the purpose of tracing any suspected cases of unacceptable interference from A-ESIMs and M-ESIMs and to immediately respond to such requests;

11 that the operation of GSO A-ESIMs and M-ESIMs, including operation of the NCMC, interference management system, and mechanism and functioning of switching facilities, be subject to the availability of the ITU-R Recommendation referred to in *invites the ITU Radiocommunication Sector* below, with the understanding that, in the meantime, *further resolves* 2, 2.1 and 2.2 strictly apply;

12 that the operation of GSO A-ESIMs and M-ESIMs under frequency assignments recorded under § 6.25 of Appendix **30B**, including operation of the NCMC, interference management system, and mechanism and functioning of switching facilities, be subject to the availability of the ITU-R Recommendation referred to in *invites the ITU Radiocommunication Sector* below, with the understanding that, in the meantime, *further resolves* 2, 2.1 and 2.2 strictly apply,

further resolves

1 that compliance with this Resolution in no way whatsoever release the notifying administration(s) from its/their obligation not to cause unacceptable interference to, nor claim protection from, the incumbent services as referred to in this Resolution;

2 that the notifying administration for the GSO network, when submitting Appendix **4** information/data elements, shall send a firm, objective, actionable, measurable and enforceable commitment that, in the event of unacceptable interference being reported, it undertakes to immediately eliminate the interference or reduce it to an acceptable level;

2.1 in case of no action being taken with regard to the obligation referred to in *further resolves* 2 above, the Bureau shall send a reminder and request the notifying administration for the GSO network to comply with the requirements referred to in the commitment;

2.2 should the interference persist 30 days after the dispatch date of the above-mentioned reminder, the Bureau shall submit the case to the subsequent meeting of the Radio Regulations Board (RRB) for review and necessary actions (including suppression of the frequency assignment to the ESIM concerned), as appropriate;

3 that frequency assignments in the frequency band 12.75-13.25 GHz (Earth-to-space) used by A-ESIMs and M-ESIMs communicating with geostationary space stations in the FSS shall be notified to the Bureau under Annex 1 to this Resolution by the notifying administration for the satellite network with which the ESIM communicates;

4 that the notifying administration for the satellite network shall ensure that A-ESIMs and M-ESIMs operate only in the territory under the jurisdiction of administrations from which authorization has been obtained, taking into account *recognizing further c)* above;

5 that, in accordance with *instructs the Director of the Radiocommunication Bureau* 4 below, the notifying administration for the Appendix **30B** FSS satellite network operating A-ESIMs and M-ESIMs, upon request by the Bureau regarding cases of unacceptable interference reported by affected administrations, shall provide the Bureau with the list of administrations that have authorized ESIM operations to communicate with that satellite network and that are potentially related to the reported case of unacceptable interference;

6 that, for the implementation of *further resolves* 2, the notifying administration responsible for the operation of GSO A-ESIMs and M-ESIMs shall also be responsible for observing and complying with all relevant regulatory and administrative provisions applicable to the operation of the above-mentioned GSO A-ESIMs and M-ESIMs, as contained in this Resolution and in the Radio Regulations;

7 that the authorization for a GSO A-ESIM and M-ESIM to operate in the territory under the jurisdiction of an administration shall in no way release the notifying administration for the satellite network with which the ESIM communicates from the obligation to comply with the provisions contained in this Resolution and in the Radio Regulations,

instructs the Director of the Radiocommunication Bureau

1 to take all necessary actions to facilitate the implementation of this Resolution;

2 to report to future world radiocommunication conferences on any difficulties or inconsistencies encountered in the implementation of this Resolution, including on whether or not the responsibilities relating to the operation of GSO A-ESIMs and M-ESIMs have been properly addressed;

3 to accelerate, to the maximum extent possible, the development and availability of the software required for implementation of the methodology contained in Annex 4 to this Resolution to examine compliance with the pfd limits in Part II of Annex 2 to this Resolution;

4 in the event of unacceptable interference:

4.1 based on information provided by the affected administration, to request the notifying administrations for satellite networks communicating with A-ESIMs and M-ESIMs that could potentially be causing unacceptable interference to promptly provide the relevant list of administrations that have authorized such ESIM operations to the affected administration;

4.2 to provide the affected administration with the list of networks potentially related to the reported case of unacceptable interference;

4.3 if a notifying administration fails to provide the information required under *instructs the Director of the Radiocommunication Bureau* 4.1 above within 45 days from the date of dispatch of the Bureau's request referred to in *instructs the Director of the Radiocommunication Bureau* 4.1, to send the notifying administration a reminder to provide the required list within 15 days from the date of this reminder;

4.4 if a notifying administration fails to provide the required information following the reminder under *instructs the Director of the Radiocommunication Bureau* 4.3 above and if the affected administration has not confirmed to the Bureau that the case of unacceptable interference has been resolved, to submit the case to the subsequent meeting of RRB for review and the necessary actions, as appropriate,

invites the ITU Radiocommunication Sector

to study, as a matter of urgency, with the objective of preparing a Recommendation to be adopted and approved in accordance with Resolution ITU-R 1, the functionalities and implementation of NCMC for ESIMs,

instructs the Secretary-General

1 to bring this Resolution to the attention of the International Maritime Organization and the International Civil Aviation Organization;

2 to bring this Resolution to the attention of the ITU Council with a view to its considering whether cost recovery should be applied to GSO A-ESIMs and M-ESIMs.

ANNEX 1 TO RESOLUTION COM5/2 (WRC-23)

PART I

Procedure to be followed by the administrations and the Bureau for submission of the earth stations in motion on aircraft and vessels operating in the frequency band 12.75-13.25 GHz (Earth-to-space) and for the protection of allotments in the Plan, assignments in the Appendix 30B List and those submitted under Articles 6 and 7 of Appendix 30B as well as under Resolution 170 (Rev.WRC-23)

Section A – Procedure for entering assignments to earth stations in motion on aircraft and vessels in the Appendix 30B ESIM List[1]

1 When an administration, or one acting on behalf of a group of named administrations, intends to use as a supporting frequency assignment one or more Appendix **30B** assignments already included in the List and the Master international Frequency Register (MIFR) in support of the operation of earth stations in motion on aircraft (A-ESIMs) and earth stations in motion on vessels (M-ESIMs) in the frequency band 12.75-13.25 GHz, it shall send to the Radiocommunication Bureau, not earlier than eight years but preferably not later than two years before the operation of A-ESIMs and M-ESIMs, the information specified in Appendix **4**[2].

An assignment in the Appendix **30B** ESIM List shall lapse if it is not brought into use within eight years of the date of receipt by the Bureau of the relevant complete information specified above. A proposed assignment not included in the Appendix **30B** ESIM List within eight years after the date of receipt by the Bureau of the relevant complete information shall also lapse.

1*bis* If the information received by the Bureau under § 1 is found to be incomplete, the Bureau shall immediately seek any clarification required and information not provided from the administration concerned.

2 Upon receipt of a complete notice under § 1, the Bureau shall examine it with respect to its conformity with:

a) the Table of Frequency Allocations and other provisions[3] of the Radio Regulations, except those provisions relating to conformity with the FSS Plan and the coordination procedures;

b) Annex 3 to Appendix **30B**;

c) the on-axis equivalent isotropically radiated power (e.i.r.p.) density and off-axis e.i.r.p. density of the supporting Appendix **30B** assignment(s);

d) the service area of the supporting Appendix **30B** assignment(s) in respect of explicit agreements of those administrations whose territories are included in the service area[4]; and

e) the frequency band of the supporting Appendix **30B** assignment(s) in the List in the frequency band 12.75-13.25 GHz.

3 When the examination with respect to § 2 leads to an unfavourable finding, the relevant part of the notice shall be returned to the notifying administration with an indication of the appropriate action.

4 When the examination with respect to § 2 leads to a favourable finding, the Bureau shall use the method of Annex 4 to Appendix **30B** (see § 17) to determine administrations whose:

a) allotments in the Plan;

b) assignments which appear in the List; or

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1 The List of assignments for earth stations in motion (ESIMs) in the frequency band 12.75-13.25 GHz in Appendix **30B**.

2 Submissions may include only the frequency band 12.75-13.0 GHz or 13.0-13.25 GHz.

3 The “other provisions” shall be identified and included in the Rules of Procedure.

4 The service area may be reduced by excluding certain countries for which explicit agreement was obtained.

c) assignments which the Bureau has previously examined under § 6.5 of Article 6 of Appendix **30B** after receiving complete information in accordance with § 6.1 of that Article

are considered as being affected and receiving more interference than that produced by the supporting Appendix **30B** assignment(s).

5 The Bureau shall publish, in a special section of its International Frequency Information Circular (BR IFIC), the complete information received under § 1, and examined under §4, together with the names of the affected administrations, the corresponding allotments in the Plan, assignments in the List and assignments for which the Bureau has previously received complete information in accordance with § 6.1 of Article 6 of Appendix **30B** and which it has examined under § 6.5 of that Article.

5*bis* The Bureau shall immediately inform the administration proposing the assignment, in the Appendix **30B** ESIM List drawing its attention to the information contained in the relevant BR IFIC and the requirement to seek and obtain the agreement of those affected administrations.

6 The Bureau shall also inform each administration listed in the special section of the BR IFIC published under § 5, drawing its attention to the information it contains.

7 An administration that has not notified its comments either to the administration seeking agreement or to the Bureau within a period of four months following the date of the BR IFIC referred to in § 5 shall be deemed to have not agreed to the proposed assignment in respect of its allotment in the Plan, conversion of an allotment into an assignment without modification or with a modification which is within the envelope characteristics of the initial allotment, Article 7 request transferred to Article 6, submission in accordance with Resolution **170 (Rev.WRC-23)**, according to the case, where the absence of reply/comments shall be construed as its disagreement to the request for coordination. This time-limit shall be extended for an administration that has requested the assistance of the Bureau by up to 30 days following the date on which the Bureau communicated the result of its action. In respect of its frequency assignments under Article 6 of Appendix **30B** other than those mentioned above, the same course of action outlined in § 6.10 of that Article shall apply.

8 Unless coordination is no longer required, the administration responsible for the notice published under § 5 shall seek and obtain the explicit agreement of the relevant affected administrations contained in the special section published under § 5 in respect of allotments in the Plan, conversion of an allotment into an assignment without modification or with a modification which is within the envelope characteristics of the initial allotment, an Article 7 request transferred to Article 6, a submission in accordance with Resolution **170 (Rev.WRC-23)**, as appropriate. In this specific case of explicit agreement, any request for the assistance of the Bureau shall not change it to implicit/tacit agreement.

9 If agreements have been reached in accordance with §§ 7 and 8 with administrations published under § 5, the administration responsible for the notice published under § 5 may request the Bureau to have the assignment entered into the Appendix **30B** ESIM List, indicating the final characteristics of the notice[5] together with the names of the administrations with which agreement has been reached.

9*bis* In submitting such information, noting the requirement of § 1 of Section B, the administration may also request the Bureau to examine the submission in respect of notification under Section B.

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[5] Submissions may include only the frequency band 12.75-13.0 GHz or 13.0-13.25 GHz.

9*ter* If the information received by the Bureau under §§ 9 and 9*bis* is found to be incomplete, the Bureau shall immediately seek any clarification required and information not provided from the administration concerned. The Bureau may also provide additional information in order to assist the notifying administration in complying with requirements under §§ 10, 12 and 13.

10 Upon receipt of a complete notice under § 9, the Bureau shall examine each assignment in the notice with respect to its conformity with:

a) the Table of Frequency Allocations and other provisions[6] of the Radio Regulations, except those provisions relating to conformity with the FSS Plan and the procedures for coordination;

b) Annex 3 to Appendix **30B**;

c) the service area published under § 5;

d) the on-axis e.i.r.p. density and off-axis e.i.r.p. density of the assignments published under § 5; and

e) the frequency band of the assignments published under § 5.

11 When the examination with respect to § 10 of an assignment received under § 9 leads to an unfavourable finding, the notice shall be returned to the notifying administration with an indication that subsequent resubmission under § 9 will be considered with a new date of receipt.

12 When the examination with respect to § 10 of an assignment received under § 9 leads to a favourable finding, the Bureau shall use the method described in Annex 4 to Appendix **30B** to examine if there is any administration and corresponding:

a) allotment in the Plan;

b) assignment which appears in the List at the date of receipt of the examined notice submitted under § 1;

c) assignments which the Bureau has previously examined under § 6.5 of Article 6 of Appendix **30B** after receiving complete information in accordance with § 6.1 of that Article at the date of receipt of the examined notice submitted under § 1[7],

considered as being affected and receiving more interference than that produced by the supporting Appendix **30B** assignment(s) and whose agreement has not been provided under § 9.

13 The Bureau shall determine if the cumulative interference is caused to an allotment in the Plan or an assignment in the List or an assignment for which the Bureau has received complete information in accordance with Article 6 of Appendix **30B** before the date of receipt of the complete notice under § 9. The cumulative interference shall be calculated based on Appendix 1 to Annex 4 of Appendix **30B**, taking into account assignments in the Appendix **30B** ESIM List together with assignments submitted under § 9. The cumulative interference is considered as being caused when the overall aggregate $(C/I)_{aggregate}$ value is less than that resulting from the supporting Appendix **30B** assignment(s) with a tolerance of 0.25 dB (inclusive of the 0.05 dB computational precision), except for an allotment in the Plan, an assignment stemming from the conversion of an allotment into an assignment without modification, or when the modification is within the envelope characteristics of the initial allotment, as well as assignments relating to application of Article 7 of Appendix **30B** for which the 0.05 dB computational precision is applicable.

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6 The "other provisions" shall be identified and included in the Rules of Procedure.

7 Similar course of action as prescribed in footnote 7*bis* of § 6.21 of Article 6 of Appendix **30B** applies.

14 In the event of a favourable finding under §§ 12 and 13, the Bureau shall enter the proposed assignment in the Appendix **30B** ESIM List and publish in a special section of a BR IFIC the characteristics of the assignment received under § 9, together with the names of administrations with which the provisions of this procedure have been successfully applied.

15 When the examination under § 12 or § 13 leads to an unfavourable finding with respect to allotments in the Plan, conversion of an allotment into an assignment without modification or with a modification which is within the envelope characteristics of the initial allotment, an Article 7 request transferred to Article 6, or a submission in accordance with Resolution **170 (Rev.WRC-23)**, the Bureau shall return the notice to the notifying administration. In this case, the notifying administration undertakes not to bring into use the frequency assignments until the finding with respect to allotments in the Plan, conversion of an allotment into an assignment without modification or with a modification which is within the envelope characteristics of the initial allotment, an Article 7 request transferred to Article 6, or a submission in accordance with Resolution **170 (Rev.WRC-23)**, is favourable. The Bureau, in returning the notice to the notifying administration, shall indicate that the subsequent resubmission under § 9 will be considered with a new date of receipt.

15*bis* When the examination under § 12 or § 13 leads to a favourable finding with respect to allotments in the Plan, conversion of an allotment into an assignment without modification or with a modification which is within the envelope characteristics of the initial allotment, an Article 7 request transferred to Article 6, a submission in accordance with Resolution **170 (Rev.WRC-23)**, but an unfavourable finding with respect to others, and if the notifying administration insists that the proposed assignment be included in the Appendix **30B** ESIM List, the Bureau shall enter the assignment provisionally in the Appendix **30B** ESIM List with an indication of those administrations whose assignments were the basis of the unfavourable finding. To this effect, the notifying administration shall include a signed commitment, indicating that use of an assignment provisionally recorded in the Appendix **30B** ESIM List shall not cause unacceptable interference to, nor claim protection from, those assignments for which agreement still needs to be obtained. The entry in the Appendix **30B** ESIM List shall be changed from provisional to definitive only if the Bureau is informed that all required agreements have been obtained.

15*ter* Should the assignments that were the basis of the unfavourable finding not be brought into use within the period specified in § 6.1 of Article 6 of Appendix **30B** or within the extension period under § 6.31*bis* of Article 6 of Appendix **30B**, the status of the assignment in the Appendix **30B** ESIM List shall be reviewed accordingly.

16 Should unacceptable interference be caused by an assignment entered in the Appendix **30B** ESIM List under § 15*bis* to any assignment in the List which was the basis of the disagreement, the notifying administration of the assignment entered in the Appendix **30B** ESIM List under § 15*bis* shall, upon receipt of advice thereof, immediately eliminate this unacceptable interference.

17 For the examinations referred to in Part I and Part II, the Bureau shall generate a set of uplink grid points everywhere within the service area of the relevant assignments to A-ESIMs and M-ESIMs, assuming that A-ESIMs and M-ESIMs are located at these uplink grid points.

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

1 Any assignment in the ESIM List for which the relevant procedure of Section A and Part II of this Annex has been successfully applied shall be notified to the Bureau using the relevant

characteristics listed in Appendix **4**, not earlier than three years before the assignment is brought into use.

2 If the first notice referred to in § 1 has not been received by the Bureau within the required period mentioned in § 1 of Section A, the assignments in the Appendix **30B** ESIM List shall be cancelled by the Bureau after having informed the administration at least three months before the expiry of this period.

3 Notices not containing those characteristics specified in Appendix **4** as mandatory or required shall be returned with comments to help the notifying administration to complete and resubmit them, unless the information not provided is immediately forthcoming in response to an inquiry by the Bureau.

4 Complete notices shall be marked by the Bureau with their date of receipt and shall be examined in the order of their dates of receipt. Following receipt of a complete notice, the Bureau shall, as soon as possible after the date of entry of the corresponding assignment into the Appendix **30B** ESIM List or within not more than two months if the corresponding assignment has already been entered into the Appendix **30B** ESIM List, publish its contents, with any diagrams and maps and the date of receipt, in the BR IFIC, which shall constitute the acknowledgement to the notifying administration of receipt of its notice. When the Bureau is not in a position to comply with the time-limit referred to above, it shall periodically so inform the administrations, giving the reasons thereof.

5 The Bureau shall not postpone the formulation of a finding on a complete notice unless it lacks sufficient data to reach a conclusion thereon.

6 Each notice shall be examined:

6.1 with respect to its conformity with the Table of Frequency Allocations and other provisions[8] of the Radio Regulations, except those provisions relating to conformity with the FSS Plan and the procedures for coordination, which are the subject of the following subparagraph; and

6.2 with respect to its conformity with the FSS Plan, the procedures for coordination and the associated provisions[9].

7 When the examination with respect to § 6.1 leads to a favourable finding, the assignment shall be examined further with respect to § 6.2; otherwise, the notice shall be returned with an indication of the appropriate action.

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[8] The “other provisions” shall be identified and included in the Rules of Procedure.

[9] When an administration notifies any assignment with characteristics different from those entered in the Appendix **30B** ESIM List through successful application of the relevant procedure of Section A and Part II of this Annex, the Bureau shall undertake calculations to determine if the proposed new characteristics increase the interference level caused to other allotments in the Plan, assignments in the List, an assignment for which the Bureau has received complete information in accordance with § 6.1 of Article 6 of Appendix **30B** before the date of receipt of this notification, assignments in the Appendix **30B** ESIM List and an assignment for which the Bureau has received complete information in accordance with § 1 of Section A before the date of receipt of this notification. The increase of the interference due to characteristics different from those entered in the Appendix **30B** ESIM List will be checked by comparing the *C*/*I* ratios of these other allotments and assignments, which result from the use of the proposed new characteristics of the subject assignment on the one hand, and those obtained with the characteristics of the subject assignment in the Appendix **30B** ESIM List, on the other hand. This *C*/*I* calculation is performed under the same technical assumptions and conditions.

8 When the examination with respect to § 6.2 leads to a favourable finding, the ESIM assignment shall be recorded in the MIFR. When the finding is unfavourable, the notice shall be returned to the notifying administration, with an indication of the appropriate action.

9 In every case when a new ESIM assignment is recorded in the MIFR it shall, in accordance with the provisions of this Resolution, include an indication of the finding reflecting the status of the assignment. This information shall also be published in a BR IFIC.

10 A notice of a change in the characteristics of the ESIM assignment already recorded, as specified in Appendix **4**, shall be examined by the Bureau under §§ 6.1 and 6.2, as appropriate. Any changes to the characteristics of an assignment that has been recorded and confirmed as having been brought into use shall be brought into use within eight years from the date of the notification of the modification. Any changes to the characteristics of an assignment that has been recorded but not yet brought into use shall be brought into use within the period provided for in § 1 of Section A.

11 In applying the provisions of this Section, any resubmitted notice which is received by the Bureau more than six months after the date on which the original notice was returned by the Bureau shall be considered to be a new notice.

12 All frequency assignments notified in advance of their being brought into use shall be entered provisionally in the MIFR. Any frequency assignment provisionally recorded under this provision shall be brought into use no later than the end of the period provided for in § 1 of Section A. Unless the Bureau has been informed by the notifying administration of the bringing into use of the assignment, it shall, no later than 15 days before the end of the regulatory period established under § 1 of Section A, send a reminder requesting confirmation that the assignment has been brought into use within the regulatory period. If the Bureau does not receive that confirmation within 30 days following the period provided under § 1 of Section A, it shall cancel the entry in the MIFR and the corresponding assignment in the Appendix **30B** ESIM List.

13 When the Bureau has received confirmation that the assignment in the Appendix **30B** ESIM List has been brought into use, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in a BR IFIC.

14 Wherever the use of a frequency assignment in the Appendix **30B** ESIM List is suspended for a period exceeding six months, the notifying administration shall inform the Bureau of the date on which such use was suspended. When that assignment is brought back into use, the notifying administration shall so inform the Bureau, as soon as possible. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in a BR IFIC. The date on which the assignment is brought back into use shall be no later than three years from the date on which the use of the frequency assignment was suspended, provided that the notifying administration informs the Bureau of the suspension within six months from the date on which the use was suspended. If the notifying administration informs the Bureau of the suspension more than six months after the date on which the use of the frequency assignment was suspended, this three-year time period shall be reduced. In this case, the amount by which the three-year period shall be reduced shall be equal to the amount of time that has elapsed between the end of the six-month period and the date that the Bureau is informed of the suspension. If the notifying administration informs the Bureau of the suspension more than 21 months after the date on which the use of the frequency assignment was suspended, the frequency assignment shall be removed from the MIFR and the Appendix **30B** ESIM List.

15 If the supporting Appendix **30B** assignment(s) is removed from the List, the corresponding ESIM assignment shall also be removed from the Appendix **30B** ESIM List and the MIFR, as appropriate.

PART II

Procedure to be followed by administrations and the Bureau for examination and protection of one earth station in motion (ESIM) with respect to other ESIMs

1 In the publication of the special section referred to in § 5 of Section A, the Bureau shall also include the names of the affected administrations, the corresponding assignments in the Appendix **30B** ESIM List and assignments for which the Bureau has previously received complete information in accordance with § 1 of Section A and which it has examined under § 4 of Section A, as appropriate.

2 In determining administrations whose assignments in the Appendix **30B** ESIM List or assignments for which the Bureau has previously received complete information in accordance with § 1 of Section A and which it has examined under § 4 of Section A are considered as being affected, the Bureau shall apply the principle of Annex 4 to Appendix **30B** and the following criteria:

a) orbital spacing as specified in § 1.2 of Annex 4;

b) Earth-to-space single-entry carrier-to-interference as specified in § 2.1 of Annex 4 or Earth-to-space single-entry carrier-to-interference (*C*/*I*) derived from the supporting Appendix **30B** assignment(s), whichever is the lowest;

c) the Earth-to-space power flux-density as specified in § 2.2 of Annex 4.

3 An administration that has not notified its comments either to the administration seeking agreement or to the Bureau within a period of four months following the date of the BR IFIC referred to in § 5 of Section A shall be deemed to have agreed to the proposed assignment. This time-limit shall be extended for an administration that has requested the assistance of the Bureau by up to thirty days following the date on which the Bureau communicated the result of its action.

4 Unless coordination is no longer required, taking into account the final characteristics of the notice in § 9 of Section A, should harmful interference be caused by an assignment included in Appendix **30B** ESIM List to any assignment in Appendix **30B** ESIM List identified in § 1 for which agreement has not been obtained, the notifying administration shall, upon receipt of advice thereof, immediately eliminate this harmful interference.

ANNEX 2 TO RESOLUTION COM5/2 (WRC-23)

Provisions for earth stations in motion on aircraft and vessels to protect terrestrial services in the frequency band 12.75-13.25 GHz

1 The parts below contain provisions to ensure that earth stations in motion on aircraft (A-ESIMs) and earth stations in motion on vessels (M-ESIMs) do not cause unacceptable interference to terrestrial service operations when A-ESIMs and M-ESIMs operate in frequency bands overlapping with those used at any time by terrestrial services to which the frequency band 12.75-13.25 GHz is allocated and operating in accordance with the Radio Regulations (see also *resolves* 1.2 of this Resolution).

PART I

M-ESIMs

2 The notifying administration for the geostationary-satellite (GSO) network in the fixed-satellite service (FSS) with which an M-ESIM communicates shall ensure compliance of the M-ESIM operating within the frequency band 12.75-13.25 GHz, or parts thereof, with both of the following conditions for the protection of terrestrial services to which the frequency band is allocated within a coastal State:

2.1 The minimum distance from the low-water mark as officially recognized by the coastal State beyond which an M-ESIM can operate without the prior agreement of any administration is 158 km in the frequency band 12.75-13.25 GHz. Any transmissions from an M-ESIM within the minimum distance shall be subject to the prior agreement of the coastal State concerned.

2.2 The maximum M-ESIM equivalent isotropically radiated power (e.i.r.p.) spectral density towards the horizon shall be limited to 12.5 dB(W/MHz). Transmissions from an M-ESIM with higher e.i.r.p. spectral density levels towards the territory of any coastal State shall be subject to the prior agreement of the coastal State concerned.

PART II

A-ESIMs

3 The notifying administration of the GSO FSS satellite network with which an A-ESIM communicates shall ensure compliance of the A-ESIM operating within the frequency band 12.75-13.25 GHz, or parts thereof, with all of the following conditions for the protection of terrestrial services to which the frequency band is allocated:

POWER FLUX-DENSITY MASK

3.1 When within line-of-sight of the territory of an administration, and above an altitude of 3 km, the maximum power flux-density (pfd) produced at the surface of the Earth on the territory of an administration by emissions from a single A-ESIM shall not exceed:

$$\begin{aligned}
&\text{pfd}(\theta) = -112 && \text{dB}(\text{W}/(\text{m}^2 \cdot 14\ \text{MHz})) && \text{for} && \theta \leq 5^\circ \\
&\text{pfd}(\theta) = -117 + \theta && \text{dB}(\text{W}/(\text{m}^2 \cdot 14\ \text{MHz})) && \text{for} && 5^\circ < \theta \leq 40^\circ \\
&\text{pfd}(\theta) = -77 && \text{dB}(\text{W}/(\text{m}^2 \cdot 14\ \text{MHz})) && \text{for} && 40^\circ < \theta \leq 90^\circ
\end{aligned}$$

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

3.2 When within line-of-sight of the territory of an administration, and up to an altitude of 3 km, the maximum pfd produced at the surface of the Earth on the territory of an administration by emissions from a single A-ESIM shall not exceed:

$$\begin{aligned}
&\text{pfd}(\theta) = -123.5 && \text{dB}(\text{W}/(\text{m}^2 \cdot \text{MHz})) && \text{for} && \theta \leq 5^\circ \\
&\text{pfd}(\theta) = -128.5 + \theta && \text{dB}(\text{W}/(\text{m}^2 \cdot \text{MHz})) && \text{for} && 5^\circ < \theta \leq 40^\circ \\
&\text{pfd}(\theta) = -88.5 && \text{dB}(\text{W}/(\text{m}^2 \cdot \text{MHz})) && \text{for} && 40^\circ < \theta \leq 90^\circ
\end{aligned}$$

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

4 The maximum power in the out-of-band domain should be attenuated below the maximum output power of the A-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 an A-ESIM at any point on the surface of the Earth within the territory of another administration, shall be subject to the prior agreement of that administration (see also *resolves* 1.2.5 of this Resolution).

ANNEX 3 TO RESOLUTION COM5/2 (WRC-23)

Provisions for earth stations in motion on aircraft and vessels to protect non-geostationary-satellite systems in the fixed-satellite service in the frequency band 12.75-13.25 GHz

1 In order to protect the non-geostationary-satellite (non-GSO) systems in the fixed-satellite service (FSS) referred to in *resolves* 1.1.5 of this Resolution in the frequency band 12.75-13.25 GHz, earth stations in motion on aircraft (A-ESIMs) and earth stations in motion on vessels (M-ESIMs) communicating with geostationary-satellite (GSO) FSS satellite networks shall not exceed the following operational limits:

a) on-axis equivalent isotropically radiated power (e.i.r.p.) density of 49 dB(W/1 MHz) for a GSO A-ESIM and M-ESIM with an antenna maximum gain lower than 38.5 dBi;

b) on-axis e.i.r.p. density of 54 dB(W/1 MHz) for a GSO A-ESIM and M-ESIM with an antenna maximum gain equal to or greater than 38.5 dBi but lower than 45 dBi;

c) on-axis e.i.r.p. density of 57.5 dB(W/1 MHz) for a GSO A-ESIM and M-ESIM with an antenna maximum gain equal to or greater than 45 dBi;

d) e.i.r.p. density for any off-axis angle φ which is 3° or more off the main-lobe axis of a GSO A-ESIM and M-ESIM antenna and outside 3° of the GSO arc:

Off-axis angle	*Maximum e.i.r.p. density*	
$3° \le \varphi \le 31.6°$	$37 - 25 \log\varphi$	dB(W/40 kHz)
$31.6° < \varphi \le 180°$	-0.5	dB(W/40 kHz)

2 The above levels are operational and are not examined by the Radiocommunication Bureau.

ANNEX 4 TO RESOLUTION COM5/2 (WRC-23)

Methodology for examining the compliance of earth stations in motion on aircraft communicating with geostationary space stations in the fixed-satellite service in the 12.75-13.25 GHz frequency band with the set of power flux-density limits pre-established in Part II of Annex 2 to this Resolution at the Earth's surface

1 Overview

The methodology below is a functional description of how to conduct examination of earth stations in motion on aircraft (A-ESIMs) operating with geostationary-satellite (GSO) networks and their conformity with the power flux-density (pfd) limits specified in Part II of Annex 2 to this Resolution.

2 A-ESIM parameters required for examination

To conduct the relevant examination of an A-ESIM and its conformity with respect to the pfd limits, the following parameters are required:

– satellite network name;

– GSO satellite longitude;

– GSO service area latitude bounds;

– GSO service area longitude bounds;

– A-ESIM peak antenna gain;

– A-ESIM minimum elevation;

– A-ESIM power density and bandwidth as given in Table 1; and

– fuselage attenuation mask expressed as a function of the angle below the horizon of the A-ESIM.

3 Examination methodology

3.1 Introduction

An A-ESIM can operate at different locations defined by latitude, longitude and altitude. This methodology determines the maximum allowable power P_j for an A-ESIM transmitter communicating with a GSO satellite network in the fixed-satellite service (FSS) to ensure compliance with the pre-established pfd limits to protect terrestrial services, at all positions, for a defined set of altitude ranges. The methodology derives P_j, taking into account the relevant loss and attenuation in the geometry considered.

The methodology then compares the computed P_j with the range of notified power for the A-ESIM emission. The minimum and maximum power values for emissions from the A-ESIM, $P_{\min\_emission,j}$ and $P_{\max\_emission,j}$, are calculated from the data included in the Appendix **4** notification information for the GSO satellite network with which the A-ESIM communicates and from the A-ESIM characteristics.

A-ESIMs are evaluated over a number of predefined altitude ranges in order to establish a number of P_j levels.

An examination by the Radiocommunication Bureau should apply this methodology for the defined altitude range, to determine whether an A-ESIM operating under a given GSO satellite network complies with the pre-established pfd limits to protect terrestrial services.

3.2 Parameters and geometry

Considering a hypothetical GSO FSS network, Table 1 below provides an example of emissions that are included in one group transmitting in the 12.75-13.25 GHz frequency band. Tables 2 to 4 provide additional assumptions and Figure 1 illustrates the geometry involved in the examination.

TABLE 1

Example of a group of A-ESIM emissions
(with reference to relevant Appendix 4 data fields)

Emission No.	C.7.a Designation of emission	$BW_{emission}$ MHz	C.8.a.3 Minimum power density dB(W/Hz)	C.8.a.2 Maximum power density dB(W/Hz)
1	6M00G7W--	6.0	−69.7	−66.0

TABLE 2

Additional example assumptions

ID	Parameter	Notation	Value	Unit
1	Frequency assignment	f	13	GHz
2	Reference bandwidth of pfd mask	BW_{Ref}	1.0 or 14.0, depending on the altitude under examination	MHz
6	A-ESIM antenna peak gain	G_{max}	36	dBi
7	A-ESIM antenna gain pattern	-	As per Rec. ITU-R S.580 (see C.10.d.5.a)	

TABLE 3

Additional assumptions defined in the methodology

ID	Parameter	Notation	Value	Unit
8	A-ESIM minimum elevation angle towards GSO satellite	ε	Appendix **4**, C.10.d.10	degrees
9	Atmospheric attenuation	L_{atm}	Computed with Rec. ITU-R P.676 (see NOTE below)	dB
10	Angle of arrival of the incident wave on the Earth's surface	δ	Specified by the pre-established sets of pfd limits, variable from 0° to 90°	degrees
11	Minimum examination altitude	H_{min}	0.01	km
12	Maximum examination altitude	H_{max}	15.0	km
13	Examination altitude spacing[1]	H_{step}	1.0	km
14	Fuselage attenuation	L_f	Use Table 4 if no ITU-R Recommendation provided in Appendix **4**, C.10.d.11	dB

[1] The fourth altitude value (H_4) computed in accordance with this H_{step} is adjusted to 2.99 km to facilitate the examination of compliance with the two sets of predefined pfd values indicated in Table 5A and Table 5B.

NOTE: The atmospheric attenuation is computed using the most recent version of Recommendation ITU-R P.676, with the mean annual global reference atmosphere as defined in the most recent version of Recommendation ITU-R P.835.

FIGURE 1

Geometry for examination of compliance for two different A-ESIM altitudes

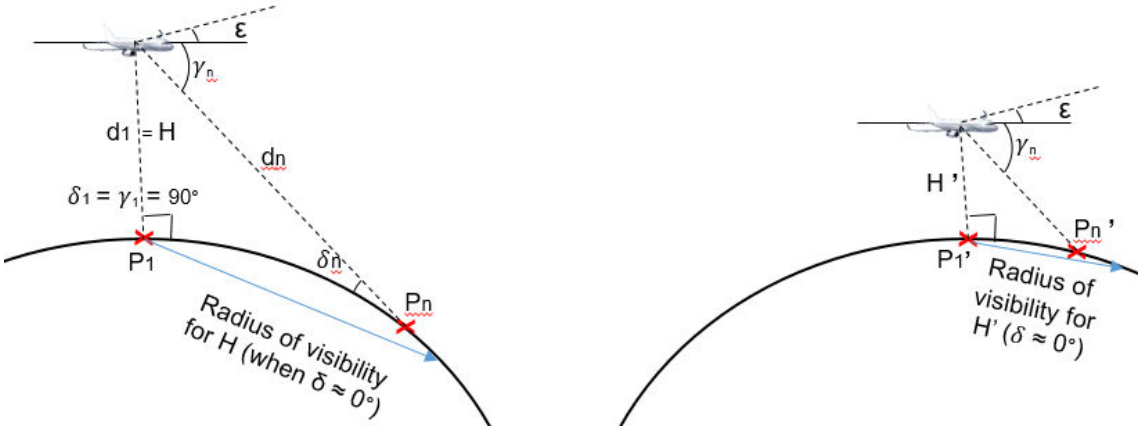


TABLE 4

Fuselage attenuation model based on Report ITU-R M.2221-0

$L_{fuse}(\gamma) = 3.5 + 0.25 \cdot \gamma$	dB	for	$0° \le \gamma \le 10°$
$L_{fuse}(\gamma) = -2 + 0.79 \cdot \gamma$	dB	for	$10° < \gamma \le 34°$
$L_{fuse}(\gamma) = 3.75 + 0.625 \cdot \gamma$	dB	for	$34° < \gamma \le 50°$
$L_{fuse}(\gamma) = 35$	dB	for	$50° < \gamma \le 90°$

Notes:

– This fuselage attenuation model is based on measurements made at 14.2 GHz (see Fig. 3.6-14 in Report ITU-R M.2221-0).

– Tables 5A and Table 5B are taken from Part II of Annex 2 to this Resolution. The reference bandwidth for the sets of pfd limits included in Table 5A and Table 5B are 1 MHz and 14 MHz, respectively.

TABLE 5A

Required conformance pfd mask for altitudes up to 3 km

$pfd(\theta) = -123.5$	$dB(W/(m^2 \cdot MHz))$	for	$\theta \le 5°$
$pfd(\theta) = -128.5 + \theta$	$dB(W/(m^2 \cdot MHz))$	for	$5° < \theta \le 40°$
$pfd(\theta) = -88.5$	$dB(W/(m^2 \cdot MHz))$	for	$40° < \theta \le 90°$

TABLE 5B

Required conformance pfd mask for altitudes above 3 km

$pfd(\theta) = -112$	$dB(W/(m^2 \cdot 14\ MHz))$	for	$\theta \le 5°$
$pfd(\theta) = -117 + \theta$	$dB(W/(m^2 \cdot 14\ MHz))$	for	$5° < \theta \le 40°$
$pfd(\theta) = -77$	$dB(W/(m^2 \cdot 14\ MHz)$	for	$40° < \theta \le 90°$

3.3 Calculation algorithm

This section includes a step-by-step description of how the examination methodology would be implemented.

START

i) For each A-ESIM altitude, it is necessary to generate as many δ_n angles (angle of arrival of the incident wave) as required in order to test full compliance with the applicable set of pfd limits. The *N* angles δ_n must be between 0° and 90° and have a resolution compatible with the granularity of the pre-established pfd limits. Each of the *N* angles δ_n will correspond to as many *N* points on the ground.

ii) For each altitude $H_j = H_{min}, H_{min} + H_{step}, \ldots, H_{max}$:

a) set the altitude of the *A-ESIM* to H_j

b) compute the angles below the horizon $\gamma_{j,n}$ as seen from the A-ESIM for each of the *N* angles δ_n generated in i) using the following equation:

$$\gamma_{j,n} = \arccos\left(\frac{R_e \cdot \cos(\delta_n)}{(R_e + H_j)}\right) \quad (1)$$

where R_e is the mean earth radius.

c) Compute the distance $D_{j,n}$, in km, for *n = 1, ..., N* between the A-ESIM and the tested point on the ground:

$$D_{j,n} = \sqrt{R_e^2 + (R_e + H_j)^2 - 2R_e(R_e + H_j)\cos(\gamma_n - \delta_n)} \quad (2)$$

d) Compute the fuselage attenuation $L_{fj,n}$ (dB) with *n = 1, ..., N* applicable to each of the angles $\gamma_{j,n}$ computed in *b)* above.

e) Compute the gaseous absorption $L_{atm\_j,n}$ (dB) with *n = 1, ..., N* applicable to each of the distances $D_{j,n}$, computed in *c)* above, using the applicable sections of the most recent version of Recommendation ITU-R P.676.

iii) *a)* For each altitude $H_j = H_{min}, H_{min} + H_{step}, \ldots, H_{max}$, and each angle below the horizon $\gamma_{j,n}$, compute the maximum emission power in the reference bandwidth $P_{j,n}(\delta_n, \gamma_{j,n})$ for which the pfd limits are met using the following algorithm:

$$P_{j,n}(\delta_n, \gamma_{j,n}) = pfd(\delta_n) + 10\,log_{10}\left(4\pi(D_{j,n} \cdot 1\,000)^2\right) + L_{fj,n} + L_{atmj,n} - Gtx(\gamma_{j,n} + \varepsilon)$$

with $Gtx(\gamma_{j,n} + \varepsilon)$ being the transmit antenna gain with the off-axis angle from the boresight, consisting of the summation of both angles $\gamma_{j,n}$ and minimum elevation angle ε as defined in Table 3.

b) Compute the minimum *Pj* across all values calculated at the previous step:

$$P_j = \text{Min}\left(P_{j,n}(\delta_n, \gamma_{j,n})\right)$$

The output of this step is the maximum power in the reference bandwidth that can be used by the A-ESIM to ensure it complies with the pfd limits indicated in Table 5A or Table 5B, as applicable, with respect to all angles δ_n at the altitude H_j, and the elevation indicated in Table 3. There will be one P_j for each of the H_j altitudes considered.

The output of step *b)* is summarized in Table 6 below:

TABLE 6

Computed P_j values

H_j (Altitude) (km)	P_j (Maximum power in the reference bandwidth that can be used at minimum elevation) dB(W/BW)
0.01	*TBD*
1.0	*TBD*
2.0	*TBD*
2.99	*TBD*
4.0	*TBD*
5.0	*TBD*
6.0	*TBD*
7.0	*TBD*
8.0	*TBD*
9.0	*TBD*
10.0	*TBD*
11.0	*TBD*
12.0	*TBD*
13.0	*TBD*
14.0	*TBD*
15.0	*TBD*

c) For each altitude $H_j = H_{min}$, $H_{min} + H_{step}$, …, H_{max}, and each emission in each group of emissions under examination, compute the minimum and the maximum powers of the emission in the reference bandwidth:

$$P_{\min\_emission,j} = minimum\ power\ density\left(emission, dBW/Hz\right) + 10 * \log_{10}\left(BW\right)$$

$$P_{\max\_emission,j} = maximum\ power\ density\left(emission, dBW/Hz\right) + 10 * \log_{10}\left(BW\right)$$

BW in Hz is:

BW_{Ref} if BW_{Ref} =1 MHz

BW_{Ref} if BW_{Ref} =14 MHz and $BW_{emission} \geq BW_{Ref}$

$BW_{emission}$ if BW_{Ref} =14 MHz and $BW_{emission} < BW_{Ref}$

The methodology assumes that only one emission within the reference bandwidth of 14 MHz is transmitted by A-ESIM.

d) For each emission in each group of emissions under examination, check if there is at least one altitude H_j for which:

$$P_{\max\_emission,j} > P_j > P_{\min\_emission,j}$$

The results of this check are illustrated in Table 7 below.

TABLE 7

Example comparison between P_j and ($P_{min\_emission,j}$; $P_{max\_emission,j}$)

Emission No.	C.7.a Designation of emission	$BW_{emission}$ MHz	C.8.a.3 Minimum power density dB(W/Hz)	C.8.a.2 Maximum power density dB(W/Hz)	Lowest altitude H_j (km) for which $P_{max\_emission,j} > P_j > P_{min\_emission,j}$
1	6M00G7W--	6.0	−69.7	−66.0	TBD

e) Based on the test detailed in iii) *d)* above applied to all emissions in the group under examination, the results of the Bureau's examination for that group is favourable, after removing emissions that have failed the examination; otherwise, it is unfavourable (i.e. all emissions have failed).

iv) The output of this methodology should, at a minimum, include:

– the resulting parameters as contained in Table 6;

– the examination results for each group;

– for those cases when some emissions successfully pass and some do not, the examination results for the resulting new group that includes only the emission(s) which successfully passed the examination.

END

ANNEX 5 TO RESOLUTION COM5/2 (WRC-23)

Required capabilities of earth stations in motion communicating with geostationary-satellite networks (in accordance with *resolves* 10.1 of this Resolution)

This Annex provides the minimum requirements for earth stations in motion (ESIMs) communicating with geostationary-satellite (GSO) networks subject to this Resolution, as shown in Table 8 below.

TABLE 8

GSO ESIM minimum requirements

Requirement	Associated provision(s)
Ability to monitor and control pointing of main beam in direction of satellite with which ESIM communicates	*Resolves* 10.2
Geolocation capability	*Resolves* 10.4
Ability of ESIM to receive information and execute commands from network control and monitoring centre (NCMC)	*Resolves* 10.3 *Resolves* 10.4
Ability to send information to NCMC	*Resolves* 10.4
Ability to monitor and control transmission power and frequency	*Resolves* 10.4
Ability to enable/disable ESIM transmission	*Resolves* 10.3

Agenda item 1.16

ADD

RESOLUTION COM5/3 (WRC-23)

Use of the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with non-geostationary space stations in the fixed-satellite service

The World Radiocommunication Conference (Dubai, 2023),

recalling

the Preamble to the ITU Constitution,

considering

a) that there is some interest in global broadband satellite communications, and that some of this need could be met by allowing aeronautical and maritime earth stations in motion (A-ESIMs and M-ESIMs, respectively) to communicate with non-geostationary-satellite (non-GSO) fixed-satellite service (FSS) systems operating in the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth), and 27.5-29.1 GHz and 29.5-30.0 GHz (Earth-to-space);

b) that the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) are allocated to space services, and that the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz, and 27.5-29.1 GHz are allocated to terrestrial services on a primary basis worldwide;

c) that, in the countries identified in No. **5.524**, the frequency band 19.7-20.2 GHz is allocated to the fixed and mobile services on a primary basis; and that, in the countries identified in No. **5.542**, the frequency band 29.5-30 GHz is allocated to the fixed and mobile services on a secondary basis;

d) that the frequency bands in *considering a)* above are used by a variety of different systems and that these existing services and their future development need to be protected without being adversely affected by the operation of non-GSO ESIMs[1];

e) that the frequency band 18.6-18.8 GHz is allocated to the Earth exploration-satellite service (EESS) (passive) and space research service (SRS) (passive) and that these services need to be protected from the operation of those systems with which non-GSO ESIMs communicate;

f) that there is no regulatory procedure in the Radio Regulations for the coordination of non-GSO ESIMs relating to terrestrial assignments pertaining to a station of these services;

g) that regulatory procedures and interference management mechanisms, including necessary mitigation measures, are required for the operation of non-GSO ESIMs to protect other space and terrestrial services to which the frequency bands referred to in *considering a)* are allocated,

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[1] Throughout this Resolution, aeronautical and maritime non-GSO ESIMs are referred to as non-GSO A-ESIMs and non-GSO M-ESIMs, respectively.

considering further

a) that there is no publicly available information on the conditions stipulated in coordination agreements reached among administrations with respect to non-GSO FSS satellite systems;

b) that, in order to enable sharing between transmitting non-GSO ESIMs and its terrestrial services, an administration intending to authorize the operation of non-GSO ESIMs on the territory under its jurisdiction, including territorial waters and national airspace, may consider adopting interference management procedures and/or mitigation measures different from those contained in this Resolution, as long as the provisions of this Resolution apply with respect to any other administration;

c) that the service area of the non-GSO FSS systems with which non-GSO ESIMs communicate may cover territories under the jurisdiction of multiple administrations;

d) that this Resolution in no way establishes or addresses any technical or regulatory provisions for the operation and use of land non-GSO ESIMs communicating with non-GSO FSS systems, and that any authorization of land non-GSO ESIMs is outside the scope of this Resolution (see *recalling* above),

recognizing

a) that an administration authorizing non-GSO ESIMs on the territory under its jurisdiction, including territorial waters and national airspace, has the right to require that the non-GSO ESIMs referred to above use only those assignments associated with non-GSO FSS systems that have been successfully coordinated, notified, brought into use and recorded in the Master International Frequency Register (MIFR) with a favourable finding under Articles **9** and **11**, including No. **11.31**, **11.32** or **11.32A**, where applicable, with the exception of No. **11.41**;

b) that, where assignments to non-GSO FSS systems recorded under No. **11.41** will be used for the operation of non-GSO ESIMs in the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-28.6 GHz and 29.5-30 GHz (Earth-to-space), such assignments may be used for non-GSO FSS ESIMs only in accordance with No. **11.42**;

c) that for cases of incomplete coordination under No. **9.7B** of the non-GSO FSS system with which non-GSO ESIMs communicate, the operation of non-GSO ESIMs in the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz (space-to-Earth) needs to be in accordance with the provisions of No. **11.42** with respect to any recorded frequency assignment which was the basis of an unfavourable finding under No. **11.38**;

d) that the provisions of No. **22.2** apply to non-GSO FSS systems with which non-GSO ESIMs operate in the frequency band 17.7-17.8 GHz (space-to-Earth) with respect to geostationary-satellite (GSO) FSS and GSO broadcasting-satellite service (BSS) networks;

e) that, under the provisions of No. **22.2**, in the frequency bands 27.5-28.6 GHz and 29.5-30 GHz (Earth-to-space) non-GSO ESIMs shall not cause unacceptable interference to GSO FSS and BSS networks operating in accordance with the Radio Regulations, and shall not claim protection from them in the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz (space-to-Earth), and No. **5.43A** does not apply in this case;

f) that a non-GSO FSS system operating in the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-28.6 GHz and 29.5-30 GHz (Earth-to-space) in compliance with the provisions and equivalent power-flux density (epfd) limits set out in Nos. **22.5C**, **22.5D** and **22.5F** is considered as having fulfilled its obligations under No. **22.2** with respect to not causing unacceptable interference to any GSO network, provided that the operational limits given in Table **22-4B** are also met by the non-GSO FSS system;

g) that the use of the frequency bands 18.8-19.3 GHz (space-to-Earth) and 28.6-29.1 GHz (Earth-to-space) by non-GSO FSS systems is subject to No**. 9.11A** (i.e. the provisions of Nos. **9.12** to **9.16** apply), and No. **22.2** does not apply in this case;

h) that, for the use of the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by non-GSO systems, No. **9.12** applies;

i) that, with respect to GSO FSS networks, in the frequency bands 18.8-19.3 GHz (space-to-Earth) and 28.6-29.1 GHz (Earth-to-space) Nos. **9.12A** and **9.13** apply, and No. **22.2** does not apply;

j) that there is no obligation for any administration to authorize any non-GSO ESIMs to operate within the territory under its jurisdiction, including territorial waters and national airspace,

recognizing further

a) that frequency assignments to non-GSO ESIMs need to be notified to the Radiocommunication Bureau;

b) that the notification by different administrations of frequency assignments to be used by the same non-GSO satellite system could create difficulties to identify the responsible administration in case of unacceptable interference;

c) that an administration authorizing the operation of non-GSO ESIMs within the territory under its jurisdiction may modify or withdraw that authorization at any time,

resolves

1 that, before using non-GSO A-ESIMs and non-GSO M-ESIMs in the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space), the notifying administration for the non-GSO FSS system in which the non-GSO ESIM is to be used shall send the Bureau the relevant Appendix **4** notification information relating to the characteristics of the non-GSO ESIM intended to communicate with the non-GSO FSS system, together with a commitment to operate the non-GSO ESIM in conformity with the Radio Regulations, including this Resolution;

1.1 that, upon receipt of the notification information and commitment referred to in *resolves* 1 above, the Bureau shall examine them to check conformity with Article **11**, taking into account *recognizing a)* and *b)*, and with the provisions of this Resolution, and publish the results of its examination in a Radiocommunication Bureau International Frequency Information Circular (BR IFIC);

2 that the characteristics of non-GSO ESIMs shall remain within the envelope characteristics, including any applicable coordination agreement, of typical earth stations associated with the non-GSO FSS system with which the ESIMs communicate;

3 that, with respect to space services in the frequency bands referred to in *resolves* 1 above, or portions thereof, non-GSO ESIMs shall comply with the following conditions:

3.1 non-GSO ESIMs communicating with space stations of a non-GSO FSS system shall not cause more interference or claim more protection than what is applicable to typical earth stations of that same non-GSO FSS system;

3.2 the notifying administration for the non-GSO FSS system with which a non-GSO ESIM communicates, together with the administration authorizing the use of that non-GSO ESIM within the territory under its jurisdiction, including territorial waters and national airspace, shall ensure that the operation of that ESIM complies with *resolves* 3.1 above and with the coordination agreements

for the frequency assignments of the typical earth station of this non-GSO FSS system obtained under the provisions of Article **9**, taking into account *recognizing a)* above;

3.3 taking into account *recognizing f)* above, the notifying administration for the non-GSO FSS system with which ESIMs communicate shall ensure that non-GSO ESIMs comply with the provisions and epfd limits set out in Nos. **22.5C**, **22.5D** and **22.5F**, as well as the operational limits given in Table **22-4B**;

3.4 non-GSO ESIMs shall not claim protection from BSS feeder-link earth stations operating in accordance with the Radio Regulations in the frequency band 17.7-18.4 GHz;

3.5 with respect to the protection of EESS (passive) operating in the frequency band 18.6-18.8 GHz, any non-GSO FSS system with an orbital apogee of less than 20 000 km operating in the frequency bands 18.3-18.6 GHz and 18.8-19.1 GHz with which non-GSO A-ESIMs and/or non-GSO M-ESIMs communicate and for which the complete notification information has been received by the Bureau after the *date of entry into force of the Final Acts of WRC-23* shall comply with the provisions indicated in Annex 3 to this Resolution;

3.6 for the implementation of *resolves* 3.5 above, the notifying administration for the non-GSO FSS system with which non-GSO ESIMs communicate shall send the Bureau the relevant Appendix **4** notification information, including a commitment that operation shall be in conformity with *resolves* 3.5 above and *further resolves* 1, 2, 3 and 4 below;

3.7 where the operation of the ESIM referred to in *resolves* 1 uses assignments to non-GSO FSS systems recorded under No. **11.41**, such assignments may be used for non-GSO ESIMs only in accordance with No. **11.42**;

3.7.1 for the implementation of *resolves* 3.7 above, the notifying administration for the non-GSO FSS system with which non-GSO ESIMs communicate shall send the Bureau a commitment that operation shall be in conformity with *resolves* 3.7 above and *further resolves* 1, 2, 3 and 4 below;

4 that, with respect to terrestrial services that operate in accordance with the Radio Regulations in the frequency bands referred to in *resolves* 1 above, or portions thereof, non-GSO ESIMs shall comply with the following conditions:

4.1 receiving non-GSO ESIMs in the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (see No. **5.524**) shall not claim protection from assignments in the terrestrial services to which those frequency bands are allocated;

4.2 transmitting non-GSO ESIMs in the frequency band 27.5-29.1 GHz shall not cause unacceptable interference to terrestrial services to which the frequency band is allocated, and Annex 1 to this Resolution shall apply;

4.3 transmitting non-GSO ESIMs in the frequency band 29.5-30.0 GHz shall not adversely affect the operations of terrestrial services to which this frequency band is allocated on a secondary basis, and the limits in Annex 1 to this Resolution shall apply with respect to those administrations mentioned in No. **5.542**;

4.4 the provisions in this Resolution, including Annex 1, set conditions for the purpose of protecting terrestrial services from unacceptable interference from non-GSO A-ESIMs and non-GSO M-ESIMs, in accordance with the provisions included in *resolves* 4.2 and 4.3 above; however, the requirement not to cause unacceptable interference to, or claim protection from, terrestrial services to which the frequency bands are allocated and operating in accordance with the Radio Regulations remains valid;

4.5 should an administration authorizing non-GSO A-ESIMs and/or non-GSO M-ESIMs agree to limits less stringent than those contained in Annex 1 to this Resolution within the territory

under its jurisdiction, including territorial waters and national airspace, such agreement shall not adversely affect other countries that are not party to that agreement;

5 that the Bureau shall examine, in accordance with the provisions included in *resolves* 4.2 and 4.3 above and with the methodology included in Annex 2, the characteristics of non-GSO A-ESIMs with respect to conformity with the power flux-density (pfd) limits at the Earth's surface specified in Part 2 of Annex 1 to this Resolution and publish the results of such examination in the BR IFIC;

5.1 should the results of examination by the Bureau with respect to this Resolution, including *resolves* 5 above, be satisfactory, the assignments in question shall be published in the appropriate special section of the BR IFIC and recorded in the MIFR with a favourable finding; otherwise, the assignments in question shall be returned to the notifying administration with the reasons therefor;

6 that, in the event that unacceptable interference caused by non-GSO A-ESIMs and/or non-GSO M-ESIMs is reported:

6.1 the notifying administration for the non-GSO FSS system with which ESIMs communicate is responsible for eliminating the case of unacceptable interference; consequently, no other administration shall be held responsible for eliminating cases of unacceptable interference (see also *resolves* 6.3 below);

6.1.1 for the implementation of *resolves* 6.1 above, the system shall employ the minimum requirements specified in Annex 4 to this Resolution;

6.2 in the event that there is more than one administration involved in the notification of frequency assignments to the same operating non-GSO satellite system with which ESIMs communicate, those administrations shall nominate one administration as the notifying administration responsible to act on their behalf to eliminate any unacceptable interference cases, and inform the Bureau accordingly;

6.3 any authorizing administration, subject to its explicit agreement and to the extent of its ability, provide any available information that may help eliminate the case of unacceptable interference;

6.4 the administration responsible for the aircraft or vessel on which the ESIM operates shall, when requested, provide the affected administration with a point of contact to assist in identifying the notifying administration for the satellite with which the ESIM communicates, which is responsible for eliminating the case of unacceptable interference (see *resolves* 6.1 and 6.2 above);

7 that the notifying administration for the non-GSO FSS system with which non-GSO ESIMs communicate shall ensure that:

7.1 for the operation of non-GSO ESIMs, techniques are employed to maintain adequate antenna-pointing accuracy towards the associated non-GSO FSS satellite to avoid inadvertently tracking non-GSO satellites other than the associated non-GSO satellite;

7.2 measures are taken so that non-GSO ESIMs are subject to permanent monitoring and control by a network control and monitoring centre (NCMC) in order to comply with the provisions in this Resolution, including the minimum requirements specified in Annex 4;

7.3 measures are taken so that non-GSO A-ESIMs and non-GSO M-ESIMs do not transmit from territory, including territorial waters and national airspace, under the jurisdiction of an administration situated inside the service area of the non-GSO FSS system with which those non-GSO A-ESIMs and non-GSO M-ESIMs communicate that has not authorized their use within its territory;

7.4 non-GSO ESIMs operate only in the territory, including territorial waters and national airspace, under the jurisdiction of administrations from which an authorization has been obtained, taking into account *recognizing further c)*;

7.5 a point of contact is designated and provided in the Appendix **4** submission by the notifying administration for the non-GSO FSS systems with which the non-GSO ESIMs communicate for the purpose of tracing any cases of unacceptable interference from non-GSO ESIMs and to respond immediately to requests from the focal point of the affected administration;

8 that non-GSO ESIMs shall not be used or relied upon for safety-of-life applications;

9 that the application of this Resolution does not provide regulatory status to non-GSO ESIMs different from that derived from the non-GSO FSS system with which they communicate, taking into account the provisions referred to in this Resolution (see *recognizing a)* and *b)*);

10 that any course of action taken under this Resolution has no impact on the original date of receipt of the frequency assignments to space and earth stations of the non-GSO FSS system with which non-GSO ESIMs communicate or on the coordination requirements of that system;

11 that compliance with this Resolution by non-GSO ESIMs does not, in any way whatsoever, release the notifying administration(s) from its/their obligation not to cause unacceptable interference to, nor claim protection from, the incumbent services, as referred to in this Resolution;

12 that the operation of non-GSO A-ESIMs and M-ESIMs, including operation of the NCMC, the interference management system, and the mechanism and functioning of switching facilities, is subject to the availability of the ITU-R Recommendation referred to in *invites the ITU Radiocommunication Sector* below; in the meantime, *further resolves* 1, 2 and 3 shall strictly apply;

13 that the operation of non-GSO A-ESIMs and M-ESIMs using frequency assignments recorded under No. **11.41**, including operation of the NCMC, the interference management system, and the mechanism and functioning of switching facilities, is subject to the availability of the ITU-R Recommendation referred to in *invites the ITU Radiocommunication Sector* below, with the understanding that, in the meantime, *further resolves* 1, 2 and 3 strictly apply,

further resolves

1 that the notifying administration for the non-GSO system with which ESIMs communicate, when submitting Appendix **4** information, shall send a firm, objective, actionable, measurable and enforceable commitment that, in the event of unacceptable interference being reported, it undertakes to immediately eliminate the interference or reduce it to an acceptable level;

2 that, in the case of no action being taken with regard to the obligation referred to in *further resolves* 1 above, the Bureau shall send a reminder and request the notifying administration for the non-GSO system with which ESIMs communicate to comply with the requirements referred to in the commitment;

3 that, should the interference persist 30 days after the dispatch date of the above-mentioned reminder, the Bureau shall submit the case to the subsequent meeting of the Radio Regulations Board (RRB) for review and the necessary actions (including suppression of the frequency assignment in question), as appropriate;

4 that, for the implementation of *further resolves* 1 above, the notifying administration responsible for the operation of non-GSO A-ESIMs and non-GSO M-ESIMs shall also be responsible for observing and complying with all relevant regulatory and administrative provisions applicable to the operation of the ESIMs included in this Resolution or contained in the Radio Regulations;

5 that, in accordance with *instructs the Director of the Radiocommunication Bureau* 4 below, any notifying administration for a non-GSO system operating non-GSO A-ESIMs and non-GSO M-ESIMs, upon request by the Bureau regarding cases of unacceptable interference reported by an affected administration, shall provide the Bureau with a list of the administrations that have authorized non-GSO ESIM operations to communicate with that non-GSO FSS system and that are potentially related to the reported case of unacceptable interference,

instructs the Director of the Radiocommunication Bureau

1 to take all necessary actions to facilitate the implementation of this Resolution;

2 to report to future world radiocommunication conferences any difficulties or inconsistencies encountered in the implementation of this Resolution, in particular with respect to the verification of compliance with the epfd limits specified in Article **22**;

3 not to examine, under No. **11.31**, the conformity of non-GSO FSS systems with the provisions of *resolves* 3.5 of this Resolution with respect to the EESS (passive);

4 in case of unacceptable interference:

4.1 based on information provided by the affected administration, to request the notifying administrations for non-GSO FSS systems with which non-GSO ESIMs communicate that could potentially be causing unacceptable interference to provide the affected administration promptly with the relevant list of administrations that have authorized non-GSO ESIM operations;

4.2 to provide the affected administration with a list of non-GSO FSS systems potentially related to the reported case of unacceptable interference;

4.3 if a notifying administration fails to provide the information required under *instructs the Director of the Radiocommunication Bureau* 4.1 above within 45 days from the date of dispatch of the Bureau's request as referred to in *instructs the Director of the Radiocommunication Bureau* 4.1, to send the notifying administration a reminder to provide the required list within 15 days from the date of this reminder;

4.4 if a notifying administration fails to provide the required information following the reminder under *instructs the Director of the Radiocommunication Bureau* 4.3 above, and if the affected administration has not confirmed to the Bureau that the case of unacceptable interference has been resolved, to submit the case to the subsequent meeting of the RRB for review and the necessary actions, as appropriate,

invites the ITU Radiocommunication Sector

to study, as a matter of urgency, with the objective of preparing a Recommendation to be adopted and approved in accordance with Resolution ITU-R 1, the functionalities and implementation of NCMC for ESIMs,

instructs the Secretary-General

1 to bring this Resolution to the attention of the International Maritime Organization and the International Civil Aviation Organization;

2 to bring this Resolution to the attention of the ITU Council with a view to its considering whether cost recovery should be applied to non-GSO A-ESIMs and non-GSO M-ESIMs.

ANNEX 1 TO RESOLUTION COM5/3 (WRC-23)

Provisions for maritime and aeronautical earth stations in motion communicating with non-geostationary-satellite systems to protect terrestrial services operating in the frequency band 27.5-29.1 GHz and for the frequency band 29.5-30.0 GHz with respect to administrations mentioned in No. 5.542

1 The parts below contain provisions to ensure that maritime and aeronautical earth stations in motion (ESIMs) communicating with non-geostationary-satellite (non-GSO) systems in the fixed-satellite service (FSS) do not cause unacceptable interference at any time in neighbouring countries to terrestrial service operations when such non-GSO ESIMs are operating in frequencies overlapping with those used by terrestrial services to which the frequency band 27.5-29.1 GHz is allocated and operating in accordance with the Radio Regulations. The provisions specified below also apply in the frequency band 29.5-30 GHz with respect to administrations mentioned in No. **5.542** (see *resolves* 4.2 and 4.3).

Part 1: Non-GSO maritime ESIMs

2 The notifying administration for the non-GSO FSS system with which maritime ESIMs (M-ESIMs) communicate shall ensure compliance of the non-GSO M-ESIM operating within the frequency bands, or parts thereof, indicated in § 1 above with the following conditions for the protection of terrestrial services to which the frequency bands are allocated within a coastal State:

2.1 The minimum distance from the low-water mark as officially recognized by the coastal State beyond which non-GSO M-ESIMs can operate without the prior agreement of any administration is 70 km within the 27.5-29.1 GHz and 29.5-30.0 GHz frequency bands. Any transmissions from non-GSO M-ESIMs within the minimum distance shall be subject to the prior agreement of the coastal State(s) concerned.

2.2 The maximum non-GSO M-ESIM equivalent isotropically radiated power (e.i.r.p.) spectral density towards the territory of any coastal State will be limited to 24.44 dBW in a reference bandwidth of 14 MHz. Transmissions from non-GSO M-ESIMs with higher e.i.r.p. spectral density levels towards the territory of any coastal state shall be subject to the prior agreement of the coastal State(s) concerned.

Part 2: Non-GSO aeronautical ESIMs

3 The notifying administration for the non-GSO FSS system with which a non-GSO aeronautical ESIM (A-ESIM) communicates shall ensure compliance of the non-GSO A-ESIM operating within the frequency bands, or parts thereof, indicated in § 1 above with all of the following conditions for the protection of terrestrial services to which the frequency band is allocated:

3.1 When within line-of-sight of the territory of an administration, and above an altitude of 3 km, the maximum power-flux density (pfd) produced at the surface of the Earth on the territory of an administration by emissions from a single non-GSO A-ESIM shall not exceed:

$pfd(\theta) = -124.7$	$dB(W/(m^2 \cdot 14\ MHz))$	for	$0° \le \theta \le 0.01°$
$pfd(\theta) = -120.9 + 1.9 \cdot \log\theta$	$dB(W/(m^2 \cdot 14\ MHz))$	for	$0.01° < \theta \le 0.3°$
$pfd(\theta) = -116.2 + 11 \cdot \log\theta$	$dB(W/(m^2 \cdot 14\ MHz))$	for	$0.3° < \theta \le 1°$
$pfd(\theta) = -116.2 + 18 \cdot \log\theta$	$dB(W/(m^2 \cdot 14\ MHz))$	for	$1° < \theta \le 2°$
$pfd(\theta) = -117.9 + 23.7 \cdot \log\theta$	$dB(W/(m^2 \cdot 14\ MHz))$	for	$2° < \theta \le 8°$
$pfd(\theta) = -96.5$	$dB(W/(m^2 \cdot 14\ MHz))$	for	$8° < \theta \le 90.0°$

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

3.2 When within line-of-sight of the territory of an administration, and up to an altitude of 3 km, the maximum pfd produced at the surface of the Earth on the territory of an administration by emissions from a single non-GSO A-ESIM shall not exceed:

$pfd(\theta) = -136.2$	$dB(W/(m^2 \cdot 1\ MHz))$	for	$0° \le \theta \le 0.01°$
$pfd(\theta) = -132.4 + 1.9 \cdot \log\theta$	$dB(W/(m^2 \cdot 1\ MHz))$	for	$0.01° < \theta \le 0.3°$
$pfd(\theta) = -127.7 + 11 \cdot \log\theta$	$dB(W/(m^2 \cdot 1\ MHz))$	for	$0.3° < \theta \le 1°$
$pfd(\theta) = -127.7 + 18 \cdot \log\theta$	$dB(W/(m^2 \cdot 1\ MHz))$	for	$1° < \theta \le 12.4°$
$pfd(\theta) = -108$	$dB(W/(m^2 \cdot 1\ MHz))$	for	$12.4° < \theta \le 90.0°$

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

3.3 A non-GSO A-ESIM operating within the frequency bands, or parts thereof, indicated in § 1 above 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 frequency bands without the prior agreement of that administration (see also *resolves* 4.5).

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

3.5 Higher pfd levels than those specified in §§ 3.1 and 3.2 above produced by A-ESIMs at the surface of the Earth in an area under the jurisdiction of any administration shall be subject to the prior agreement of that administration (see also *resolves* 4.5).

ANNEX 2 TO RESOLUTION COM5/3 (WRC-23)

Methodology and procedure to examine power flux-density at the Earth's surface produced by aeronautical earth stations in motion communicating with non-geostationary satellites in the fixed-satellite service and conformity with power flux-density limits

1 Overview

The methodology below is a functional description to conduct examination of aeronautical earth stations in motion (A-ESIMs) communicating with non-geostationary satellite (non-GSO) systems and their conformity with the power flux-density (pfd) limits specified in Part 2 of Annex 1 to this Resolution (see *resolves* 5).

2 A-ESIM parameters required for examination

To conduct the relevant examination of A-ESIMs and their conformity with respect to the pfd limits established in Part 2 of Annex 1, the following parameters are required:

– satellite system name;
– A-ESIM peak antenna gain;
– A-ESIM power density and bandwidth as given in Table 1; and
– fuselage attenuation mask expressed as a function of the angle below the horizon of the A-ESIM.

3 Examination methodology

3.1 Introduction

An A-ESIM can operate at different locations defined by latitude, longitude and altitude. This methodology determines the maximum allowable power P_j for an A-ESIM transmitter communicating with a non-GSO satellite system in the fixed-satellite service (FSS) to ensure compliance with the pre-established pfd limits to protect terrestrial services, at all positions, for a defined set of altitude ranges. The methodology derives P_j, taking into account the relevant loss and attenuation in the geometry considered.

The methodology then compares the computed P_j with the range of notified power for the A-ESIM emission. The minimum and maximum power values for emissions from the A-ESIM, $P_{min\_emission,j}$ and $P_{max\_emission,j}$, are calculated from the data included in the Appendix **4** notification information for the non-GSO FSS system with which the A-ESIM communicates and from the A-ESIM characteristics.

A-ESIMs are evaluated over a number of predefined altitude ranges in order to establish a number of P_j levels.

An examination by the Radiocommunication Bureau should apply this methodology for the defined altitude range to determine whether an A-ESIM operating under a given non-GSO satellite system complies with the pre-established pfd limits to protect terrestrial services.

3.2 Parameters and geometry

Considering a hypothetical non-GSO FSS system, Table 1 below provides an example of emissions that are included in one group associated with the A-ESIM non-GSO FSS class of earth station transmitting in the 27.5-29.1 GHz and 29.5-30 GHz frequency bands. Tables 2 to 4 provide additional assumptions and Figure 1 illustrates the geometry involved in the examination.

TABLE 1

Example of a group of A-ESIM emissions (with reference to relevant Appendix 4 data fields)

Emission No.	C.7.a Designation of emission	$BW_{emission}$ MHz	C.8.c.3 Minimum power density dB(W/Hz)	C.8.a.2/C.8.b.2 Maximum power density dB(W/Hz)
1	6M00G7W--	6.0	−69.7	−66.0
2	6M00G7W--	6.0	−64.7	−61.0
3	6M00G7W--	6.0	−59.7	−56.0

TABLE 2

Additional example assumptions

ID	Parameter	Notation	Value	Unit
1	Frequency assignment	f	29.1	GHz
2	Reference bandwidth of pfd mask	BW_{Ref}	1.0 or 14.0, depending on the altitude under examination	MHz
6	A-ESIM antenna peak gain	G_{max}	37.5	dBi
7	A-ESIM antenna gain pattern	-	As per Rec. ITU-R S.580 (see C.10.d.5.a)	

TABLE 3

Characteristics defined in the methodology

ID	Parameter	Notation	Value	Unit
8	A-ESIM minimum elevation angle towards non-GSO FSS system	ε	Appendix **4**, data item A.27.a	degrees
9	Atmospheric attenuation	L_{atm}	Computed with Rec. ITU-R P.676 (see NOTE below)	dB
10	Angle of arrival of the incident wave on the Earth's surface	δ	Specified by the pre-established sets of pfd limits in Part 2 of Annex 1, variable from 0° to 90°	degrees
11	Minimum examination altitude	H_{min}	0.01	km
12	Maximum examination altitude	H_{max}	15.0	km
13	Examination altitude spacing[2]	H_{step}	1.0	km
14	Fuselage attenuation	L_f	Use Table 4 if no ITU-R Recommendation provided in Appendix **4** (see data item A.27.b)	dB

NOTE: The atmospheric attenuation is computed using the most recent version of Recommendation ITU-R P.676, with the mean annual global reference atmosphere as defined in the most recent version of Recommendation ITU-R P.835.

[2] The fourth altitude value (H_4) computed in accordance with this H_{step} is adjusted to 2.99 km to facilitate the examination of compliance with the two sets of pfd values indicated in Part 2 of Annex 1 to this Resolution.

FIGURE 1

Geometry for examination of compliance for two different A-ESIM altitudes

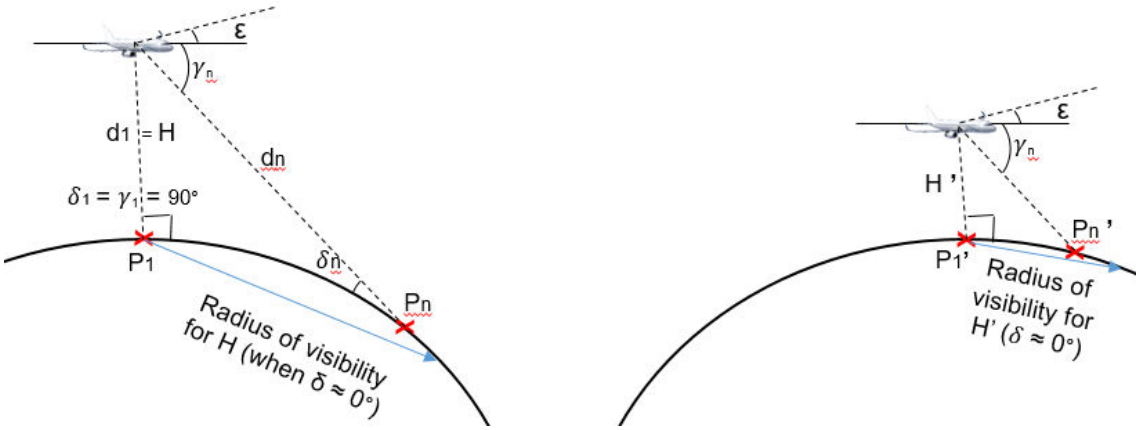


TABLE 4

Fuselage attenuation model based on Report ITU-R M.2221-0

$L_{fuse}(\gamma) = 3.5 + 0.25 \cdot \gamma$	dB	for	$0° \le \gamma \le 10°$
$L_{fuse}(\gamma) = -2 + 0.79 \cdot \gamma$	dB	for	$10° < \gamma \le 34°$
$L_{fuse}(\gamma) = 3.75 + 0.625 \cdot \gamma$	dB	for	$34° < \gamma \le 50°$
$L_{fuse}(\gamma) = 35$	dB	for	$50° < \gamma \le 90°$

NOTE: This fuselage attenuation model is based on measurements made at 14.2 GHz (see Figure 3.6-14 in Report ITU-R M.2221-0).

3.3 Calculation algorithm

This section includes a step-by-step description of how the examination methodology would be implemented.

START

i) For each A-ESIM altitude, it is necessary to generate as many δ_n angles (angle of arrival of the incident wave) as required in order to test full compliance with the applicable set of pfd limits. The N angles δ_n must be between 0° and 90° and have a resolution compatible with the granularity of the pre-established pfd limits. Each of the N angles δ_n will correspond to as many N points on the ground.

ii) For each altitude $H_j = H_{min}, H_{min} + H_{step}, \ldots, H_{max}$:

a) Set the altitude of the A-ESIM to H_j

b) Compute the angle below the horizon $\gamma_{j,n}$ as seen from the A-ESIM for each of the N angles δ_n generated in i) using the following equation:

$$\gamma_{j,n} = \arccos\left(\frac{R_e \cdot \cos(\delta_n)}{(R_e + H_j)}\right) \quad (1)$$

where R_e is the mean Earth radius.

c) Compute the distance $D_{j,n}$, in km, for $n = 1, \ldots, N$ between the A-ESIM and the tested point on the ground:

$$D_{j,n} = \sqrt{R_e^2 + \left(R_e + H_j\right)^2 - 2R_e\left(R_e + H_j\right)\cos\left(\gamma_n - \delta_n\right)} \quad (2)$$

d) Compute the fuselage attenuation $L_{f\,j,n}$ (dB) with $n = 1, \ldots, N$ applicable to each of the angles $\gamma_{j,n}$ computed in b) above.

e) Compute the gaseous absorption $L_{atm\_j,n}$ (dB) with $n = 1, \ldots, N$ applicable to each of the distances $D_{j,n}$ computed in c) above, using the applicable sections of the most recent version of Recommendation ITU-R P.676.

iii)

a) For each altitude $H_j = H_{min}, H_{min} + H_{step}, \ldots, H_{max}$, and each angle below the horizon $\gamma_{j,n}$, compute the maximum emission power in the reference bandwidth $P_{j,n}(\delta_n, \gamma_{j,n})$ for which the pfd limits are met using the following algorithm:

$$P_{j,n}\left(\delta_n, \gamma_{j,n}\right) = pfd\left(\delta_n\right) + 10\log_{10}\left(4\pi\left(D_{j,n}\cdot 1000\right)^2\right) + L_{f\,j,n} + L_{atm_j,n} - Gtx\left(\gamma_{j,n} + \varepsilon\right)$$

With $Gtx(\gamma_{j,n} + \varepsilon)$ being the transmit antenna gain with the off-axis angle from the boresight, consisting of the summation of both angles $\gamma_{j,n}$ and minimum elevation angle ε as defined in Table 3.

b) Compute the minimum P_j across all values calculated at the previous step:

$$P_j = \mathrm{Min}\left(P_{j,n}\left(\delta_n, \gamma_{j,n}\right)\right)$$

The output of this step is the maximum power in the reference bandwidth that can be used by the A-ESIM to ensure it complies with the pfd limits in Part 2 of Annex 1, with respect to all angles δ_n at the altitude H_j, and the elevation indicated in Table 3. There will be one P_j for each of the H_j altitudes considered.

The output of step *b)* is summarized in Table 5 below:

TABLE 5

Computed P_j values

H_j **(Altitude)** **(km)**	P_j **(Maximum power in the reference bandwidth that can be used at minimum elevation) dB(W/BW)**
0.01	*TBD*
1.0	*TBD*
2.0	*TBD*
2.99	*TBD*
4.0	*TBD*
5.0	*TBD*
6.0	*TBD*
7.0	*TBD*
8.0	*TBD*

H_j (Altitude) (km)	P_j (Maximum power in the reference bandwidth that can be used at minimum elevation) dB(W/BW)
9.0	*TBD*
10.0	*TBD*
11.0	*TBD*
12.0	*TBD*
13.0	*TBD*
14.0	*TBD*
15.0	*TBD*

c) For each altitude $H_j = H_{min}$, $H_{min} + H_{step}$, …, H_{max}, and each emission in each group of emissions under examination, compute the minimum and the maximum powers of the emission in the reference bandwidth:

$$P_{\min\_emission,j} = minimum\ power\ density\left(emission, dBW/Hz\right) + 10 * \log_{10}\left(BW\right)$$

$$P_{\max\_emission,j} = maximum\ power\ density\left(emission, dBW/Hz\right) + 10 * \log_{10}\left(BW\right)$$

BW in Hz is:

BW_{Ref} if BW_{Ref} = 1 MHz

BW_{Ref} if BW_{Ref} = 14 MHz and $BW_{emission} \geq BW_{Ref}$

$BW_{emission}$ if BW_{Ref} = 14 MHz and $BW_{emission} < BW_{Ref}$

d) For each emission in each group of emissions under examination check if there is at least one altitude H_j for which:

$$P_{\max\_emission,j} > P_j > P_{\min\_emission,j}$$

The results of this check are illustrated in Table 6 below:

TABLE 6

Example comparison between P_j and ($P_{\min\_emission,j}$; $P_{\max\_emission,j}$)

Emission No.	C.7.a Designation of emission	$BW_{emission}$ MHz	C.8.c.3 Minimum power density dB(W/Hz)	C.8.a.2/C.8.b.2 Maximum power density dB(W/Hz)	Lowest altitude H_j (km) for which $P_{\max\_emission,j} > P_j > P_{\min\_emission,j}$
1	6M00G7W--	6.0	−69.7	−66.0	*TBD*
2	6M00G7W--	6.0	−64.7	−61.0	*TBD*
3	6M00G7W--	6.0	−59.7	−56.0	*TBD*

e) Based on the test detailed in iii) *d)* above applied to all emissions in the group under examination, the results of the Bureau's examination for that group is favourable, after removing emissions that have failed the examination; otherwise, it is unfavourable (i.e. all emissions have failed).

iv) The output of this methodology should, at a minimum, include:

– the resulting parameters as contained in Table 5;

– the examination results for each group;

– for those cases when some emissions successfully pass and some do not, the examination results for the resulting new group that includes only the emission(s) which successfully passed the examination.

END

ANNEX 3 TO RESOLUTION COM5/3 (WRC-23)

Provisions for non-geostationary-satellite fixed-satellite service systems[3] transmitting to aeronautical and/or maritime earth stations in motion operating in or over an ocean in the frequency bands 18.3-18.6 GHz and 18.8-19.1 GHz with respect to Earth exploration-satellite service (passive) operating in the frequency band 18.6-18.8 GHz (in accordance with *resolves* 3.5 of this Resolution)

Non-geostationary-satellite (non-GSO) space stations operating with an orbit apogee of more than 2 000 km and less than 20 000 km in the frequency bands 18.3-18.6 GHz and 18.8-19.1 GHz, when communicating with an aeronautical or maritime earth station in motion (A-ESIM and M-ESIM, respectively), shall not exceed a power flux-density (pfd) of −118 dB(W/(m² · 200 MHz)) produced at the surface of the oceans across the 200 MHz of the 18.6-18.8 GHz frequency band.

Non-GSO space stations operating with an orbit apogee less than or equal to 2 000 km in the frequency bands 18.3-18.6 GHz and 18.8-19.1 GHz, when communicating with an A-ESIM or M-ESIM, shall not exceed a pfd of −110 dB(W/(m² · 200 MHz)) produced at the surface of the oceans across the 200 MHz of the 18.6-18.8 GHz frequency band.

ANNEX 4 TO RESOLUTION COM5/3 (WRC-23)

Required capabilities of earth stations in motion communicating with non-geostationary-satellite systems (in accordance with *resolves* 6.1.1 of this Resolution)

This Annex provides the minimum requirements for earth stations in motion (ESIMs) communicating with non-geostationary-satellite (non-GSO) systems subject to this Resolution, as shown in Table A4-1 below.

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[3] These provisions do not apply to non-GSO systems using orbits with an apogee less than 2 000 km that employ a frequency reuse factor of at least 3.

TABLE A4-1

Non-GSO ESIM minimum requirements

Requirement	Associated provision(s)
Ability to monitor and control pointing of main beam in direction of satellite with which ESIM communicates	*Resolves* 7.1
Geolocation capability	*Resolves* 7.3 *Resolves* 7.4
Ability of ESIM to receive information and execute commands from network control and monitoring centre (NCMC)	*Resolves* 7.2 *Resolves* 7.3 *Resolves* 7.4
Ability to send information to NCMC	*Resolves* 7.3
Ability to monitor and control transmission power and frequency	*Resolves* 7.3
Ability to enable/disable ESIM transmission	*Resolves* 7.3 *Resolves* 7.4

Agenda item 7(A)

ADD

RESOLUTION COM5/4 (WRC-23)

Tolerances for certain orbital characteristics of space stations deployed as part of non-geostationary-satellite orbit systems in the fixed-satellite, broadcasting-satellite or mobile-satellite service

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that WRC-19 invited the ITU Radiocommunication Sector (ITU-R) to study, as a matter of urgency, tolerances for certain orbital characteristics of the non-geostationary-satellite orbit (non-GSO) space stations of the fixed-satellite service (FSS), the broadcasting-satellite service (BSS) and the mobile-satellite service (MSS) to account for the potential differences between the notified and deployed orbital characteristics for the inclination of the orbital plane, the altitude of the apogee of the space station, the altitude of the perigee of the space station and the argument of the perigee of the orbital plane;

b) that satellites on highly-elliptical orbits and highly-inclined orbits having an apogee altitude greater than 15 000 km and an orbital inclination between 35° and 145° have significant orbital precession rates and, consequently, restrictive orbital-keeping requirements and correction of orbit parameters may lead to a reduction of such satellites' lifetime and to frequent replacement;

c) that design considerations (including the impact of atmospheric drag[1] characteristics of the altitude chosen and solar cycle effects for systems at altitudes lower than 600 km); maintaining separation between satellites in the same and other systems to ensure safe flight operations and minimize the risk of collisions; and other operational considerations can lead to notifying administrations needing to operate some space stations in orbital planes with some deviation from the notified orbital planes for their non-GSO systems;

d) that significant deviations between the operational orbital plane(s) of a non-GSO system and the notified orbital plane(s) for those systems as recorded in the Master International Frequency Register (MIFR) could negatively impact the efficient use of the orbit and spectrum resources;

e) that it is important, for consideration of instances where a non-GSO system operates with orbital planes that deviate from the system's notified orbital planes, that there is a mechanism developed for determining that such operation does not now and will not in the future result in the space stations of the non-GSO system causing more interference or claiming a higher need for protection than would have been the case if the operational orbital planes exactly matched the notified orbital planes for the system;

f) that adherence to a transparent approach to the question of orbital tolerances is desirable, as this reduces uncertainty with respect to the deployment of non-GSO systems,

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[1] Atmospheric drag is the atmospheric force acting opposite to the relative motion of an object. Atmospheric drag is important for a space station as it hinders the space station exiting the atmosphere, and also pulls orbital satellites back towards Earth over time.

recognizing

a) that Nos. **11.44C** and **11.49.2** require the deployment of satellites on notified orbital planes;

b) that No. **13.6** is applicable to non-GSO systems with frequency assignments in the frequency bands and services to which this Resolution applies;

c) that orbital tolerances should ensure an adequate level of operational flexibility for non-GSO system operations, while ensuring that the interference environment into other systems and services is not degraded;

d) that the orbit and spectrum resources are a shared resource, and this Resolution does not preclude coordination requests or notification filings under Articles **9** and **11** of the Radio Regulations for other non-GSO systems at the same altitude and tolerance,

noting

that for the purpose of this Resolution:

– the term "frequency assignments" is understood to refer to frequency assignments to a space station of a non-GSO system;

– the term "notified orbital plane" means an orbital plane of the non-GSO system, as provided to the Bureau in the most recent notification information for the system's frequency assignments, that possesses the general characteristics of items:

  • A.4.b.4.a, the angle of inclination of the orbital plane of the space station;
  • A.4.b.4.d, the altitude of the apogee of the space station;
  • A.4.b.4.e, the altitude of the perigee of the space station;
  • A.4.b.4.i, the argument of the perigee of the orbit of the space station (only for orbits whose altitudes of the apogee and perigee are different);
  • A.4.b.4.r, the distance to the apogee of the space station; and
  • A.4.b.4.s, the distance to the perigee of the space station;

  in Table A of Annex 2 to Appendix **4**;

– the term "observed distance to the apogee" refers to the distance in kilometres from the centre of the Earth to the deployed space station at its apogee;

– the term "observed distance to the perigee" refers to the distance in kilometres from the centre of the Earth to the deployed space station at its perigee;

– the term "tolerances" refers to deviations between the value notified and/or recorded for the orbital characteristics as referred to in this *noting* and those observed for the actual deployment of satellites of the non-GSO FSS, BSS or MSS system under consideration,

resolves

1 that this Resolution applies to frequency assignments to non-GSO systems, for orbital planes having an orbital eccentricity[2] less than 0.5 and an apogee altitude less than 15 000 km notified as part of a non-GSO FSS, BSS or MSS system subject to Resolution **35 (Rev.WRC-23)**;

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[2] The eccentricity e is equal to: $e=\left(R_a-R_p\right)/\left(R_a+R_p\right)$

where:

R_a: distance between the centre of the Earth and the space station at apogee
R_p: distance between the centre of the Earth and the space station at perigee.

2 that, for frequency assignments to which *resolves* 1 applies, and for which information concerning the bringing into use or bringing back into use, or the deployment information under Resolution **35 (Rev.WRC-23)**, has been provided to the Bureau prior to 1 January 2025, the notifying administration shall communicate to the Bureau the required information regarding the system's deployed space stations in accordance with Annex 1 to this Resolution no later than 1 April 2025 and include in this submission, for each orbital plane and without submitting a modification to the notification information, the information under Appendix **4** data items A.4.b.4.r and A.4.b.4.s (distances to the apogee and perigee of the space station);

3 that, for frequency assignments to which *resolves* 1 applies, and for which information concerning the bringing into use or bringing back into use of the frequency assignments is provided to the Bureau on or after 1 January 2025, the notifying administration shall communicate to the Bureau the required information regarding the system's deployed space station(s) in accordance with Annex 1 to this Resolution at the same time as the notifying administration informs the Bureau of the bringing into use of applicable frequency assignments under No. **11.44C** or the bringing back into use of applicable frequency assignments under No. **11.49.2**, and, for each orbital plane, include in this submission, if not already provided, and without submitting a modification to the notification information, the information under Appendix **4** data items A.4.b.4.r and A.4.b.4.s (distances to the apogee and perigee of the space station);

4 that, for frequency assignments to which *resolves* 1 applies, and which retain the remark to the MIFR entry that was added under *resolves* 5*b)* of Resolution **35 (Rev.WRC-23)**, and for which deployment information under Resolution **35 (Rev.WRC-23)** is provided to the Bureau on or after 1 January 2025, the notifying administration shall communicate to the Bureau the required information regarding the system's deployed space stations in accordance with Annex 1 to this Resolution at the same time as the notifying administration communicates to the Bureau the required information under *resolves* 7 or 8, as applicable, from Resolution **35 (Rev.WRC-23)**;

5 that, for frequency assignments to which *resolves* 1 applies, and for which a modification to the characteristics of the notified or recorded frequency assignments has been submitted pursuant to *resolves* 11*c)* of Resolution **35 (Rev.WRC-23)**, the notifying administration shall communicate to the Bureau the required information regarding the system's deployed space stations in accordance with Annex 1 to this Resolution within 30 days after notification information reflecting the modified characteristics is published in the Radiocommunication Bureau International Frequency Information Circular (BR IFIC) (Part II-S);

6 that, based on the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available), and for each space station reported to have been deployed and operated, when:

a) the magnitude of the difference between the observed and the notified distances to the apogee of the space station and between the observed and the notified distances to the perigee of the space station is 70 km or less (for a notified altitude of the apogee/notified altitude of the perigee of 2 000 km or less) or of 5% in km or less (for a notified altitude of the apogee/notified altitude of the perigee greater than 2 000 km), and

b) the magnitude of the difference between the observed and the notified angle of inclination of the orbital plane of the space station is 2 degrees or less (for a notified altitude of the apogee/notified altitude of the perigee of 2 000 km or less), or 3 degrees or less (for a notified altitude of the apogee/notified altitude of the perigee greater than 2 000 km),

the notifying administration shall provide as part of its report under Annex 1 to this Resolution under *resolves* 2, 3, 4 or 5, as appropriate, an explanation of why there is a difference between the observed and the notified values for the orbital characteristics of the space station;

7 that, based on the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available), and for each space station reported to have been deployed and operated, when one or both of the following conditions apply:

a) the magnitude of the difference between the observed and the notified distances to the apogee of the space station or between the observed and the notified distances to the perigee of the space station is between 70 km and 100 km (for a notified altitude of the apogee/notified altitude of the perigee of 2 000 km or less)[3] or between 5% and 10% in km (for a notified altitude of the apogee/notified altitude of the perigee greater than 2 000 km)[4],

b) the magnitude of the difference between the observed and the notified angle of inclination of the orbital plane of the space station is between 2 and 3 degrees (for a notified altitude of the apogee/notified altitude of the perigee of 2 000 km or less), or between 3 and 4 degrees (for a notified altitude of the apogee/notified altitude of the perigee greater than 2 000 km),

the notifying administration shall provide as part of its report under Annex 1 to this Resolution under *resolves* 2, 3, 4 or 5, as appropriate, an explanation of why there is a difference between the observed and the notified values for the orbital characteristics of the space station and a technical demonstration confirming that a difference between the observed and the notified distances to the apogee of the space station or a difference between the observed and the notified distances to the perigee of the space station greater than 70 km but less than or equal to 100 km (for a notified altitude of the apogee/notified altitude of the perigee of 2 000 km or less) or greater than 5% but less than or equal to 10% in km (for a notified altitude of the apogee/notified altitude of the perigee greater than 2 000 km), as applicable, does not result in any increased interference protection requirements as compared to those requirements for operation in accordance with the notified orbital characteristics for the space station under consideration;

8 that, upon receipt of the required information submitted in accordance with *resolves* 2, 3, 4 or 5 above, the Bureau shall promptly make this information available "as received" on the ITU website;

9 that, if the information to be provided in any Annex 1 submission under *resolves* 2, 3, 4 or 5 above shows a difference between the observed and notified/recorded distances to the apogee or perigee of the space station, or a difference between the observed and notified/recorded angles of inclination of the orbital plane of the space station, that is greater than the values specified in *resolves* 7 above, the notifying administration shall also submit to the Bureau, no later than the deadline for the Annex 1 submission under *resolves* 2, 3, 4 or 5 above, modifications to the characteristics of the notified or recorded frequency assignments reflecting the revised orbital

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[3] This *resolves* applies if the magnitude of the difference between the observed and notified distances to the apogee is between 70 km and 100 km while the magnitude of the difference between the observed and notified distances to the perigee is less than 70 km, as well as if the magnitude of the difference between the observed and notified deviation of the distance to the apogee is less than 70 km and the magnitude of the difference between the observed and notified distances to the perigee is between 70 km and 100 km.

[4] This *resolves* applies if the magnitude of the difference between the observed and notified distances to the apogee is between 5% and 10% in km while the magnitude of the difference between the observed and notified distances to the perigee is below 5% in km, as well as if the magnitude of the difference between the observed and notified distances to the apogee is below 5% in km and the magnitude of the difference between the observed and notified distances to the perigee is between 5% and 10% in km.

parameters; a failure to provide such a modification will result in the frequency assignments subject to this *resolves* 9 not being considered as brought into use under No. **11.44C** or brought back into use under No. **11.49.2**, or counted toward a milestone under the procedures in Resolution **35 (Rev.WRC-23)**;

10 that, where a notifying administration has communicated to the Bureau the required information regarding the system's deployed space stations in accordance with Annex 1 to this Resolution under *resolves* 4 or 5 (in reference to *resolves* 11*c)* of Resolution **35 (Rev.WRC-23)**, and where *resolves* 9 of this Resolution does not apply), the notifying administration shall ensure that its notification information aligns with the fully-deployed system, and any such modification is to be considered under *resolves* 16 below;

11 that, for any space stations in non-geostationary systems with frequency assignments subject to this Resolution that have either been brought into use under No. **11.44C** or brought back into use under No. **11.49.2**, or where the space stations themselves have been counted toward a milestone under the procedures in Resolution **35 (Rev.WRC-23)**:

a) the maximum allowed difference between the observed distance to the apogee or perigee of the space station and the distances to the apogee or perigee of a space station previously declared under this Resolution is 30 km;

b) the maximum allowed difference between the observed angle of inclination of the orbital plane of the space station and the angle of inclination of the orbital plane of a space station previously declared under this Resolution is 2 degrees (for a notified altitude of the apogee/notified altitude of the perigee of 2 000 km or less), or 3 degrees (for a notified altitude of the apogee/notified altitude of the perigee greater than 2 000 km);

for purposes of this *resolves* 11, the tolerance required can be maintained as against any notified orbital plane in the system or against any distance to the apogee and perigee previously declared under this Resolution if different than a notified orbital plane;

12 that any space station deployed as part of a non-GSO FSS, BSS or MSS system subject to this Resolution that has been counted toward a milestone under the procedures in Resolution **35 (Rev.WRC-23)** for systems that have not completed the milestone process shall be considered in the deployment information submitted under *resolves* 7 or 8 of Resolution **35 (Rev.WRC-23)**, as applicable, for any subsequent milestone submission if the tolerances referred to in *resolves* 11 above have not been exceeded for a maximum of 60 consecutive days;

13 that any space station deployed as part of a non-GSO FSS, BSS or MSS system subject to this Resolution that have completed the milestone process in *resolves* 6 or *resolves* 7 to 18 of Resolution **35 (Rev.WRC-23)** shall not exceed the tolerances referred to in *resolves* 11 above for a maximum of 60 consecutive days;

14 that, for any space stations under *resolves* 12 or 13 above that have exceeded the maximum allowed differences in *resolves* 11 above for more than 60 consecutive days, the notifying administration shall provide the Bureau with the information in Annex 1 to this Resolution for these space stations only, within 30 days after the end of this 60-day period (unless *resolves* 15 below is applied), and, within 90 days after the end of this 60-day period, submit modifications to the characteristics of the notified or recorded frequency assignments reflecting the revised parameters;

15 that, instead of applying the procedure in *resolves* 14 of this Resolution, if the notifying administration has informed the Bureau before the end of the 60-day period that it is temporarily discontinuing use of the frequency assignments, it may, within 3 years after the initiation of the discontinued use, inform the Bureau of the resumption of use within the maximum allowed differences in *resolves* 11, subject to the condition that the space stations with these frequency

assignments cannot be counted towards any milestone submission under Resolution **35 (Rev.WRC-23)** prior to such resumption;

16 that, upon receipt of the modifications to the characteristics of the notified or recorded frequency assignments as referred to in *resolves* 10, the Bureau shall:

a) promptly make this information available "as received" on the ITU website;

b) conduct an examination for compliance with Nos. **11.43A/11.43B**, as appropriate;

c) for the purpose of No. **11.43B**, retain the original dates of entry of the frequency assignments in the MIFR, in the modifications submitted pursuant to *resolves* 10, if:

i) the Bureau reaches a favourable finding under No. **11.31**; and

ii) the modifications are limited to any Appendix **4** data item A.4.b.4 except Appendix **4** data item A.4.b.4.b (i.e. the number of satellites in the orbital plane) and any Appendix **4** data items A.14, A.4.b.6.a and A.4.b.7; and

iii) the notifying administration provides a commitment stating that the characteristics as modified will not cause more interference nor 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 (see Appendix **4** data item A.26.a);

d) publish the information provided and its findings under No. **11.43B** in the BR IFIC;

17 that the Bureau shall, no later than 45 days before any deadline for submission by a notifying administration under *resolves* 2, 3, 4, 5 or 14, send a reminder to the notifying administration to provide the information required;

18 that, if a notifying administration fails to communicate the information required under *resolves* 2, 3, 4, 5 or 14, as appropriate, the Bureau shall promptly send the notifying administration a reminder asking the administration to provide the required information within 30 days from the date of this reminder from the Bureau;

19 that, if a notifying administration fails to provide information after the reminder sent under *resolves* 18, the Bureau shall send the notifying administration a second reminder asking it to provide the required information within 15 days from the date of the second reminder;

20 that, if a notifying administration fails to provide the required information under resolves 2, 3, 4, 5 or 14, as appropriate, following the reminders under resolves 18 and 19, the Bureau shall:

a) continue to take the entry in the MIFR into account when conducting its examinations, until the Radio Regulations Board confirms that *resolves* 20*b)* shall apply;

b) no longer consider the frequency assignments in subsequent examinations under Nos. **9.36**, **11.32** or **11.32A** and inform administrations having frequency assignments subject to Sub-Section IA of Article **9** that those assignments shall not cause harmful interference to, nor claim protection from, other frequency assignments recorded in the MIFR with a favourable finding under No. **11.31**;

21 that, if information provided by a notifying administration under *resolves* 4 or 5 of this Resolution results in frequency assignments not retaining their original dates of entry in the MIFR after application of *resolves* 9 or 14 of this Resolution, those space stations with altitude or inclination deviations that caused this result shall not be included in the total number of space stations deployed as part of the system for purposes of the milestone submission under Resolution **35 (Rev.WRC-23)** with which the information under *resolves* 4 or 5 of this Resolution is associated,

further resolves

to apply the provisions of this Resolution on a provisional basis as from the *date of entry into force of the Radio Regulations* pending review by a future competent conference,

instructs the Radiocommunication Bureau

1 to take the necessary actions to implement this Resolution and to report any difficulties it or administrations encounter in the implementation or application of this Resolution to future world radiocommunication conferences;

2 not to revisit or review, in connection with submissions from administrations under this Resolution, any prior confirmations that frequency assignments subject to this Resolution have been brought into use or brought back into use, or any prior milestone determinations under Resolution **35 (Rev.WRC-23)**;

3 to develop tools, including a naming convention applicable to large non-GSO systems complying with this Resolution, to help with implementation of this Resolution,

invites the ITU Radiocommunication Sector

to continue studies with a view to identifying a methodology or methodologies for determining whether specific changes to a notified orbital plane will cause more interference or require more protection than the characteristics provided in the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available) for the frequency assignments.

ANNEX 1 TO RESOLUTION COM5/4 (WRC-23)

Information to be submitted about the deployed space stations

A Satellite system information

1) Name of the satellite system.

2) Name of the notifying administration.

3) Country symbol.

4) Reference to the advance publication information or the request for coordination, or the notification information, if available.

5) Total number of space stations deployed into each notified orbital plane of the satellite system with the capability of transmitting or receiving the frequency assignments.

6) Orbital plane number indicated in the latest notification information published in the Radiocommunication Bureau International Frequency Information Circular (BR IFIC) (Part II-S, if available, or Part I-S if Part II-S is not available) for the frequency assignments into which each space station is deployed.

B Space station characteristics for each space station deployed

1) Name of the space station.

2) Orbital plane number with which the space station is associated and, for information purposes the initial phase angle of the space station in the orbital plane.

3) Observed distance to the apogee and observed distance to the perigee of the space station, and observed angle of inclination of the orbital plane of the space station.

C Commitment of non-interference/non-protection

By providing a submission under Annex 1 to this Resolution, the notifying administration commits that the operation of its notified frequency assignments using the orbital characteristics of the submission that are at deviation with the notified orbital plane(s) will not cause more interference or require more protection than would otherwise be the case for operation in accordance with the characteristics provided in the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available) for the frequency assignments to the non-geostationary-satellite system.

Agenda item 9.2

ADD

RESOLUTION COM5/5 (WRC-23)

Prevention and mitigation of harmful interference to the radionavigation-satellite service in the frequency bands 1 164-1 215 MHz and 1 559-1 610 MHz

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the radionavigation-satellite service (RNSS) in the frequency bands 1 164-1 215 MHz and 1 559-1 610 MHz is used in several aeronautical and maritime communication, navigation and surveillance safety-of-life systems;

b) that the RNSS is used for safety-of-life applications, for scientific applications and in many applications and devices around the world and across all sectors of the global economy, as described in Report ITU-R M.2458;

c) that harmful interference to the RNSS has potential consequences for safety systems used by aeronautical and maritime applications, and for the regularity and efficiency of civil aviation operations;

d) that the International Civil Aviation Organization (ICAO) has taken action to reinforce the resilience to interference of aeronautical positioning, navigation and timing (PNT) systems (see ICAO Assembly Resolution 41-8, Appendix C);

e) that ICAO has established a strategy for retaining essential conventional PNT infrastructure for contingency support in case of RNSS outages, and for developing mitigation techniques for loss of services (see Convention on International Civil Aviation, Annex 10, Vol. I, Att. H); however, such infrastructure and mitigation techniques may not be available in some areas (for example, over the high seas);

f) that the International Maritime Organization (IMO) through its Maritime Safety Committee (MSC), despite actions taken to mitigate the impact of harmful interference on RNSS and its applications, has recognized that harmful interference impacting RNSS poses a substantial risk to the safety of navigation, the safety of life and property, and the protection of the marine environment (see MSC.1/Circ. 1644*)*;

g) that harmful interference to RNSS may be difficult to detect and trace to origin,

recognizing

a) that disruption to RNSS has been identified globally by the aeronautical community and the maritime community;

b) that there are different types of activities, notably the use of unauthorized transmitters, which may cause the disruption;

c) that ICAO decided at its 40th Assembly in October 2019 to take measures to prevent and avoid interference to RNSS;

d) that the Radiocommunication Bureau, in response to a decision of the Radio Regulations Board, issued Circular Letter CR/488, containing recommendations to Member States concerning mitigation of harmful interference to the RNSS;

e) that Article 45 of the ITU Constitution states that "All stations, whatever their purpose, must be established and operated in such a manner as not to cause harmful interference to the radio services or communications of other Member States or of recognized operating agencies, or of other duly authorized operating agencies which carry on a radio service, and which operate in accordance with the provisions of the Radio Regulations";

f) that Article 47 of the Constitution states that "Member States agree to take the steps required to prevent the transmission or circulation of false or deceptive distress, urgency, safety or identification signals, and to collaborate in locating and identifying stations under their jurisdiction transmitting such signals";

g) that No. **4.10** states that "the safety aspects of radionavigation and other safety services require special measures to ensure their freedom from harmful interference";

h) that No. **5.328A** states that "Stations in the radionavigation-satellite service in the band 1 164-1 215 MHz shall operate in accordance with the provisions of Resolution **609 (Rev.WRC-07)** and shall not claim protection from stations in the aeronautical radionavigation service in the band 960-1 215 MHz. No. **5.43A** does not apply. The provisions of No. **21.18** shall apply";

i) that prevention, identification, reporting and handling of cases of harmful interference, are subject to the provisions of Article **15**;

j) that there are other RNSS applications in the frequency bands 1 164-1 215 MHz and 1 559-1 610 MHz and that there are other RNSS applications operating in other frequency bands that need to be protected and that are not within the scope of this Resolution,

resolves to urge administrations

1 to apply necessary measures to avoid the proliferation, circulation and operation of unauthorized transmitters that cause or have the potential to cause harmful interference to RNSS systems and networks operating in the frequency bands 1 164-1 215 MHz and 1 559-1 610 MHz, including possible measures that might need to be taken with respect to *recognizing j)*;

2 to take the following actions to prevent and mitigate harmful interference affecting RNSS operating in the frequency bands 1 164-1 215 MHz and 1 559-1 610 MHz without prejudice to the right of administrations to deny access to RNSS, for security or defence purposes:

2.1 to encourage collaboration between spectrum regulators, enforcement authorities and RNSS stakeholders, in particular in the aeronautical and maritime domains;

2.2 to encourage cooperation between aeronautical, maritime and security authorities, as well as spectrum regulators, as appropriate, to address interference risks to RNSS systems that may stem from the activities of these security authorities;

3 to report cases, as the affected administration deems appropriate, of harmful interference to RNSS in accordance with Article **15**,

instructs the Director of the Radiocommunication Bureau

to provide, on request, assistance to administrations in accordance with No. **13.2**,

instructs the Secretary-General

to bring this Resolution to the attention of ICAO and IMO.

Agenda item 1.12

ADD

RESOLUTION COM5/6 (WRC-23)

Use of the frequency range 40-50 MHz allocated to the Earth exploration-satellite service (active) for spaceborne radar sounders

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that spaceborne active sensors operating in the Earth exploration-satellite service (EESS) (active), described in Recommendation ITU-R RS.2042, can provide unique information on the physical properties of the Earth, such as characteristics of polar ice sheets and subterranean fossil aquifers in desertic environments;

b) that spaceborne active remote sensing requires specific frequency ranges depending on the physical phenomena to be observed;

c) that worldwide, periodic measurements of subsurface water/ice deposits require the use of spaceborne radar sounder active sensors;

d) that the measurement of reflectivity from subsurface scattering layers as deep as 10-100 metres for shallow aquifers and groundwater conduits, and on the order of 5 km for basal interface topography and ice-sheet thickness, is necessary;

e) that spaceborne radar sounders operating in the EESS (active) are intended to be operated from polar orbits, only in either uninhabited, sparsely populated or remote areas, with particular focus on deserts and polar ice fields;

f) that the 40-50 MHz frequency range is preferable to satisfy all operational requirements for such spaceborne radar sounder active sensors,

recognizing

a) that, given the complexity of the EESS (active) instrument implementation in these low frequencies and the high investment costs associated with these observation missions, very few such platforms are expected to be in orbit at the same time; consequently, aggregate interference from multiple spaceborne radar sounders into incumbent services is not anticipated and could be mitigated by coordination between the operators of such instruments;

b) that measurements by these radar sounders are only possible when the total electron content of the ionosphere is near its daily minimum, which normally occurs in a window of a few hours, centred at approximately 4 a.m. local time;

c) that No. **21.16.8** provides the equation to determine mean power flux-density (pfd) values for the EESS (active);

d) that wind profiler radars in the VHF band are addressed in Resolution **217 (Rev.WRC-23)** and are ideally suited for meteorological measurements (wind, atmospheric turbulence, tropopause height) up to high altitudes of 20-25 km that cannot be accommodated in other frequency bands;

e) that coordination between operators of EESS (active) systems and operators of wind profiler radars in the 40-50 MHz band may be needed on a case-by-case basis to ensure coexistence

between the corresponding stations, acknowledging that there is no compatibility issue between those stations when they operate in adjacent bands;

f) that, at a pfd level of −189 dB(W/(m^2 · 4 kHz)), EESS (active) systems are not functional or are in mute mode,

resolves

1 that the use of the frequency band 40-50 MHz by the EESS (active) is limited to spaceborne radar sounders, as described in the most recent version of Recommendation ITU-R RS.2042;

2 that, for the purpose of protecting the in-band and adjacent-band services, the following conditions outlined in *resolves* 2.1 to 2.4 shall apply to the EESS (active) in the frequency band 40-50 MHz when the subsatellite[1] point is located within any of the following areas:

a) the spherical cap formed by latitudes between 72 and 90 degrees North;

b) the spherical cap formed by latitudes between 60 and 90 degrees South;

c) the quadrangle formed by latitudes between 59 and 72 degrees North and longitudes between 25 and 55 degrees West;

2.1 stations operating in the EESS (active) shall transmit within the areas defined in *resolves* 2 for no more than a total of 90 minutes within a 24-hour period;

2.2 the mean pfd level per spaceborne radar sounder produced at any given point on the surface of the Earth shall not exceed −147 dB(W/(m^2 · 4 kHz)), under clear sky propagation conditions, for more than 0.05% of the time within a 24-hour period;

2.3 the mean pfd level per spaceborne radar sounder produced at any given point on the surface of the Earth shall not exceed −136 dB(W/(m^2 · 4 kHz)), under clear sky propagation conditions;

2.4 if more than one spaceborne radar sounder is in operation:

– administrations shall ensure collectively that the pfd limit in *resolves* 2.2 is not exceeded for more than 0.1% of the time and shall have consultations accordingly;

– until such consultations enable to ensure compliance with this pfd limit, each system will have to ensure that the limit in *resolves* 2.2 is not exceeded for more than 0.1/*N*% of the time, where *N* is the number of spaceborne radar sounders;

3 that, for the purpose of protecting the in-band and adjacent-band services, the following conditions shall apply when the subsatellite1 point is located outside of the areas provided in *resolves* 2;

3.1 in order to ensure that the spaceborne radar sounder is not operational or is in mute mode, the peak pfd level per spaceborne radar sounder produced at the surface of the Earth shall not exceed −189 dB(W/(m^2 · 4 kHz)), under free-space propagation conditions;

3.2 for the use of the frequency band 40-50 MHz by the EESS (active) for operation of spaceborne radar sounders outside the areas defined in *resolves* 2, if the pfd level of −189 dB(W/(m^2 · 4 kHz)) per spaceborne radar sounder produced at the surface of the Earth over the territory of any administration is exceeded, this exceedance is only permitted subject to an explicit agreement obtained;

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[1] The subsatellite point is defined as the location of the projection of the satellite's nadir-pointing vector onto the Earth's surface.

3.3 stations operating in the EESS (active) in the 40-50 MHz frequency band shall not claim protection from stations operating in the radiolocation service in the frequency bands 42-42.5 MHz in Region 1, 41-44 MHz in countries included in No. **5.161,** and 46-50 MHz in countries included in No. **5.162A**; No. **5.43A** does not apply,

invites the ITU Radiocommunication Sector

to regularly review the number and characteristics of spaceborne radar sounders and the application of *resolves* 2.4 by Member States concerned,

instructs the Radiocommunication Bureau

to ensure the examination of the maximum pfd level given in *resolves* 2.3,

instructs the Director of the Radiocommunication Bureau

to report to future competent world radiocommunication conferences on the number of EESS satellites in operation in the frequency band 40-50 MHz and on the application of *resolves* 2.4 above.

Agenda item 1.13

ADD

RESOLUTION COM5/7 (WRC-23)

Use of the frequency band 14.8-15.35 GHz by the space research service (space-to-space) (Earth-to-space) (space-to-Earth) and associated transitional measures

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that there is a need for broadband communication downlinks in the space research service (SRS) for the purpose of transmitting future scientific data at high data transmission speeds;

b) that SRS operators need more stable regulatory certainty in order to be able to ensure long-term operation of systems in this service of public interest, and that operating on the basis of a secondary allocation conflicts with this objective;

c) that the frequency band 15.35-15.4 GHz is currently allocated to the radio astronomy service (RAS) on a primary basis;

d) that the frequency band 14.8-15.35 GHz is currently allocated to the fixed and mobile services on a primary basis;

e) that some applications in the aeronautical mobile service in the frequency band 14.8-15.35 GHz are non-commercial applications that need high flexibility of operations in order to achieve their mission;

f) that the helicopter television transmission system is used to transmit real-time television signals and data from a helicopter to the receiving stations on the ground or a ship, operated in the aeronautical mobile service in the frequency band 14.8-15.35 GHz,

noting

a) that Recommendations ITU-R F.758, ITU-R M.2068 and ITU-R M.2089 contain characteristics of, and protection criteria for, systems operating in the fixed, land and aeronautical mobile services, respectively, in the frequency range 14.5-15.35 GHz;

b) that Recommendations ITU-R RA.769, ITU-R RA.1513 and ITU-R RA.1631 contain protection criteria used for radio astronomical measurements in the frequency range 15.35-15.4 GHz, including percentage-of-time criteria, and reference radio astronomy antenna pattern to be used for compatibility analyses between non-geostationary orbit (non-GSO) systems and RAS stations based on the equivalent power flux-density (epfd) concept, respectively;

c) that Recommendation ITU-R SA.2141 provides technical and operational system characteristics for the SRS in the frequency range 14.8-15.35 GHz,

recognizing

a) that the frequency band 14.8-15.35 GHz is currently used by data relay satellites in inter-satellite links, which permits the establishment of communications with satellites in the non-GSO, including manned flights in the SRS;

b) that the frequency band 14.8-15.35 GHz is planned for use by high-speed data links from non-GSO satellites within the SRS;

c) that the use of the frequency band 14.8-15.35 GHz by the SRS should not cause harmful interference to the stations of the RAS in the frequency band 15.35-15.4 GHz,

resolves

1 that, for the purpose of protecting the in-band and adjacent-band services, the following conditions outlined in *resolves* 1.1 to 1.6 shall apply to the SRS in the frequency band 14.8-15.35 GHz:

1.1 any earth station in the SRS operating in the frequency band 14.8-15.35 GHz shall not exceed the power flux-density (pfd) level of −156 dB(W/m^2) for more than 2% of the time in a 50 MHz bandwidth in the frequency band 15.35-15.4 GHz, at any radio astronomy site observing in the frequency band 15.35-15.4 GHz;

1.2 the pfd produced in the frequency band 15.35-15.40 GHz by a space station of a GSO satellite network in the SRS (space-to-Earth) (space-to-space) shall not exceed the protection criteria specified in Recommendation ITU-R RA.769-2 for more than 2% of the time, at any radio astronomy site observing in the frequency band 15.35-15.4 GHz;

1.3 the epfd produced in the frequency band 15.35-15.40 GHz by all space stations of a non-GSO satellite system in the SRS (space-to-Earth) (space-to-space) shall not exceed −240 dB(W/m^2) for more than 2% of the time in a 50 MHz bandwidth in the frequency band 15.35-15.4 GHz at any radio astronomy site observing in the frequency band 15.35-15.4 GHz; the above limit shall be evaluated in accordance with Recommendation ITU-R RA.1513-2;

1.4 space stations in the SRS, operating in the space-to-space and Earth-to-space directions, shall not claim protection from stations in the fixed service; No. **5.43A** does not apply;

1.5 the pfd produced by a space station in the SRS at any point on the Earth's surface shall not exceed:

−124 dB(W/(m^2 · MHz)) for space-to-space links;

−145.6 dB(W/(m^2 · MHz)) for space-to-space links for more than 1% of time within a 24-hour period, and

−138 dB(W/(m^2 · MHz)) for space-to-Earth links;

1.6 receiving earth stations in the SRS shall not claim protection from stations in the aeronautical mobile service operating in the frequency band 14.8-15.35 GHz within the respective border(s) of neighbouring countries, unless otherwise agreed between the administrations; No. **9.18** does not apply to stations in the aeronautical mobile service,

instructs the Director of the Radiocommunication Bureau

that, in reviewing the findings under No. **11.50** of the frequency assignments to a station in the space research service (space-to-space) (Earth-to-space) (space-to-Earth) in the frequency band 14.8-15.35 GHz, recorded in the Master International Frequency Register (MIFR) prior to 16 December 2023, the Bureau shall review as follows:

a) the original date of receipt of the recorded assignment in the MIFR shall be kept;

b) the Bureau shall examine each frequency assignment recorded in the MIFR in accordance with No. **11.31**;

c) when the examination with respect to No. **11.31** leads to a favourable finding, the assignment shall be upgraded to a primary status;

d) when the finding with respect to No. **11.31** is unfavourable, the assignment shall be modified in the MIFR to "for information purposes" and subject to application of No. **8.5**, only if the administration undertakes that it will be operated in accordance with No. **4.4**; otherwise the assignment shall be removed from the MIFR.

Agenda item 1.17

ADD

RESOLUTION COM5/8 (WRC-23)

Use of the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz by the inter-satellite service

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that there is a need for non-geostationary-satellite orbit (non-GSO) space stations to be able to relay data to the Earth, and that part of this need could be met by allowing such non-GSO space stations to communicate with inter-satellite service (ISS) space stations operating in the geostationary-satellite orbit (GSO) and in the non-GSO in the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz, or parts thereof;

b) that the administration responsible for the notification of non-GSO space stations communicating with GSO or non-GSO space stations in the ISS at higher altitude does not need to be the same administration that has already notified assignments in the ISS;

c) that imposing the hard limits necessary to protect other services would provide regulatory certainty for notifying administrations both of non-GSO space stations communicating with ISS space stations and of potentially impacted services;

d) that there is growing interest in utilizing satellite-to-satellite links for a variety of applications;

e) that the ITU Radiocommunication Sector (ITU-R) has carried out studies on sharing and compatibility between incumbent services in the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz and adjacent bands and satellite-to-satellite transmissions in the ISS;

f) that these studies were based on certain principles, including the limitation of the use of frequency bands to a specific direction, in accordance with the existing fixed-satellite service (FSS) allocations in these frequency bands, the use of power control and antenna steering capabilities, and compliance with applicable equivalent power flux-density (epfd), power flux-density (pfd) and off-axis equivalent isotropically radiated power (e.i.r.p.) limits to protect incumbent services;

g) that the frequency bands 18.1-18.6 GHz (space-to-Earth), 18.8-20.2 GHz (space-to-Earth) and 27.5-30 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, without the imposition of additional constraints, from the operation of the satellite-to-satellite links in the ISS;

h) that there are no protection criteria for evaluation of time-varying interference into non-GSO satellite systems established in ITU-R; therefore, the following protection criteria were used as a basis for sharing studies involving links between two non-GSO space stations and interfered-with non-GSO FSS systems: *I/N* of 0 dB not to be exceeded more than 0.02% of the time, −6 dB no more than 0.6% of the time and −10.5 dB no more than 20% of the time,

recognizing

a) 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 or the non-GSO FSS

system with which non-GSO space stations communicate or on the coordination requirements of that satellite network;

b) that the protection of frequency assignments to GSO FSS satellite networks in the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz, or parts thereof, is a fundamental and important issue due to the fact that these bands are used for the telecommunication/information and communication technology (ICT) infrastructure of many countries, in particular developing countries,

resolves

1 that, for a non-GSO space station subject to this Resolution communicating with a GSO or non-GSO ISS space station within the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz, and 27.5-30 GHz, or parts thereof, the following conditions shall apply:

1.1 the non-GSO ISS space station transmitting in the frequency band 27.5-30 GHz and receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz, or parts thereof, shall only operate inter-satellite links when its apogee altitude[1] is lower than the minimum operational altitude[2] of the GSO or non-GSO space station with which it communicates and when the off-nadir angle between this GSO or non-GSO space station and the non-GSO space station with which it communicates is less than or equal to θ_{Max} (as defined in Annex 1 to this Resolution);

1.2 the GSO or non-GSO space station receiving in the frequency band 27.5-30 GHz and transmitting in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz, or parts thereof, shall only operate inter-satellite links when its minimum operational altitude is higher than the apogee altitude of the non-GSO space station with which it communicates;

1.3 that the use of inter-satellite links by GSO or non-GSO space stations transmitting in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz and receiving in the frequency band 27.5-30 GHz is limited to those with recorded assignments in the relevant FSS (space-to-Earth) and (Earth-to-space) allocations in these bands;

2 that for a non-GSO ISS space station transmitting in the frequency band 27.5-30 GHz, the following conditions shall apply:

2.1 this non-GSO ISS space station shall transmit only when within the cone whose apex is the GSO or non-GSO receiving space station and whose angle is θ_{Max} (as defined in Annex 1 to this Resolution);

2.2 the emissions of this non-GSO ISS space station shall remain within the envelope of the recorded characteristics of the associated transmitting FSS earth stations of the GSO FSS network or non-GSO FSS system with which it communicates;

2.3 this non-GSO space station shall comply with the limits contained in Article **21**, Table **21-4**, taking into account the provisions in Annex 2 to this Resolution for protection of terrestrial services in the frequency band 27.5-29.5 GHz and shall not cause unacceptable interference to or otherwise impose constraints on the operation or the development of terrestrial services; in the frequency band 29.5-30 GHz, with respect to the terrestrial services on the territory of administrations listed in footnote No. **5.542**, the operation of inter-satellite links in the frequency band 29.5-30 GHz should not adversely impact the required protection of terrestrial services operated by the administrations listed in footnote No. **5.542**;

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[1] See item A.4.b.4.d of Appendix **4**.

[2] See item A.4.b.4.f of Appendix **4**.

2.3*bis* the requirement not to cause unacceptable interference to terrestrial services shall not release the notifying administration from its obligation as contained in *resolves* 2.3 above;

2.4 this non-GSO space station shall not cause unacceptable interference to or otherwise impose constraints on the operation or the development of non-GSO FSS systems and shall comply with the provisions contained in Annex 4 to this Resolution;

2.5 this non-GSO space station shall not cause unacceptable interference to or otherwise impose constraints on the operation or development of FSS feeder links to non-GSO mobile-satellite service (MSS) systems operating in the band 29.1-29.5 GHz; the conditions in section b) of Annex 4 to this Resolution shall apply;

2.6 the emission of this non-GSO space station shall not produce a pfd at any point in the GSO arc greater than the pfd produced by earth stations associated with the satellite network/system with which they communicate, and Annex 5 to this Resolution shall apply;

3 that for a space station transmitting in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz or parts thereof, the following conditions shall apply:

3.1 this non-GSO or GSO space station shall transmit only when the non-GSO ISS receiving space station is within the cone whose apex is the GSO or non-GSO transmitting space station and whose angle is θ_{Max} (as defined in Annex 1 to this Resolution);

3.2 the transmissions shall remain within the envelope of the recorded characteristics of the transmitting GSO FSS or non-GSO FSS space station towards its associated FSS earth stations;

3.3 with respect to the Earth exploration-satellite service (EESS) (passive) operating in the frequency band 18.6-18.8 GHz, any non-GSO FSS system with an altitude of apogee of less than 20 000 km communicating with lower-orbiting non-GSO space stations in the frequency bands 18.3-18.6 GHz and 18.8-19.1 GHz and for which complete notification information has been received by the Radiocommunication Bureau after *the date of entry into force of the Final Acts of WRC-23* shall comply with the provisions indicated in Annex 3 to this Resolution;

4 that non-GSO ISS space stations receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz, or parts thereof, shall not claim protection from FSS and MSS networks and systems or meteorological-satellite service networks, or from terrestrial services operating in conformity with the Radio Regulations;

4*bis* that the notifying administration for a non-GSO FSS system communicating with a non-GSO space station in the frequency bands 18.1-18.6 GHz, 19.7-20.2 GHz, 27.5-28.6 GHz and 29.5-30.0 GHz shall ensure that the epfd produced by the emissions from all combined operations of inter-satellite links in the ISS and Earth-to-space and space-to-Earth links in the FSS comply with the epfd limits contained in Article **22**, Tables **22-1B**, **22-1C** and **22-2**;

4*ter* that the notifying administration for a non-GSO ISS system communicating with a non-GSO space station in the frequency bands18.1-18.6 GHz and 19.7-20.2 GHz and receiving in the frequency bands 27.5-28.6 GHz and 29.5-30.0 GHz shall ensure that the epfd produced by the emissions from operations of inter-satellite links in the ISS comply with the epfd limits contained in Article **22**, Tables **22-1B**, **22-1C** and **22-2**;

5 that space stations receiving inter-satellite transmissions in the frequency band 27.5-30 GHz from non-GSO space stations shall not claim protection for inter-satellite links from FSS and MSS networks and systems or from terrestrial services operating in conformity with the Radio Regulations;

6 that assignments to inter-satellite links in the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz shall not cause unacceptable interference to, nor claim protection from, GSO FSS services operating in the frequency band allocated to the FSS,

further resolves

1 that, subject to this Resolution:

a) the notifying administration for the non-GSO system choosing to operate inter-satellite links and receiving in the frequency bands 27.5-28.6 GHz and 29.5-30.0 GHz shall indicate to the Bureau its commitment that the epfd produced at any point in the GSO by emissions from all combined operations of inter-satellite links and associated earth station transmissions shall not exceed the limits given in Article **22**, Table **22-2**;

b) the notifying administration for a non-GSO ISS space station transmitting in the frequency band 27.5-30 GHz towards a GSO network and receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz shall send the Bureau the relevant Appendix **4** advance publication information containing the characteristics of the non-GSO ISS space station and the associated name of the notified GSO FSS network with which it intends to communicate;

c) the notifying administration for a non-GSO ISS space station transmitting in the frequency bands 27.5-29.1 GHz and 29.5-30.0 GHz towards a non-GSO system and receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz shall send the Bureau the relevant Appendix **4** advance publication information containing the characteristics of the non-GSO ISS space station and the associated name of the notified non-GSO FSS system(s) with which it intends to communicate;

d) the notifying administration for a non-GSO system operating inter-satellite links and receiving in the frequency bands 27.5-29.1 GHz and 29.5-30.0 GHz or of a GSO network operating inter-satellite links and receiving in the frequency band 27.5-30.0 GHz is responsible for eliminating any case of unacceptable interference;

2 that the notifying administration for a GSO network/non-GSO system receiving in the frequency band 27.5-30 GHz shall submit, with the Appendix **4** data, a firm, objective, actionable, measurable and enforceable commitment that, in the event of reported unacceptable interference, it undertakes to immediately eliminate the interference or reduce it to an acceptable level, following the procedures in *further resolves* 3:

a) that in case no action is taken with regard to the obligation referred to in *further resolves* 2 above, the Bureau shall send a reminder requesting the notifying administration for the GSO network/non-GSO system to comply with the requirements referred to in the commitment;

b) should the interference persist 30 days after the dispatch date of the above-mentioned reminder, the Bureau shall submit the case to the subsequent meeting of the Radio Regulations Board for review and the necessary actions (including suppression of the frequency assignment in question), as appropriate;

3 that in the event of unacceptable interference caused by a non-GSO ISS space station transmitting in the frequency band 27.5-30 GHz or parts thereof:

a) the notifying administration for that non-GSO ISS space station shall cooperate with an investigation into the matter and provide the information on the operation of the transmitting space station needed to assess the interference and a point of contact to provide such information;

b) the notifying administration for the non-GSO ISS space station transmitting in the frequency band 27.5-30 GHz and the notifying administration for the GSO or non-GSO network or system with which the non-GSO transmitting space station communicates shall, jointly or individually, as the case may be, upon receipt of a report of unacceptable interference, take the required actions to eliminate or reduce the interference to an acceptable level;

4 that the notifying administration for the GSO or non-GSO FSS space station receiving inter-satellite transmissions in the frequency band 27.5-30 GHz shall ensure that:

a) the non-GSO ISS space stations transmitting in these frequency bands employ techniques to maintain pointing accuracy with the associated receiving space station and to avoid inadvertently tracking an adjacent GSO space station of any other notifying administration or a space station in a non-GSO system of any other notifying administration;

b) all necessary measures are taken so that non-GSO ISS space stations transmitting in these frequency bands are subject to permanent monitoring and control by a Network Control and Monitoring Centre (NCMC) or equivalent facility and are capable of receiving and acting upon at least "enable transmission" and "disable transmission" commands from the NCMC or equivalent facility;

c) a permanent point of contact is provided for the purpose of tracing any cases of unacceptable interference from non-GSO ISS space stations transmitting in these frequency bands and responding immediately to requests from the focal point;

5 that, upon examination of the information submitted by the notifying administration under *further resolves* 1*b)* or 1*c)*, if no recorded frequency assignments with typical earth stations for the relevant frequency bands can be identified for the GSO FSS network or non-GSO FSS system with which the notifying administration for the non-GSO ISS space station intends to communicate, the Bureau shall return the information to the notifying administration,

invites the ITU Radiocommunication Sector

1 to develop a suitable methodology for calculating the epfd produced by the emissions from operations of all ISS links in the frequency bands 27.5-28.6 GHz and 29.5-30 GHz, within a given non-GSO ISS system, for use by the Bureau in examining whether the system is in compliance with the epfd limits contained in Article **22**, Table **22-2**;

2 to develop a suitable methodology for calculating the epfd produced by the emissions from operations of all ISS links in the frequency bands 18.1-18.6 GHz and 19.7-20.2 GHz, within a given non-GSO ISS system, for use by the Bureau in examining whether the system is in compliance with the epfd limits contained in Article **22**, Tables **22-1B** and **22-1C**,

instructs the Director of the Radiocommunication Bureau

1 to take all necessary actions to facilitate the implementation of this Resolution, together with providing any assistance for the resolution of interference, if and when required;

2 to report to future world radiocommunication conferences any difficulties or inconsistencies encountered in the implementation of this Resolution;

3 to use the methodology given in Annex 2 to this Resolution when assessing compliance with the pfd limits in Article **21**, Table **21-4**;

4 to use the methodology given in Appendices 1 to 3 to Annex 5 to this Resolution when assessing compliance with Annex 5;

5 not to examine, under No. **11.31**, the conformity of non-GSO ISS systems with the provisions of *resolves* 3.3 of this Resolution in view of the fact that the detailed characteristics of non-GSO ISS system transmitters are not available;

6 that, until the methodology is developed according to *invites the ITU Radiocommunication Sector* 1 and 2 above, the Bureau shall issue a qualified favourable finding for examination under No. **11.31**; when the methodology is available, the Bureau shall review its finding under No. **11.31**.

ANNEX 1 TO RESOLUTION
COM5/8 (WRC-23)

Determination of the off-nadir angle

1 A non-GSO ISS space station transmitting in the frequency band 27.5-30 GHz and receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz shall communicate with a non-GSO space station only when the off-nadir angle between this non-GSO space station and the non-GSO space station with which it communicates is equal to or smaller than:

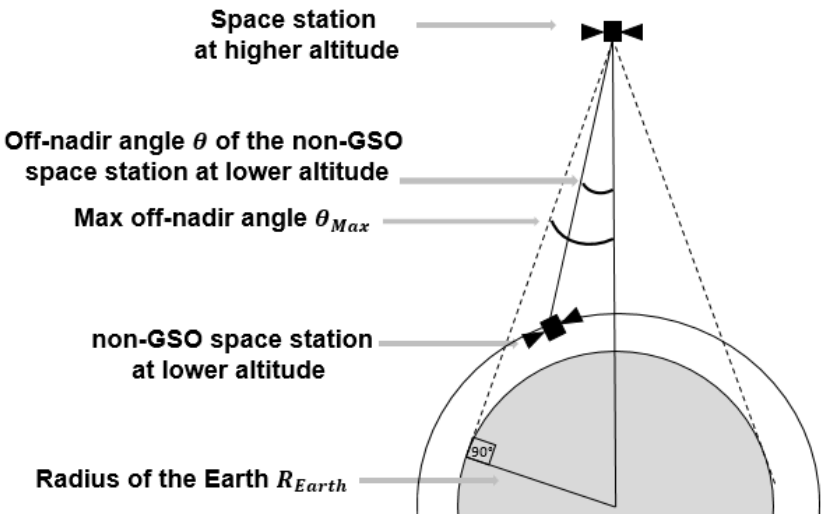
$$\theta_{Max} = \sin^{-1}\left(\frac{R_{Earth}}{R_{Earth} + Alt_{Higher}}\right)$$

where:

R_{Earth} = 6 378 km

Alt_{Higher} = altitude of the non-GSO space station at a higher orbital altitude in km.

FIGURE 1



2 A non-GSO ISS space station transmitting in the frequency band 27.5-30 GHz and receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz shall communicate with a GSO space station only when the off-nadir angle between this GSO space station and the non-GSO space station with which it communicates is equal to or smaller than:

– if the altitude of the non-GSO space station is less than 2 000 km:

$$\theta_{Max} = \sin^{-1}\left(\frac{R_{Earth} + Alt_{non-GSO}}{R_{Earth} + Alt_{GSO}}\right)$$

– if the altitude of the non-GSO space station is greater than or equal to 2 000 km:

$$\theta_{Max} = \sin^{-1}\left(\frac{R_{Earth}}{R_{Earth} + Alt_{GSO}}\right)$$

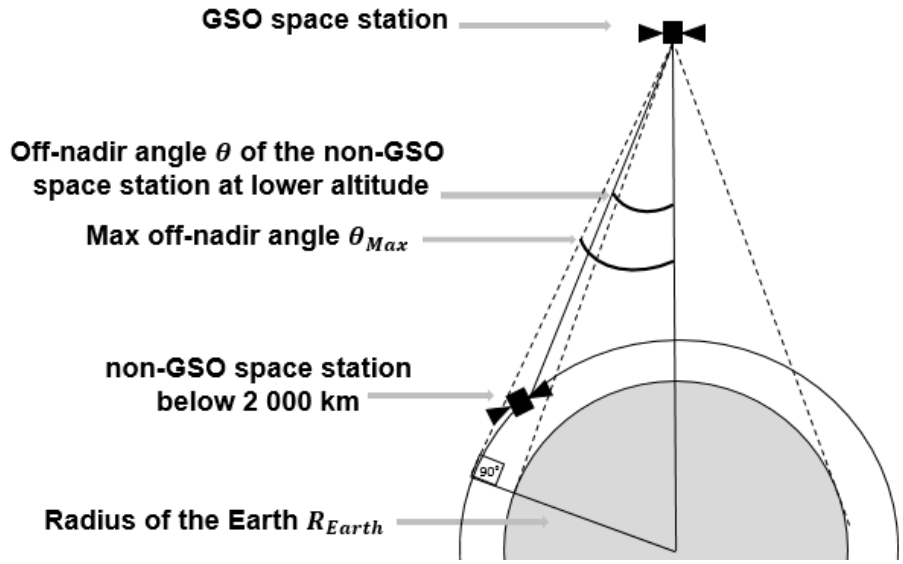
where:

R_{Earth} = 6 378 km

Alt_{GSO} = altitude of the GSO space station in km

$Alt_{non\text{-}GSO}$ = altitude of the non-GSO space station in km.

FIGURE 2



2*bis* If the altitude of the non-GSO space station transmitting in the frequency band 27.5-30 GHz and receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz is less than 2 000 km, the angle between the vector from this space station to the centre of the Earth and the vector between this space station and the GSO space station shall be at least 90°.

3 Where the notified service area of the GSO or non-GSO network/system at a higher orbital altitude is not global, the maximum off-nadir angle θ_{Max} will vary at each azimuth according to the notified service area and there will be a specific maximum off-nadir angle associated with each azimuth, based on the position in space of the FSS network/system at higher orbital altitude and the geographical coordinates (latitude, longitude) of the border of the notified service area at each azimuth, which are extracted from the Graphical Interference Management System (GIMS) database container that was submitted to the Bureau when notifying a specific non-global service area:

$$\theta_{Max} = \cos^{-1}\left(\frac{\left(R_{Earth} + Alt_{Higher}\right)^2 + dist^2 - R_{Earth}^{\ 2}}{2\times\left(R_{Earth} + Alt_{Higher}\right)\times dist}\right)$$

with:

$$dist = \sqrt{\left(X_E - X_S\right)^2 + \left(Y_E - Y_S\right)^2 + \left(Z_E - Z_S\right)^2}$$

$$X_E = R_{Earth} \times \cos\left(lat_{sab}(\varphi)\right) \times \cos\left(lon_{sab}(\varphi)\right)$$

$$Y_E = R_{Earth} \times \cos\left(lat_{sab}(\varphi)\right) \times \sin\left(lon_{sab}(\varphi)\right)$$

$$Z_E = R_{Earth} \times \sin\left(lat_{sab}(\varphi)\right)$$

$$X_S = \left(R_{Earth} + Alt_{Higher}\right) \times \cos\left(lat_{SS}\right) \times \cos\left(lon_{SS}\right)$$

$$Y_S = \left(R_{Earth} + Alt_{Higher}\right) \times \cos\left(lat_{SS}\right) \times \sin\left(lon_{SS}\right)$$

$$Z_S = \left(R_{Earth} + Alt_{SS}\right) \times \sin\left(lat_{Higher}\right)$$

where:

$lat_{sab}(\varphi)$ = latitude of the service area border for the azimuth φ

$lon_{sab}(\varphi)$ = longitude of the service area border for the azimuth φ

lat_{SS} = latitude of the sub-satellite point of the GSO/non-GSO space station

lon_{SS} = longitude of the sub-satellite point of the GSO/non-GSO space station.

ANNEX 2 TO RESOLUTION COM5/8 (WRC-23)

Provisions for non-GSO ISS space stations transmitting in the frequency band 27.5-30.0 GHz to protect terrestrial services in the frequency band 27.5-30.0 GHz

To check the compliance of the non-GSO ISS emissions with the power flux-density (pfd) mask described in Table **21-4**, the following procedures shall be followed:

1 Parameter *a* is the orbital altitude (km) of the non-GSO ISS system identified in *further resolves* 1*b)* or in *further resolves* 1*c)*. PSD is the power spectral density in the reference bandwidth associated with the pfd limit. Compute the off-axis gain pattern *Gtx*(φ), with φ being the off-axis angle in the direction of the terrestrial receiver. Assume the Earth is a sphere whose radius, R_e, is 6 378 km.

2 Compute the angle, as seen from the non-GSO ISS system transmitting in the frequency band 27.5-30.0 GHz (the user space station), between the centre of the Earth and the GSO network or non-GSO systems receiving in the frequency band 27.5-30.0 GHz (the service provider space station), assuming that the user is at the edge of the cone of coverage with the formula:

$$\delta = \arcsin\left(\frac{R_e}{R_e + a}\right)$$

3 Sweep the angle of arrival to the terrestrial station, θ, from 0 to 90 degrees in 0.1 degree increments.

4 Compute the satellite angle $\gamma = \arcsin\left(\frac{\sin(90+\theta)}{R_e + a} * R_e\right)$.

5 Compute the off-axis angle $\varphi = 180 - \delta - \gamma$.

6 Compute the gain *Gtx* in dBi towards the Earth point for each of the angles from Step 5, using the user space station transmit antenna pattern.

7 Compute the slant range $d = (R_e + a)\frac{\sin(90-\gamma-\theta)}{\sin(90+\theta)}$.

8 Compute the *PFD* on the ground:

$$PFD = PSD + Gtx(\theta) - 10 \times \log_{10}(4\pi d^2)$$

ANNEX 3 TO RESOLUTION COM5/8 (WRC-23)

Provisions for non-GSO space station[3] links in the frequency bands 18.3-18.6 GHz and 18.8-19.1 GHz towards non-GSO space stations with respect to the Earth exploration-satellite service (passive) in the frequency band 18.6-18.8 GHz

Non-GSO space stations operating with an altitude of apogee of more than 2 000 km and less than 20 000 km in the frequency bands 18.3-18.6 GHz and 18.8-19.1 GHz, when communicating with a non-GSO ISS space station as described in *resolves* 1 of this Resolution, shall not exceed a power flux-density (pfd) produced at the surface of the oceans across the 200 MHz of the 18.6-18.8 GHz band of −118 dB(W/(m² · 200 MHz)).

Non-GSO space stations operating with an altitude of apogee of less than 2 000 km in the frequency bands 18.3-18.6 GHz and 18.8-19.1 GHz, when communicating with a non-GSO space station as described in *resolves* 1 of this Resolution, shall not exceed a pfd produced at the surface of the oceans across the 200 MHz of the 18.6-18.8 GHz band of −110 dB(W/(m² · 200 MHz)).

ANNEX 4 TO RESOLUTION COM5/8 (WRC-23)

Provisions for non-GSO inter-satellite links in the frequency band 27.5-30.0 GHz to protect non-GSO space stations

The following conditions for non-GSO ISS space stations transmitting in the frequency band 27.5-30.0 GHz shall apply to protect non-GSO space stations:

a) The emissions from any non-GSO ISS space station transmitting in the frequency bands 27.5-29.1 GHz and 29.5-30 GHz to communicate with a GSO FSS network shall not

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[3] These provisions do not apply to non-GSO systems using orbits with an altitude of apogee of less than 2 000 km that employ a frequency reuse factor of at least 3.

exceed the following on-axis equivalent isotropically radiated power (e.i.r.p.) spectral density limits:

– for non-GSO space station transmit on-axis antenna gains greater than or equal to 40.6 dBi: 52.5 dBW/10 MHz;

– for non-GSO space station transmit on-axis antenna gains less than 40.6 dBi: 52.5 − (40.6 – X) dBW/10 MHz;

where X is the on-axis gain of the non-GSO space station antenna in dBi, where the 10 MHz reference bandwidth is in any 10 MHz (e.g. adjacent but non-overlapping).

b) To protect FSS feeder links to non-GSO mobile-satellite service systems, the following conditions for non-GSO space stations and systems transmitting in the frequency band 29.1-29.5 GHz shall apply:

– emissions from any non-GSO space station communicating with a GSO network shall not exceed a maximum power spectral density of −66 dBW/Hz at the input of the antenna of the non-GSO space station;

– any non-GSO space station communicating with a GSO network shall have a minimum antenna diameter of 0.3 m whose gain shall not exceed the gain envelope in the most recent version of Recommendation ITU-R S.580;

– non-GSO space stations communicating with a GSO network shall operate only in orbits with inclination between 75 and 105 degrees;

– non-GSO systems communicating with a GSO network shall not contain more than 100 satellites.

c) The emissions from any non-GSO space station transmitting in the frequency bands 27.5-29.1 GHz and 29.5-30 GHz to communicate with a non-GSO system with a minimum operational altitude higher than or equal to 2 000 km shall not exceed an on-axis e.i.r.p. spectral density of −20 dBW/Hz, and the total e.i.r.p. from any non-GSO space station shall not exceed:

Transmitting non-GSO space station operational altitude (km)	**Maximum total e.i.r.p. (dBW) Brought into use on or before 31 December 2036**	**Maximum total e.i.r.p. (dBW) Brought into use after 31 December 2036**
altitude < 450	63	66
450 ≤ altitude < 600	61	64
600 ≤ altitude < 750	58	58
750 ≤ altitude < 900	55	55
900 ≤ altitude < 1 350	25	44
altitude ≥ 1 350	Not applicable	Not applicable

d) The emissions from any non-GSO space station transmitting in the frequency bands 27.5-29.1 GHz and 29.5-30 GHz to communicate with a non-GSO system with a minimum operational altitude lower than 2 000 km shall not exceed an on-axis e.i.r.p. spectral density of −28 dBW/Hz, and the total e.i.r.p. from any non-GSO space station shall not exceed:

Transmitting non-GSO space station operational altitude (km)	Maximum total e.i.r.p. (dBW) Brought into use on or before 31 December 2036	Maximum total e.i.r.p. (dBW) Brought into use after 31 December 2036
altitude < 375	61	64
375≤ altitude < 450	60	63
450 ≤ altitude < 600	58	61
600 ≤ altitude < 750	55	55
750 ≤ altitude < 900	53	53
900 ≤ altitude < 1 350	25	44
altitude ≥ 1 350	Not applicable	Not applicable

e) For off-axis angles greater than 3.5 degrees, the off-axis e.i.r.p. emissions of a non-GSO space station transmitting in the frequency bands 27.5-29.1 GHz and 29.5-30 GHz to communicate with a non-GSO system with a minimum operational altitude higher than or equal to 2 000 km shall not exceed the envelope generated by the combination of an input power spectral density at the antenna flange of −62 dBW/Hz coupled with the following off-axis gain:

– 29-25 log(φ) dBi for angles between 3.5 and 4.9 degrees;

– 11.71 dBi for angles between 4.9 and 9.5 degrees;

– 43-32log(φ) dBi for angles between 9.5 and 20 degrees.

ANNEX 5 TO RESOLUTION COM5/8 (WRC-23)

Provisions for non-GSO inter-satellite links in the frequency band 27.5-30.0 GHz bands to protect GSO space stations

1 In the frequency band 27.5-30 GHz, when a non-GSO system, as identified in *further resolves* 1*b)*, identifies an associated GSO network, as described in *further resolves* 1*b)*, to operate inter-satellite links, the Radiocommunication Bureau shall perform the examination described in Appendix 1 to this Annex.

2 The notifying administration for the GSO network identified in § 1 above shall respect all coordination agreements that have already been recorded, noting the provisions of *further resolves* 3 and 4.

3 The notifying administration for the GSO network identified in § 2 above shall provide, upon any request from the notifying administration of a GSO network involved in the coordination agreements referred to above, additional information on how the relevant coordination agreements will be respected with regard to protection from inter-satellite links. This information shall be provided within 90 days after the reception of the request.

4 In the frequency bands 27.5-29.1 GHz and 29.5-30 GHz, when a non-GSO system, as identified in *further resolves* 1*c)*, identifies a non-GSO system, as described in *further resolves* 1*c)*, to operate inter-satellite links, the Bureau shall perform the examination described in Appendix 2 to this Annex.

5 The notifying administration for the receiving non-GSO network identified in § 3 above shall respect all coordination agreements that have already been recorded, noting the provisions of *further resolves* 3 and 4.

6 In the frequency bands 27.5-28.6 GHz and 29.5-30 GHz, the power flux-density (pfd) produced at any point in the geostationary-satellite orbit by a non-GSO space station, as mentioned in *further resolves* 1*c)*, shall not exceed a pfd of −164 dB(W/m²) in any 40 kHz band. A computation methodology is provided in Appendix 3 to this Annex.

7 In those cases where all of the conditions identified in Appendix 4 to this Annex are met, the notifying administration for frequency assignments to the ISS GSO space stations shall seek agreement from the notifying administration for the GSO FSS or MSS network. In the absence of agreement, frequency assignments to the ISS space station shall operate under the express condition that the ISS space station does not cause harmful interference to, nor claim protection from, frequency assignments to the GSO FSS or MSS network operating in accordance with the Radio Regulations.

7.1 The Bureau shall not perform an examination under § 7 of this Annex.

7.2 In the event of the harmful interference actually being caused by an ISS space station under § 7 of this Annex, for the case of ISS links between a non-GSO space station and a GSO space station, to any GSO FSS or MSS with recorded frequency assignments operating in accordance with the Radio Regulations, the notifying administration for the GSO ISS space station shall, upon receipt of a report providing the particulars relating to the harmful interference given in the form indicated in Appendix **10**, immediately eliminate this harmful interference.

7.3 In the case of unresolved harmful interference under § 7 of this Annex, the Bureau shall submit the case to the subsequent meeting of the Radio Regulations Board for review and the necessary actions (including suppression of the frequency assignment in question), as appropriate.

7.4 the notifying administration for the GSO ISS space station shall inform the notifying administration for the non-GSO ISS space station of the status of the agreement being sought under § 7 of this Annex.

APPENDIX 1 TO ANNEX 5

The aim of this Appendix is to provide a method to be used by the Radiocommunication Bureau to assess whether the emissions from a non-GSO space station operating inter-satellite links with a GSO space station are within the envelope of the typical earth stations of the GSO network.

Step 1: For each group of the transmitting non-GSO notification.

Step 2: For each of the receiving GSO networks, as listed in *further resolves* 1*b)*.

Step 3: For each beam in the Earth-to-space direction of the receiving GSO network notification, compute the maximum e.i.r.p. produced in one hertz (*EIRPSD*).

Step 4: Compute the reduction in free-space loss at the altitude of the user using:

$$\Delta FSL = 20 \log_{10}\left(\frac{GSO_{alt}}{GSO_{alt} - NGSO_{alt}}\right)$$

where $NGSO_{alt}$ is the altitude of the transmitting non-GSO system space stations and GSO_{alt} = 35 786 km. It should be noted that if several altitudes are included in the notification, each altitude shall be tested.

Step 5: Compute the reduced e.i.r.p. spectral density as $EIRPSD_{reduced} = EIRPSD - \Delta FSL$.

Step 6: For all beams in the non-GSO system notification with a class of station ES, the e.i.r.p. spectral density mask is given in Appendix **4**, data item A.25.c.2.

Step 7: For all emissions in the GSO network notification, compute the e.i.r.p. spectral density mask for all off-axis angles between 0 and 80°, with a step of 1°, and reduce it by ΔFSL. The e.i.r.p. spectral density mask computation should assume that the maximum gain is for an off-axis angle of 0°.

Step 8: Frequency assignments to non-GSO systems shall receive a favourable finding with respect to Annex 5 if, for all beams:

– the maximum value of the e.i.r.p. spectral density mask from Step 6 does not exceed the $EIRPSD_{reduced}$ quantity, computed at the same altitude; and

– the e.i.r.p. spectral density mask of the transmitting non-GSO space station from Step 6 is less than the reduced e.i.r.p. spectral density mask, compared in one hertz, from Step 7 for all angles for at least one emission in the GSO network notification.

Otherwise, the assignments shall receive an unfavourable finding.

APPENDIX 2 TO ANNEX 5

The aim of this Appendix is to provide a method to be used by the Radiocommunication Bureau to assess whether the emissions from a non-GSO space station operating inter-satellite links with a non-GSO space station are within the envelope of the typical earth stations of the non-GSO system.

Step 1: For each group of the transmitting non-GSO notification.

Step 2: For each of the receiving non-GSO systems, as listed in *further resolves* 1*c).*

Step 3: For each beam in the Earth-to-space direction of the receiving non-GSO system notification, compute the maximum e.i.r.p. produced in one hertz (*EIRPSD*).

Step 4: Compute the reduction in free-space loss at the altitude of the user using:

$$\Delta FSL = 20\log_{10}\left(\frac{GSO_{alt}}{GSO_{alt} - NGSO_{alt}}\right)$$

where $NGSO_{alt}$ is the altitude of the transmitting non-GSO system space stations and GSO_{alt} = 35 786 km. It should be noted that if several altitudes are included in the notification, each altitude shall be tested.

Step 5: Compute the reduced e.i.r.p. spectral density as $EIRPSD_{reduced} = EIRPSD - \Delta FSL$.

Step 6: For all beams in the non-GSO system notification with a class station ES, the e.i.r.p. spectral density mask is given in Appendix **4**, data item A.25.c.2.

Step 7: For all emissions in the receiving non-GSO network notification, compute the e.i.r.p. spectral density mask for all off-axis angles between 0 and 80°, with a step of 1°, and reduce it by ΔFSL. The e.i.r.p. spectral density mask computation should assume that the maximum gain is for an off-axis angle of 0°.

Step 8: Frequency assignments to non-GSO systems shall receive a favourable finding with respect to Annex 5 if, for all beams:

– the maximum value of the mask from Step 6 does not exceed the $EIRPSD_{reduced}$ quantity, computed at the same altitude; and

– the e.i.r.p. spectral density mask of the transmitting non-GSO space station from Step 6 is less than the reduced e.i.r.p. spectral density mask from Step 7 for all angles.

Otherwise, the assignments shall receive an unfavourable finding.

APPENDIX 3 TO ANNEX 5

To check the compliance of the non-GSO emissions with the pfd limit given in Annex 5, § 6, the following procedure shall be followed.

Step 1: For each of the latitudes in the e.i.r.p. spectral density mask given in Appendix **4** data item A.25.c.2, select the corresponding value to the GSO arc avoidance and denote it as $eirp_{\alpha}$. If the mask is non-monotonic, select the largest value in the e.i.r.p. mask considering all angles greater than or equal to the GSO arc avoidance angle as given in Appendix **4**, data item A.25.c.1.

Step 2a: compute the slant distance to the GSO arc as:

$$d = \sqrt{(6378 + alt)^2 + 42164^2 - 2 \times (6378 + alt) \times 42164 \times \cos(latitude)}$$

where *alt* is the altitude of the transmitting non-GSO space station, in km**,** and latitude is at the nadir of the non-GSO space station.

Step 2b: Compute the *PFD* on the GSO arc using:

$$PFD = eirp_{\alpha} - 10\log\left(4\pi\left(d \times 1000\right)^2\right)$$

Step 3: Frequency assignments to non-GSO systems shall receive a favourable finding with respect to Annex 5, § 6, if all pfd values calculated in Step 3 are below the threshold given in Annex 5, § 6.

APPENDIX 4 TO ANNEX 5

§ 7 under this Annex applies when all of the following conditions are met between frequency assignments for the notifying administration for a GSO FSS or MSS network and frequency assignments to the GSO ISS space station receiving in the frequency band 27.5-30 GHz and transmitting in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz:

– the date of receipt under No. **9.6** of the frequency assignments to the GSO FSS or MSS network is before the date of recording of the ISS frequency assignments in the Master International Frequency Register, and

– frequency overlap, and

– orbital separation of less than or equal to two degrees, and

– the maximum off-axis e.i.r.p. spectral density of the non-GSO ISS space station towards the affected GSO FSS or MSS space station exceeds −65 + 29 − 25 * log(θ) dBW/Hz, where θ is the topocentric angular separation between the notified affected GSO FSS or MSS space station and the notified GSO ISS space station, and

– the service area of the potentially affected GSO FSS or MSS network includes the territory of its notifying administration.

Agenda item 7(I)

ADD

RESOLUTION COM5/9 (WRC-23)

Temporary regulatory measures in Appendix 30B to improve the reference situation of severely impacted national allotments

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that some national allotments, especially those of developing countries, have a low overall aggregate carrier-to-interference values in Appendix **30B**;

b) that implementation of a national allotment with a low overall aggregate carrier-to-interference value could be difficult,

recognizing

a) that the special procedure outlined in this Resolution may be difficult to implement when the territory of the administration responsible for affected national allotment, deemed to have implicitly agreed to the assignment in the List, is neighbouring the territories included in the service area of this assignment (see § 6.15 of Appendix **30B** of the 2020 version of the Radio Regulations);

b) that Article 44 of the ITU Constitution stipulates that: "In using frequency bands for radio services, Member States shall bear in mind that radio frequencies and any associated orbits, including the geostationary-satellite orbit, are limited natural resources and that they must be used rationally, efficiently and economically, in conformity with the provisions of the Radio Regulations, so that countries or groups of countries may have equitable access to those orbits and frequencies, taking into account the special needs of the developing countries and the geographical situation of particular countries";

c) that the administration of an assignment in the List which applied § 6.15 of Appendix **30B** with regard to a national allotment can sign an agreement under § 6.15*quat* of Appendix **30B** (WRC-23),

resolves

1 that the special procedure outlined in this Resolution shall only be applied by administrations of assignments in the List and administrations of national allotments for which § 6.15 of Appendix **30B** of the 2020 version of the Radio Regulations was applied;

2 that, when agreements under § 6.15*quat* of Appendix **30B** are received by the Radiocommunication Bureau in accordance with *recognizing c)*, the Bureau shall immediately apply § 6.15*quin* and § 6.27*bis* of Appendix **30B** (WRC-23) and update the reference situation without reviewing the previous examinations;

3 to request the notifying administrations of assignments for which the procedures of Article 6 of Appendix **30B** have not yet been completed and which have been examined by the Bureau before its application of *resolves* 2 to make their utmost efforts to take into account the new reference situations of national allotments with respect to which the special procedure of this Resolution has been applied when submitting their notice under § 6.17 or § 6.25 of Appendix **30B**,

instructs the Director of the Radiocommunication Bureau

1 to take the necessary actions to implement this Resolution, including drawing the attention of the notifying administrations to *resolves* 3 and providing necessary assistance to the notifying administrations for the implementation of *resolves* 3;

2 to report to the relevant meetings of the Radio Regulations Board on the efforts undertaken by the notifying administrations in implementing *resolves* 3 for further consideration;

3 to report to a future world radiocommunication conference on the implementation of this Resolution.

Agenda item 10

ADD

RESOLUTION COM6/1 (WRC-23)

Studies on possible revisions of sharing conditions in the frequency band 13.75-14 GHz to allow the use of uplink fixed-satellite service earth stations with smaller antenna sizes

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that WARC-92 added an allocation to the fixed-satellite service (FSS) (Earth-to-space) in the frequency band 13.75-14 GHz;

b) that WRC-03 introduced changes to Nos. **5.502** and **5.503** that made it possible to use earth station antennas in the range of 1.2 to 4.5 metres for the geostationary fixed-satellite service (FSS) networks with limits on power flux-density (pfd) and equivalent isotropically radiated power (e.i.r.p.) density;

c) that WRC-03 did not introduce any changes in Nos. **5.502** and **5.503** in regard to earth stations for non-geostationary-satellite orbit (non-GSO) systems;

d) that there is congestion in the geostationary orbit (GSO);

e) that many new satellite systems are being introduced into non-GSO;

f) that it is necessary to guarantee that orbit and spectrum resources are used efficiently and rationally to facilitate the introduction of new satellite networks;

g) that there is a requirement for more uplink spectrum in the frequency range 13-15 GHz, which could be used worldwide by smaller earth station antennas, to complement the downlink capacity in the frequency range 10-13 GHz;

h) that the frequency band 13.75-14 GHz is allocated worldwide on a primary basis to the radiolocation service (RLS);

i) that the frequency band 13.75-14 GHz is shared with the RLS on the basis of the conditions set forth in No. **5.502**;

j) that the sharing conditions in No. **5.502** impose technical limitations on both the RLS and FSS to balance the operational needs of the two services;

k) that WRC-03 decided that a reduction in the FSS earth station’s antenna size required the application of a pfd limit applied at the low-water mark and at national land borders to ensure continued protection of the RLS;

l) that the enhancement of operating conditions of the earth stations in the frequency band 13.75-14 GHz would help to meet the evolving needs of FSS applications and facilitate an efficient and rational use of the Earth-to-space and space-to-Earth frequency bands corresponding to the frequency ranges 13-15 GHz and 10-13 GHz;

m) that space research service (SRS) systems continue to operate in the frequency band 13.75-14 GHz, including on a primary basis under No. **5.503**,

noting

a) that the SRS is allocated to this band on a secondary basis;

b) that the geostationary space stations of the SRS for which the Bureau has received information for advance publication before 31 January 1992 shall be operating on an equal footing with the stations in the FSS; after that date, the new geostationary space stations of the SRS shall operate on a secondary basis;

c) that, until the geostationary space stations of the SRS for which the Bureau has received information for advance publication before 31 January 1992 stop operating in that frequency band, the frequency band 13.77-13.78 GHz shall be shared with the SRS under the conditions set forth in No. **5.503**;

d) that, in the Master International Frequency Register, there is currently only a very limited number of earth stations and satellite networks of the SRS in the frequency band 13.77-13.78 GHz for which advance publication information was received before 31 January 1992;

e) that the usage of the FSS and other services that share this band may have evolved;

f) that the service objectives, geographical areas of operations, and protection requirements of the RLS are described in Recommendation ITU-R M.1644;

g) that, in some countries, the band is also allocated to the fixed service and the mobile service (Nos. **5.499** and **5.500**) and to the radionavigation service (RNS) (No. **5.501**),

recognizing

a) that the possible use of the frequency band 13.75-14 GHz by uplink FSS earth stations with smaller antenna sizes requires studies to support possible regulatory changes while continuing to ensure the protection of the RLS and SRS, as addressed in Nos. **5.502** and **5.503**;

b) that it is necessary to study possible revised coexistence conditions between the primary services that share this band with their current characteristics and applications and uplink FSS earth stations with smaller antenna sizes, in particular noting Nos. **5.502** and **5.503**;

c) that these studies need to take into account that current SRS systems have been developed and operate in the current sharing environment in accordance with Nos. **5.502** and **5.503**, and changes to these regulations may change this sharing environment;

d) that there is a need to ensure the continued operations of the RLS in the frequency band 13.75-14 GHz;

e) that the pfd limits at the low-water mark and at the border of national territories in No. **5.502** are critical to ensure the protection of the RLS;

f) that the power limitations applicable to stations in the RLS and RNS stated in No. **5.502** shall remain unchanged;

g) that frequency assignments to ship and mobile stations of the RLS cannot be notified under No. **11.14**, and as such the coordination procedure as stipulated in Section II of Article **9** cannot apply as a method for resolving interference issues between FSS earth stations and mobile stations of the RLS;

h) that the protection of the RLS in the frequency band 13.75-14 GHz and SRS in the frequency band 13.77-13.78 GHz relies on the application of a combination of FSS antenna size limitation and of pfd limits at the low-water mark and at the border of national territories,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

1 studies on the technical and operational limitations regarding the minimum antenna size and associated power limitations of GSO and non-GSO FSS earth stations in the frequency band 13.75-14 GHz (Earth-to-space), while ensuring the protection of the services stipulated in Nos. **5.502** and **5.503**;

2 studies on possible changes to Nos. **5.502** and **5.503** and possible associated regulatory measures,

invites administrations

to participate actively in the studies and provide the information required for the studies listed under *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* by submitting contributions to the ITU Radiocommunication Sector,

invites the 2027 world radiocommunication conference

to consider, based on the results of the above studies, the minimum antenna size and associated power limitations of GSO and non-GSO FSS earth stations in the frequency band 13.75-14 GHz (Earth-to-space), possible changes to Nos. **5.502** and **5.503**, and consequential regulatory measures.

ADD

RESOLUTION COM6/2 (WRC-23)

Consideration of appropriate regulatory actions to update Appendix 26 in support of modernization of high-frequency spectrum use in the aeronautical mobile (OR) service

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that digital aeronautical high-frequency (HF) systems need to coexist with existing aeronautical analogue voice and data HF systems without causing harmful interference;

b) that characteristics of HF propagation enable long distance communication for aircraft;

c) that aeronautical analogue voice and narrowband digital HF systems are some of the current means of communication with aircraft in remote and oceanic areas;

d) that there exist modern HF systems that can enhance the HF communication capability of aircraft,

recognizing

a) that the modernization of aeronautical HF communications will not require any changes to Article **5**;

b) that the frequencies 3 023 kHz and 5 680 kHz are designated for search and rescue in Appendix **15**;

c) that for the purpose of this Resolution, the term “wideband” in HF communications may refer to a combination of emissions wider than 3 kHz channels;

d) that wideband operation can be achieved by single- or multi-carrier emissions;

e) that wideband operation may be achieved by contiguous or non-contiguous channel aggregation for multi-carrier emissions;

f) that the use of existing frequency and area allotments in the frequency bands allocated to the aeronautical mobile (OR) service between 3 025 kHz and 18 030 kHz is governed by the provisions of Appendix **26**,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

1 studies on the introduction of new technologies that enhance performance, including, but not limited to, new classes of emission, wideband systems (see *recognizing c)*, *d)* and *e)*), etc., to the aeronautical mobile (OR) service systems in the frequency ranges considered in Appendix **26**;

2 in order to undertake *resolves to invite ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* 1, the definition of the relevant technical and operational characteristics and conduct sharing and compatibility studies with existing aeronautical mobile (OR) service systems and with other incumbent services that are allocated on a primary basis in the same or adjacent frequency bands;

3 based on ITU Radiocommunication Sector (ITU-R) studies, the identification of any potential modifications to Appendix **26**, without modifying the existing area allotments in

recognizing f), and while taking into account that the current use of the narrowband systems shall remain unchanged and shall not be impacted nor precluded by the revision of Appendix **26**,

invites administrations

to participate actively in the studies and provide the information required for the studies listed in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* by submitting contributions to ITU-R,

invites the 2027 world radiocommunication conference

to consider necessary changes, as appropriate, to Appendix **26**, on the basis of the studies conducted under *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* above.

ADD

RESOLUTION COM6/3 (WRC-23)

Studies relating to the use of the frequency band 51.4-52.4 GHz to enable its use by gateway earth stations transmitting to non-geostationary-satellite orbit systems in the fixed-satellite service (Earth-to-space)

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that satellite systems are increasingly being used to deliver broadband services and can help enable universal broadband access;

b) that next-generation fixed-satellite service (FSS) technologies for broadband will increase speeds, with faster rates expected in the near future;

c) that technological developments such as advances in spot-beam technologies and frequency reuse are used by the FSS in frequency bands above 30 GHz to increase the efficient use of spectrum;

d) that fixed-satellite applications in frequency bands above 30 GHz, such as feeder links, may be easier to share with other radiocommunication services than high-density FSS (HDFSS) applications;

e) that the current frequency allocations to the FSS in the frequency band 51.4-52.4 GHz do not enable its use by non-geostationary-satellite orbit (non-GSO) gateway operations, and as such do not meet the expected needs of such systems;

f) that the protection of the Earth exploration-satellite service (EESS) (passive) in the adjacent frequency bands 50.2-50.4 GHz and 52.6-54.25 GHz is vital to weather prediction and disaster management,

recognizing

a) the need to protect existing services when considering frequency bands for possible additional allocations to any service;

b) that the conditions in No. **5.555C** with respect to geostationary-satellite orbit (GSO) networks should not be changed;

c) that the frequency band 51.4-52.4 GHz is allocated to the fixed and mobile services, which will need to be protected, and is available for high-density applications in the fixed service, as indicated in No. **5.547**;

d) that No. **5.340** applies to the frequency bands 50.2-50.4 GHz and 52.6-54.25 GHz;

e) that in the frequency band 51.4-54.25 GHz, radio astronomy observations are carried out under national arrangements, as indicated in No. **5.556**, and that appropriate measures may have to be defined to protect the radio astronomy service;

f) that Report ITU-R S.2461 identifies the spectrum needs in the frequency band 51.4-52.4 GHz for additional FSS spectrum (Earth-to-space) for both GSO networks and non-GSO systems;

g) that the use of the frequency band 51.4-52.4 GHz by the FSS (Earth-to-space) is limited only to GSO networks and associated gateway earth stations with a minimum antenna diameter of 2.4 metres, in accordance with No. **5.555C**, as a result of WRC-19 studies;

h) that, in the frequency band 51.4-52.4 GHz, Resolution **750 (Rev.WRC-19)** applies as indicated in No. **5.338A**;

i) that the frequency band 50.2-50.4 GHz is also allocated to the EESS (passive) with the applicable non-GSO FSS unwanted emission limits provided in Resolution **750 (Rev.WRC-19)**;

j) that the frequency band 52.6-54.25 GHz is allocated to the EESS (passive), which needs to be protected, as indicated in No. **5.340**, through revision of Resolution **750 (Rev.WRC-19)**, with a view to including the non-GSO FSS unwanted emission limit for the frequency band 52.6-54.25 GHz together with possible modification of the GSO FSS unwanted emission limit for the frequency band 52.6-54.25 GHz, subject to the result of the studies, taking into account the aggregation of interference into EESS (passive);

k) that the existing limits for GSO FSS networks to protect EESS (passive) operating in the frequency band 52.6-54.25 GHz established in Resolution **750 (Rev.WRC-19)** continue to apply for those GSO FSS networks that were notified/brought into use before a date to be defined at WRC-27;

l) that Report ITU-R S.2462 contains studies on sharing and compatibility between GSO FSS networks and non-GSO FSS systems in the frequency bands 37.5-42.5 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz;

m) that, although the studies prior to WRC-19 were conducted only for GSO FSS earth stations, as noted in Report ITU-R S.2463, spectrum needs for both GSO and non-GSO FSS earth stations in the frequency band 51.4-52.4 GHz were ultimately identified, as indicated in *recognizing f)*;

n) that the need for additional uplink spectrum in the 50 GHz frequency range for non-GSO FSS gateway earth station use continues,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

1 sharing and compatibility studies with existing services, including in adjacent bands, including protection of the fixed and mobile services, and studies relating to the suitability of revising conditions associated with the primary allocation to the FSS in the frequency band 51.4-52.4 GHz (Earth-to-space) to enable its use by gateway earth stations of non-GSO FSS systems (Earth-to-space), and the relevant regulatory studies;

2 compatibility studies between non-GSO FSS gateway operation in the frequency band 51.4-52.4 GHz and the existing primary passive services operating in the frequency band 52.6-54.25 GHz in order to review and revise Resolution **750 (Rev.WRC-19)** to protect the EESS (passive), considering the aggregated interference from GSO gateway earth stations and non-GSO FSS gateway earth stations and taking into account that the existing limits for GSO FSS networks to protect the EESS (passive) operating in the frequency band 52.6-54.25 GHz established in Resolution **750 (Rev.WRC-19)** continue to apply for those GSO FSS networks that were notified/brought into use before a date to be defined at WRC-27;

3 studies on sharing and compatibility between non-GSO FSS gateway operation in the frequency band 51.4-52.4 GHz and the radio astronomy observations carried out in the frequency band 51.4-54.25 GHz in conformity with No. **5.556**, in order to determine the conditions to ensure the protection of these observations;

4 studies regarding the protection of GSO FSS space stations from the emissions of non-GSO FSS gateway earth stations, including possible associated regulatory actions and possible inclusion of the frequency band 51.4-52.4 GHz in the scope of Resolutions **769 (WRC-19)** and **770 (Rev.WRC-23)**,

invites administrations

to participate actively in the studies and provide the information required for the studies listed under *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* by submitting contributions to the ITU Radiocommunication Sector (ITU-R),

invites the 2027 world radiocommunication conference

to consider, based on the results of the ITU-R studies, the possible revision of the conditions related to allocations to the FSS in the frequency band 51.4-52.4 GHz to enable its use by non-GSO FSS gateway earth stations on a primary basis and any other related regulatory provisions.

ADD

RESOLUTION COM6/4 (WRC-23)

Studies on frequency-related matters, including possible new or modified space research service (space-to-space) allocations, for future development of communications on the lunar surface and between lunar orbit and the lunar surface

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that there is increased interest in conducting scientific discovery and space exploration activities in lunar orbit and on the lunar surface;

b) that wireless communication technology is well-developed and widely deployed on the Earth and could be applied to lunar communications;

c) that point-to-multipoint systems on the lunar surface used for scientific or technological research purposes could operate in the space research service (SRS) (space-to-space) currently;

d) that lunar missions may require signals for accurate Positioning, Navigation and Timing (PNT) in the lunar region originating from Moon-orbiting satellites;

e) that the lunar environment has unique atmospheric, soil and topographic conditions;

f) that the shielded zone of the Moon (SZM) and the absence of appreciable water vapour and oxygen in the lunar atmosphere allow for radioastronomical observations which are not possible on Earth;

g) that the interests of scientific discovery and space exploration are of a global nature;

h) that lunar scientific and exploration activities can advance the development of potential future space activities beyond space research, which may in the future include other relevant radiocommunication services for lunar communications,

noting

a) that Section V of Article **22** addresses protection of radio astronomy in the SZM;

b) that Recommendation ITU-R RA.479-5 relates to the protection of frequencies for radioastronomical measurements in the SZM, with a view to preserving the unique radioastronomical capabilities in this zone;

c) that the impact of unintended electromagnetic radiation from electrical and electronic systems into radio astronomy receivers should be assessed (see Question ITU-R 243/1);

recognizing

a) that studies on sharing and compatibility between potential systems on the Moon's surface and systems orbiting the Moon would need to take into account any existing SRS applications and other affected services in the same or, as appropriate, adjacent bands;

b) that frequencies for communications between the Earth and the Moon are provided through the existing allocations to the SRS;

c) that frequencies for communications between satellites orbiting the Moon can operate in existing frequency allocations to the SRS (space-to-space) and the inter-satellite service;

d) that existing allocations to the amateur radio service have also been used for communications between the Earth and the Moon, and Earth-to-Earth via passive reflection from the Moon;

e) that dedicated frequencies are needed in the lunar vicinity for local communications between systems operating on the lunar surface and between systems in lunar orbit and systems on the lunar surface;

f) that future development of communications on the lunar surface and between lunar orbit and the lunar surface should take into account the need to maintain the opportunities for radio astronomy observations and the operation of space research sensors, including active and passive sensors on the Moon;

g) that the frequency bands 7 190-7 235 MHz (Earth-to-space) and 8 450-8 500 MHz (space-to-Earth) are allocated to the SRS on a primary basis;

h) that the frequency band 5 250-5 570 MHz is allocated to the SRS (active) on a primary basis;

i) that the frequency bands 3 500-3 800 MHz (space-to-Earth) and 5 725-5 925 MHz (Earth-to-space) are allocated to the fixed-satellite service on a primary basis;

j) that the frequency band 25.25-27.5 GHz is allocated to the inter-satellite service on a primary basis, limited to space research and Earth exploration-satellite applications, and also transmissions of data originating from industrial and medical activities in space, as stipulated in No. **5.536**;

k) that the fixed and mobile (in some bands mobile, except aeronautical mobile) services are allocated on a primary basis within the frequency ranges 390-399.9 MHz, 400.05-401 MHz by No. **5.262**, 420-430 MHz, 440-450 MHz, 2 400-2 690 MHz, 3 500-3 800 MHz, 5 650-5 850 MHz by No. **5.453**, 7 190-7 235 MHz, 8 450-8 500 MHz and 25.25-28.35 GHz;

l) that the mobile, except aeronautical mobile, service is allocated on a primary basis in the frequency ranges 5 150-5 350 MHz and 5 470-5 725 MHz, the aeronautical mobile service is allocated on a primary basis under Nos. **5.446C** and **5.446D** in the frequency band 5 150-5 250 MHz, the fixed service is allocated on a primary basis under No. **5.447E** in the frequency band 5 250-5 350 MHz and the fixed service is allocated on a primary basis in the frequency band 5 670-5 850 MHz in No. **5.455**;

m) that the aeronautical radionavigation service is allocated on a primary basis in the frequency bands 5 150-5 250 MHz and 5 350-5 460 MHz and by No. **5.450** in the frequency band 5 470-5 650 MHz, the radionavigation service is allocated on a primary basis in the frequency band 2 450-2 500 MHz (Regions 2 and 3), in the frequency band 5 250-5 350 by No. **5.448** and in the frequency band 5 460-5 470 MHz, the maritime radionavigation is allocated on a primary basis in the frequency range 5 470-5 650 MHz, the radiolocation service (RLS) is allocated on a primary basis in the frequency range 5 250-5 850 MHz, and the RLS is allocated on a primary basis under No. **5.269** in the frequency bands 420-430 MHz and 440-450 MHz,

n) that the broadcasting-satellite service (BSS) is allocated on a primary basis in the frequency range 2 520-2 670 MHz, and the BSS (sound) and complementary terrestrial sound broadcasting service are allocated on a primary basis under No. **5.418** in the frequency band 2 535-2 565 MHz;

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

1 studies of the spectrum needs of systems in the SRS which may operate on the lunar surface, or systems in lunar orbit communicating with systems on the lunar surface, in the following frequency ranges or portions thereof, taking into account *noting a)*, *b)* and *c)*:

– 390-406.1 MHz, 420-430 MHz and 440-450 MHz, limited to outside the SZM

– 2 400-2 690 MHz, 3 500-3 800 MHz, 5 150-5 570 MHz, 5 570-5 725 MHz, 5 775-5 925 MHz, 7 190-7 235 MHz, 8 450-8 500 MHz and 25.25-28.35 GHz;

2 studies of the technical and operational characteristics, as well as protection criteria, of systems in the SRS that are planned for operation in the frequency bands in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* 1, as well as protection criteria to be applied for the protection of the radio astronomy service (RAS) and SRS active and passive sensors on the lunar surface and lunar orbit;

3 studies of the propagation considerations for lunar surface systems and lunar-orbiting systems operating in the frequency ranges in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* 1;

4 studies of sharing and compatibility related to systems in the SRS that are planned for operation in the frequency ranges identified in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* 1 to ensure protection of:

– radiocommunication services, as specified in *recognizing g)* to *n)*, and

– the RAS on the Earth and in the SZM in the same, adjacent or nearby bands;

5 studies of potential new or modified frequency allocations and/or identifications to the SRS with appropriate regulatory provisions, for communications on the lunar surface or in lunar orbit communicating with systems on the lunar surface;

invites the ITU Radiocommunication Sector

1 to begin studying, taking into account *considering h)*, future spectrum needs for lunar communications and systems, beyond those identified in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* 1, which may be needed for communications between the Earth, lunar-orbiting spacecraft and the lunar surface;

2 to study whether future radiocommunications in the vicinity of the Moon, as described in *considering h)*, can be accommodated within existing space radiocommunication services and whether the regulatory provisions described in the Radio Regulations are sufficient,

invites administrations

to participate in the studies by submitting contributions to the ITU Radiocommunication Sector,

invites the 2027 world radiocommunication conference

to consider, based on the results of the studies referred to in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* 1 to 5, new or modified allocations and/or identifications in the SRS in the frequency ranges in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* 1 above, or portions thereof, for use in the vicinity of the Moon,

instructs the Director of the Radiocommunication Bureau

to report to WRC-27 on the progress of the studies referred to in *invites the ITU Radiocommunication Sector* 1 and 2 above,

invites a future competent world radiocommunication conference after WRC-27

to consider, if necessary, appropriate regulatory actions based upon the studies called for in *invites the ITU Radiocommunication Sector* 1 and 2 above.

ADD

RESOLUTION COM6/5 (WRC-23)

Studies on compatibility between the Earth exploration-satellite service (passive), the radio astronomy service in certain bands above 76 GHz, and active services in adjacent and nearby frequency bands

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that WRC-2000 made a number of different allocation changes to the frequency bands above 71 GHz, including primary allocations to the Earth exploration-satellite service (EESS) (passive) subject to No. **5.340**, based on the requirements known at the time of that conference;

b) that primary allocations have been made to various active services in frequency bands adjacent to frequency bands above 86 GHz allocated to the EESS (passive) subject to No. **5.340**;

c) that primary service allocations have been made, in adjacent or nearby frequency bands, to the radio astronomy service (RAS) and to various space services, such as the fixed-satellite service (FSS), mobile-satellite service (MSS), broadcasting-satellite service (BSS) and radionavigation-satellite service (RNSS), hereinafter referred to as "active satellite services", in frequency bands above 76 GHz;

d) that unwanted emissions from active services have the potential to cause unacceptable interference to the EESS (passive) and the RAS;

e) that, in many cases, the frequencies used by EESS (passive) sensors and stations of the RAS are chosen to study natural phenomena producing radio emissions at frequencies fixed by the laws of nature, and therefore shifting frequency to avoid or mitigate interference problems is not possible;

f) that the current regulatory provisions and procedures may require review to ensure protection of the EESS (passive) and the RAS from harmful interference produced by active services as listed in Tables 1 and 2 below,

noting

a) that Resolution **750 (Rev.WRC-19)** deals with compatibility between the EESS (passive) and some active services;

b) that Resolution **750 (Rev.WRC-19)** already contains provisions to protect the EESS (passive) in the frequency band 86-92 GHz from emissions of the fixed service in the frequency bands 81-86 GHz and 92-94 GHz and that there is no intention to change these provisions;

c) that there is no intention to change the existing allocations or status of allocations in Article **5** for the frequency bands above 86 GHz;

d) that interference criteria for EESS (passive) sensors have been developed and are given in Recommendation ITU-R RS.2017;

e) that typical technical and operational characteristics of EESS (passive) systems are given in Recommendation ITU-R RS.1861;

f) that the allocation to the inter-satellite service in the frequency band 116-119.98 GHz is subject to No. **5.562C**;

g) that Resolution **739 (Rev.WRC-19)** applies under No. **5.208B** for the frequency bands listed in the Annex to that Resolution;

h) that, according to *resolves* 3 of Resolution **739 (Rev.WRC-19)**, in case the unwanted emissions from the space station or satellite system cannot meet the values given in the Annex to that Resolution, the concerned administrations enter into a consultation process in order to achieve a mutually acceptable solution;

i) that Resolution **739 (Rev.WRC-19)** defines thresholds to be met by any geostationary space station (Table 1 of Annex to Resolution **739 (Rev.WRC-19**) or by any single network of non-geostationary-satellite orbit (non-GSO) space stations (Table 2 of Annex to Resolution **739 (Rev.WRC-19)**) in order to protect radio astronomy stations;

j) that Recommendation ITU-R RA.769 provides, in Annex 1, the general consideration and assumptions used in the calculation of interference levels;

k) that Recommendation ITU-R RA.769 provides, in Table 1 and Table 2, the threshold levels for interference detrimental to radio astronomy observations in some radio astronomy bands;

l) that Recommendation ITU-R RA.1631 provides the typical maximum RAS antenna gains in order to derive the equivalent power flux-density (epfd) resulting from unwanted emission levels produced by a non-GSO system at radio astronomy stations,

recognizing

a) that Resolution **739 (Rev.WRC-19)** contains no power flux-density (pfd)/epfd threshold for unwanted emission from any geostationary-satellite orbit (GSO)/non-GSO space station in the bands listed in Table 2 to this Resolution;

b) that the current values provided in Resolution **739 (Rev.WRC-19)** are derived from Recommendations ITU-R RA.769 and ITU-R RA.1631,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

1 compatibility studies between the EESS (passive) and the corresponding active services in adjacent frequency bands as listed in Table 1 below:

TABLE 1

EESS (passive) frequency bands to be studied and corresponding active services to be included

EESS (passive) frequency band	Active service frequency band	Active service
86-92 GHz	81-86 GHz	Fixed-satellite service (FSS) (Earth-to-space), mobile service (MS)
	92-94 GHz	MS, radiolocation service (RLS)
114.25-116 GHz	111.8-114.25 GHz	Fixed service (FS), MS
164-167 GHz	158.5-164 GHz	FS, FSS (space-to-Earth), MS, mobile-satellite service (MSS) (space-to-Earth)
	167-174.5 GHz	FS, FSS (space-to-Earth), inter-satellite service (ISS), MS
200-209 GHz	191.8-200 GHz	FS, ISS, MS, MSS, radionavigation service (RNS), radionavigation-satellite service (RNSS)
	209-217 GHz	FS, FSS (Earth-to-space), MS

2 compatibility studies between the RAS and the active satellite services in certain adjacent and nearby frequency bands listed in Table 2 below with a view to setting the relevant threshold levels for unwanted emissions from any GSO and non-GSO space stations and revising and updating Resolution **739 (Rev.WRC-19)** accordingly:

TABLE 2

RAS frequency bands to be studied and corresponding active services to be included

Radio astronomy frequency band	Active satellite service frequency band	Active satellite service (space-to-Earth)
76-81 GHz	71-76 GHz	Fixed-satellite service (FSS), mobile-satellite service (MSS), broadcasting-satellite service (BSS)
130-134 GHz	123-130 GHz	FSS, MSS, radionavigation-satellite service (RNSS)
164-167 GHz	167-174.5 GHz	FSS
226-231.5 GHz	232-235 GHz	FSS

invites administrations

to participate actively in the studies and provide the technical and operational characteristics of the systems involved by submitting contributions to the ITU Radiocommunication Sector,

invites the 2027 world radiocommunication conference

1 to determine, based on the results of studies, any required regulatory measures regarding the protection of the EESS (passive) in the frequency bands listed in Table 1 above from unwanted emissions of active services and update Resolution **750 (Rev.WRC-19)** accordingly;

2 to determine, based on the results of studies, any required regulatory measures regarding the protection of the RAS in the frequency bands listed in Table 2 above and update Resolution **739 (Rev.WRC-19)** accordingly,

instructs the Secretary-General

to bring this Resolution to the attention of the international and regional organizations concerned.

ADD

RESOLUTION COM6/6 (WRC-23)

Studies on development of regulatory measures, and implementability thereof, to limit the unauthorized operations of non-geostationary-satellite orbit (non-GSO) earth stations in the fixed-satellite service (FSS) and mobile-satellite service (MSS) and associated issues related to the service area of non-GSO FSS and MSS satellite systems

The World Radiocommunication Conference (Dubai, 2023)

considering

a) the active implementation of non-geostationary-satellite orbit (non-GSO) systems in the fixed-satellite service (FSS) and mobile-satellite service (MSS) with a global service area;

b) reports to the Radio Regulations Board (RRB) from administrations regarding the presence of unauthorized transmissions of transmitting earth stations of non-GSO FSS and MSS systems within their territory;

noting

a) that Article **18** specifies the requirements for licensing the operation of stations within any given territory;

b) that No. **18.1** provides that no transmitting station may be established or operated by a private person or by any enterprise without a licence issued in an appropriate form and in conformity with the provisions of the Radio Regulations by or on behalf of the government of the country to which the station in question is subject;

c) that administrations involved in the provision of satellite services, including notifying administrations of satellite networks or systems, are subject to Article **18**;

d) that Resolution **22 (Rev.WRC-23)**, on measures to limit unauthorized uplink transmissions from earth stations, resolves that the operation of transmitting earth stations within the territory of an administration shall be carried out only if authorized by that administration;

e) that Resolution **25 (Rev.WRC-23)**, on operation of global satellite systems for personal communications, *resolves* that administrations licensing global satellite systems and stations intended to provide public personal communications by means of fixed, mobile or transportable terminals shall ensure, when licensing these systems and stations, that they can be operated only from the territory or territories of administrations having authorized such service and stations in compliance with Articles **17** and **18**, in particular No. **18.1**;

f) that Resolution 219 (Bucharest, 2022) of the Plenipotentiary Conference encourages Member States, when authorizing non-GSO systems, to take all necessary actions to avoid unacceptable interference to GSO and other non-GSO systems, as well as to other radio services of other administrations, and to ensure the efficient use of radio-frequency spectrum and associated satellite orbit resources; to this effect, the necessary regulatory frameworks need to be developed for the operation of non-GSO systems;

g) that No. **15.5** *b)* provides that "radiation in and reception from unnecessary directions shall be minimized by taking the maximum practical advantage of the properties of directional antennas whenever the nature of the service permits";

h) that earth stations may be equipped with devices allowing geolocation as well as cessation of emissions in the Earth-to-space direction,

recognizing

a) that the ITU Constitution recognizes the sovereign right of each Member State to regulate its telecommunications;

b) that Member States have the sovereign right to license the use of non-GSO systems in their territories and that radiation in and reception from unnecessary directions shall be minimized;

c) that Member States may wish to exclude its territory from the service area of the non-GSO satellite system;

d) that unauthorized use of non-GSO FSS and MSS earth stations is prohibited,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

1 studies on regulatory measures to limit the unauthorized operations of non-GSO FSS and MSS earth stations in the Earth-to-space direction in order to address and cease such operations, taking into account technical and operational aspects, as appropriate;

2 studies on regulatory measures, taking into account *recognizing c)* with regard to non-GSO FSS and MSS satellite systems, and the implementability of such measures, without adversely affecting the provision of service in the rest of the service area of the non-GSO satellite system,

invites administrations

to participate actively in the studies and provide the information required for the studies listed under *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* by submitting contributions to ITU Radiocommunication Sector,

resolves to invite the 2027 world radiocommunication conference

to consider the results of the studies under *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* above and take appropriate action.

ADD

RESOLUTION COM6/7 (WRC-23)

Consideration of technical and regulatory measures for fixed-satellite service satellite networks/systems in the frequency bands 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) for equitable access to these frequency bands

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that, in the frequency ranges at 4/6/10/11/12/13/14/17/20/30/40/50 GHz, there are allocations to the fixed-satellite service (FSS) and/or broadcasting-satellite service (BSS) on a primary basis;

b) that a portion of radio-frequency spectrum in the frequency ranges at 4/6/10/11/12/13/14/17 GHz has been used to develop planned space services as contained in Appendices **30**, **30A** and **30B**;

c) the additional regulatory measures for the enhancement of equitable access are included in Resolution **553 (Rev.WRC-23)** in the BSS in the frequency band 21.4-22 GHz in Regions 1 and 3;

d) that all countries have equal rights with respect to the use of both the radio frequencies allocated to various space radiocommunication services and geostationary-satellite orbits (GSO) and non-geostationary-satellite orbits (non-GSO) for these services in accordance with the Radio Regulations;

e) that, accordingly, a country or a group of countries having satellite filings in the FSS in the frequency ranges at 30/40/50 GHz can take practical measures to facilitate the use of new space systems by other countries or groups of countries;

f) that the Plenipotentiary Conference 2022 adopted Resolution 219 (Bucharest, 2022), on sustainability of the radio-frequency spectrum and associated satellite-orbit resources used by space services;

g) that No. **5.550B**, which identifies the 37-43.5 GHz band for IMT, notes that potential deployment of FSS earth stations within the frequency range 37.5-42.5 GHz and high-density applications in the FSS in the frequency bands 39.5-40 GHz in Region 1, 40-40.5 GHz in all Regions and 40.5-42 GHz in Region 2 (see No. **5.516B**); administrations should further take into account potential constraints to IMT in these frequency bands, as appropriate,

considering further

that planning for FSS networks, as was done in the Appendices **30**, **30A** and **30B** in the C- and Ku-bands, resulted in undesired consequences such as a lack of flexibility to adapt to new technologies, and that lessons learned should be taken into account in the consideration of the frequency bands 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) for equitable access,

recognizing

a) that Articles 12 and 44 of the ITU Constitution lay down the basic principles for the use of the radio-frequency spectrum and the GSO and non-GSO systems, taking into account the needs of developing countries;

b) that the "first-come, first-served" concept in Articles **9** and **11** can result in difficulties for future access to limited spectrum and orbits resources for later filed systems;

c) the relative disadvantage for developing countries in coordination negotiations due to reasons such as a lack of resources and expertise;

d) that Resolution **2 (Rev.WRC-03)** resolves that "the registration with the Radiocommunication Bureau of frequency assignments for space radiocommunication services and their use do not provide any permanent priority for any individual country or groups of countries and do not create an obstacle to the establishment of space systems by other countries";

e) that Resolution ITU-R 74 resolves to continue activities in the scope of the ITU Radiocommunication Sector (ITU-R) with a focus on equitable, efficient and economical use of the radio-frequency spectrum taking into account the special needs of developing countries,

recognizing further

a) that there is a need to have additional technical and regulatory measures to ensure equitable access to the frequency ranges at 30/40/50 GHz in the FSS;

b) that there are many GSO FSS submissions in the frequency ranges at 30/40/50 GHz, which can prevent access to these frequency bands by developing countries,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

to study the technical and regulatory measures for FSS satellite networks/systems in the frequency bands 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space), or portions thereof, for equitable access, while ensuring the protection of existing primary services to which the band is allocated in the same and adjacent bands, taking into account the specific needs of developing countries:

– without adversely affecting those services, specifically the operation of the satellite networks and systems in the bands;

– without changing measures to protect terrestrial services from unacceptable interference,

invites the 2027 world radiocommunication conference

to review the results of the studies in accordance with *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* above and take appropriate action on the usage of the frequency bands 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) for equitable access to these frequency bands by FSS satellite networks/systems,

invites administrations

to participate actively in the studies by submitting contributions to ITU-R.

ADD

RESOLUTION COM6/8 (WRC-23)

Studies on potential new allocations to, and regulatory actions for, the mobile-satellite service in the frequency bands 1 427-1 432 MHz (space-to-Earth), 1 645.5-1 646.5 MHz (space-to-Earth) (Earth-to-space), 1 880-1 920 MHz (space-to-Earth) (Earth-to-space) and 2 010-2 025 MHz (space-to-Earth) (Earth-to-space) required for the future development of low-data-rate non-geostationary mobile-satellite systems

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that low-data-rate mobile-satellite service (MSS) systems, in the context of this Resolution, refer to non-geostationary (non-GSO) systems not delivering telephony that transmit data in bursts and can therefore operate with periodic or intermittent data transmission and maintain a service while experiencing packet loss;

b) that there is a need for low-data-rate MSS systems for the purpose of developing the Internet of Things;

c) that there are insufficient spectrum opportunities for new non-voice low-data-rate non-GSO MSS systems to operate in existing MSS frequency bands below 5 000 MHz;

d) that the number of mobile-satellite systems using small satellites is growing and the spectrum demand for suitable MSS allocations is increasing,

noting

a) that the frequency band 1 427-1 429 MHz is currently allocated to the space operations (Earth-to-space), fixed, and mobile, except aeronautical mobile, services on a primary basis;

b) that the frequency band 1 429-1 452 MHz is currently allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis in Region 1, and to the fixed and mobile services on a primary basis in Regions 2 and 3;

c) that the frequency band 1 400-1 427 MHz is currently allocated to the Earth exploration-satellite (passive), radio astronomy and space research (passive) services on a primary basis;

d) that the frequency band 1 645.5-1 646 5 MHz is currently allocated to the MSS (Earth-to-space) on a primary basis;

e) that the frequency band 1 880-1 920 MHz is currently allocated to the fixed and mobile services on a primary basis;

f) that the frequency band 2 010-2 025 MHz is currently allocated to the fixed and mobile services on a primary basis;

g) that the frequency band 2 010-2 025 MHz is currently allocated to the MSS on a primary basis in Region 2 only;

h) that in Regions 1 and 3, the frequency band 2 010-2 025 MHz may be used by high-altitude platform stations as base stations to provide International Mobile Telecommunications (IMT), in accordance with No. **5.388A**;

i) that the frequency band 1 427-1 432 MHz is identified for IMT globally, in accordance with Resolution **223 (Rev.WRC-23)**;

j) that the frequency bands 1 880-1 920 MHz and 2 010-2 025 MHz are identified for IMT globally in accordance with Resolution **212 (Rev.WRC-23)** and are included in arrangement B1 for implementation of IMT in Recommendation ITU-R M.1036;

k) that Report ITU-R SA.2312 provides technical characteristics and benefits of some low-data-rate MSS satellites and suggests that MSS frequency bands already allocated above 5 000 MHz are not suited to the inherent size, weight and power restrictions of small satellites (usually having a mass of less than 100 kg);

l) the need for regulatory certainty regarding the available spectrum for both satellite and earth station design and planning purposes,

recognizing

a) that the frequency bands 1 427-1 432 MHz, 1 645.5-1 646.5 MHz, 1 880-1 920 MHz and 2 010-2 025 MHz, and adjacent frequency bands, are also allocated to other radiocommunication services on a primary basis and that those allocations are used by a variety of incumbent systems in many administrations, and that the protection of these services should be studied;

b) that, for the determination of the incumbent services, the relevant provisions of the Radio Regulations in force apply;

c) that low-data-rate MSS systems in non-GSO orbits should, in the context of this Resolution have the following properties:

– not including telephony;

– transmitting data in bursts;

– capable of operating with periodic or intermittent data transmission;

– capable of maintaining a service while experiencing packet loss;

d) that MSS systems use different modes of operation and employ interference-mitigating measures to facilitate spectrum sharing and compatibility between systems and other services;

e) that new allocations for MSS systems are needed,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

1 studies on spectrum requirements, technical and operational characteristics and conditions for non-GSO low-data-rate MSS systems, including mitigation techniques, that allow coexistence of these systems in the same frequency bands;

2 studies on sharing and compatibility between the non-GSO low-data-rate MSS systems and the existing primary services operating in the frequency bands 1 427-1 432 MHz (space-to-Earth), 1 645.5-1 646.5 MHz (space-to-Earth) (Earth-to-space), 1 880-1 920 MHz (space-to-Earth) (Earth-to-space) and 2 010-2 025 MHz (space-to-Earth) (Earth-to-space) and in the relevant adjacent frequency bands, in order to ensure protection of existing services,

invites administrations

to participate actively in the studies and provide the information required for the studies listed under *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* by submitting contributions to the ITU Radiocommunication Sector,

invites the 2027 world radiocommunication conference

to consider, based on the results of studies, possible allocations to the MSS and possible regulatory actions in the frequency bands referred to in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference*.

ADD

RESOLUTION COM6/9 (WRC-23)

Studies on possible new allocations to the mobile-satellite service for direct connectivity between space stations and International Mobile Telecommunications (IMT) user equipment to complement terrestrial IMT network coverage

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that International Mobile Telecommunications (IMT) systems support terrestrial and satellite components, including the capability to enable direct communication to IMT user equipment;

b) that the mobile-satellite system may provide alternative network resilience and mobile connectivity to underserved communities and in rural and remote areas, in particular in the event of network failures of terrestrial IMT and natural disasters;

c) that the expected usage of the mobile-satellite service (MSS) in IMT frequency bands in specific service areas is based on the authorization by administrations within the territory under their jurisdiction,

noting

a) that Report ITU-R M.2077-0 indicated a shortfall of spectrum available for the satellite component of IMT and systems beyond IMT-2000 of more than 144 MHz (space-to-Earth) and more than 19 MHz (Earth-to-space);

b) that Report ITU-R M.2218-0 estimated the spectrum requirement in the frequency range 4-16 GHz for MSS broadband applications between 240 MHz and 355 MHz;

c) that Report ITU-R M.2514-0, on vision, requirements and evaluation guidelines for satellite radio interfaces of IMT-2020, defined the minimum technical requirements for satellite systems which can be part of the IMT-2020 ecosystem, including bandwidth requirements;

d) that Report ITU-R M.2041-0 addressed sharing and adjacent band compatibility in the 2.5 GHz band between the terrestrial and satellite components of IMT-2000;

e) that Recommendation ITU-R M.1182-1 considered the integration of terrestrial and satellite mobile communication systems;

f) that Recommendation ITU-R M.1036-6 addressed frequency arrangements for the implementation of the terrestrial component of IMT in the bands identified for IMT in the Radio Regulations;

g) that Recommendation ITU-R RA.769-2 contains the protection criteria used for radio astronomical measurements;

h) that Recommendation ITU-R RA.1513-2 provides the acceptable levels of data loss to radio astronomy observations and percentage-of-time criteria resulting from degradation by interference for frequency bands allocated to the radio astronomy service (RAS) on a primary basis;

i) that Recommendation ITU-R M.1808-1 also applies for the studies of frequency bands allocated for the mobile service below 960 MHz;

j) that Resolution **646 (Rev.WRC-19)** also applies in frequency bands below 960 MHz;

k) that the GE06 Agreement applies for countries in Region 1, except Mongolia, and including the Islamic Republic of Iran,

recognizing

a) that the growth in demand for mobile-satellite systems is making it difficult to sustain MSS services on a long-term basis in the existing bands;

b) that MSS systems may provide direct connectivity between space stations and IMT user equipment to complement terrestrial IMT network coverage;

c) that new allocations to the MSS would be consistent with the International Telecommunication Union's objective of promoting access to telecommunication services, particularly in remote and rural areas;

d) that there is a need to concentrate the studies on the frequency bands allocated to the mobile service on a primary basis and used for IMT or identified for IMT by country footnotes or on a regional or multi-regional basis;

e) that for the determination of the incumbent services, the relevant provisions of the Radio Regulations in force apply;

f) that unwanted emissions in the spurious domain may be considered regarding RAS frequency allocations,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

1 studies on possible allocations to the MSS in the frequency range between 694/698 MHz and 2.7 GHz, taking into account the IMT frequency arrangements addressed in the most recent version of Recommendation ITU-R M.1036;

2 studies on spectrum requirements and on technical, operational and regulatory matters related to the implementation of the mobile-satellite service for direct connectivity to the IMT user equipment to complement the terrestrial IMT network coverage,

further resolves

1 to conduct studies on sharing and compatibility between incumbent services, including in adjacent frequency bands, ensuring the protection of incumbent services in accordance with the Radio Regulations;

2 to study possible technical and operational measures to ensure that the stations in the MSS do not cause harmful interference to, or claim protection from, stations operating in the mobile service,

invites administrations

to participate actively in the studies and provide the information required for the studies listed in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* by submitting contributions to the ITU Radiocommunication Sector,

invites the 2027 world radiocommunication conference

to consider, based on the results of studies, the appropriate regulatory actions, including possible new allocations to the MSS for direct connectivity between space stations and IMT user equipment to complement terrestrial IMT network coverage.

ADD

RESOLUTION COM6/10 (WRC-23)

Studies on possible new frequency allocations to the mobile-satellite service in the frequency bands 2 010-2 025 MHz (Earth-to-space) and 2 160-2 170 MHz (space-to-Earth) in Regions 1 and 3 and 2 120-2 160 MHz (space-to-Earth) in all Regions

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that demand for mobility communications has driven an increasing demand for mobile-satellite service and connectivity anywhere;

b) that the range of mobile-satellite service applications has expanded manifold since the last mobile-satellite service (MSS) allocations were made, and the number of MSS systems is growing and the spectrum demand for suitable MSS allocations is increasing;

c) that MSS systems implementing various applications, including data applications, are a proven, practical and cost-effective method of providing telecommunication service that contributes to global economic and social development especially in remote and underserved areas;

d) that recent advances in technology and the development of external standards are facilitating the integration of mobile-satellite solutions to address connectivity, which increases the range of potential users of the MSS;

e) that MSS systems play a part in reducing the digital divide;

f) that MSS systems have the capability of overcoming practical and logistical difficulties associated with terrestrial infrastructure;

g) that contiguous spectrum for the MSS would enable efficiencies in spectrum management;

h) the need for regulatory certainty regarding the available spectrum for both satellite and earth station design and planning purposes;

i) that new MSS allocations in the frequency bands 2 010-2 025 MHz (Earth-to-space) and 2 160-2 170 MHz (space-to-Earth) in Regions 1 and 3 and 2 120-2 160 MHz (Earth-to-space) in all Regions may help to address MSS spectrum demands;

j) that it may be possible to provide additional MSS capacity by amending some existing secondary MSS allocations to primary,

noting

a) that MSS characteristics can be found in ITU-R Recommendations and Reports, such as Recommendation ITU-R M.1184;

b) that Report ITU-R M.2514, “Vision, requirements and evaluation guidelines for satellite radio interface(s) of IMT-2020”, has been approved;

c) that the frequency band 2 010-2 025 MHz is allocated to the MSS on a primary basis for Earth-to-space operations in Region 2;

d) that the frequency bands 2 025-2 110 MHz and 2 200-2 290 MHz are allocated to the fixed and mobile services on a primary basis;

e) that the frequency band 2 120-2 160 MHz is allocated to the MSS on a secondary basis for space-to-Earth operations in Region 2;

f) that the frequency band 2 160-2 170 MHz is allocated to the MSS on a primary basis for space-to-Earth operations in Region 2;

g) that the frequency bands 2 010-2 025 MHz, 2 160-2 170 MHz and 2 200-2 215 MHz are adjacent to bands that are allocated to the MSS on a primary basis and identified for the satellite component of IMT-2020;

h) that the frequency bands 2 010-2 025 MHz, 2 120-2 160 MHz and 2 160-2 170 MHz are adjacent to bands allocated to the MSS on a primary basis globally or in Region 2;

i) that, under Recommendation ITU-R M.1036, the frequency bands 1 920-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz are included as arrangements B1, B4, B5 and B7 for the implementation of IMT; some administrations have used these bands in Regions 1, 2 and 3, and terrestrial mobile operators have deployed IMT systems, and also in some countries portions of these bands have been implemented for railway control and dispatching systems, which are critical for the safety of railway operations; the frequency band 2 110-2 170 MHz is used for downlink transmission from terrestrial IMT base stations; IMT systems in the frequency range 2 010-2 025 MHz are operated in TDD mode;

j) that, in accordance with No. **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 IMT; such use does not preclude the use of these frequency bands by other services to which they are allocated; these frequency bands should be made available for IMT in accordance with Resolution **212 (Rev.WRC-23)**;

k) that, in accordance with Resolution **212 (Rev.WRC-23)**, both the terrestrial and the satellite components of IMT have already been deployed or are being planned for deployment within the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz, and that the availability of the satellite component of IMT in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz simultaneously with the terrestrial component of IMT in the frequency bands identified in No. **5.388** could improve the overall use of IMT;

l) that the frequency bands 2 025-2 110 MHz and 2 200-2 290 MHz are allocated to the space operation, Earth-exploration satellite and space research services on a primary basis in the Earth-to-space, space-to-Earth and space-to-space directions and are currently heavily used by most satellite systems for telecommand, telemetry and precision tracking, as well as by launchers and manned or unmanned space research missions,

recognizing

a) that some existing satellite allocations may be adapted to provide further MSS capacity;

b) that the introduction of applications of the possible new allocation of the MSS should not adversely affect existing primary services allocated in the frequency bands being considered and adjacent frequency bands that operate in accordance with the Radio Regulations,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

1 studies on relevant spectrum requirements and technical, operational and regulatory matters for the MSS in connection with possible new allocations to the MSS in the frequency bands

2 010-2 025 MHz (Earth-to-space) and 2 160-2 170 MHz (space-to-Earth) in Regions 1 and 3 and 2 120-2 160 MHz (space-to-Earth) in all Regions;

2 studies on sharing and compatibility of possible new allocations to the MSS in the frequency bands being studied to ensure the protection of existing services allocated on a primary basis, and also in adjacent frequency bands, without adversely affecting those services;

3 studies on possible technical, operational and regulatory measures that ensure the protection of existing services and their continued operation and future development without imposing additional regulatory or technical constraints on those services, while ensuring their protection from harmful interference, when considering possible additional allocations to the MSS,

invites administrations

to participate actively in the studies and provide the information required for the studies referred to in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* by submitting contributions to the ITU Radiocommunication Sector,

invites the 2027 world radiocommunication conference

to consider, based on results of studies conducted under *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference*, possible new allocations and associated regulatory conditions for the MSS, while ensuring the protection of existing primary services.

ADD

RESOLUTION COM6/11 (WRC-23)

Studies of technical and regulatory provisions necessary to protect radio astronomy operating in specific Radio Quiet Zones and, in radio astronomy service primary allocated frequency bands globally, from aggregate radio-frequency interference caused by systems in the non-geostationary-satellite orbit

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that radio astronomy is a pivotal scientific discipline that plays a crucial role in unravelling the mysteries of the cosmos;

b) that the number of non-geostationary-satellite orbit (non-GSO) satellite launches has increased in recent years and even more launches are planned for the next decade;

c) that for the purpose of this Resolution, a Radio Quiet Zone (RQZ) is any recognized geographic area within which the usual spectrum management procedures are modified for the specific purpose of reducing or avoiding interference with radio telescopes, thereby maintaining the required standards for quality and availability of observational data, as defined in Report ITU-R RA.2259;

d) that aggregate emissions from single and multiple non-GSO satellite systems may cause interference to the radio astronomy service (RAS), even in RQZs, which may be challenging to resolve with only national regulation;

e) that non-GSO satellite systems are being considered for future use as part of terrestrial networks under the mobile-satellite service (MSS);

f) that a number of administrations have implemented regulations to establish RQZs which may not be applicable to satellite operations;

g) that the 2023 Radiocommunication Assembly instructed ITU Radiocommunication Sector (ITU-R) Study Group 7 to facilitate information sharing to enable better coordination between satellite operators and RAS sites, including, for example, the creation of a database of RQZs;

h) that the potential impact of non-GSO satellite systems on astronomy has been recognized and is currently being discussed in the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) under the name “Dark and Quiet Skies”;

i) that the impact of non-GSO satellite systems on radio astronomy has been recognized by the International Astronomical Union by creating the Centre for the Protection of the Dark and Quiet Sky from Satellite Constellation Interference;

j) that a small number of remote RAS stations are of the utmost importance as they are designed to make observations of significance, resulting in new knowledge of astronomical phenomena, which may require observations of objects not previously studied, or observing objects with increased precision;

k) that, for the purpose of this Resolution, the facilities which fall into the category defined in *considering j)* are:

– the Square Kilometre Array Observatory in South Africa;

– the Atacama Large Millimeter/submillimeter Array (ALMA) in Chile;

l) that the RAS stations in *considering k)* must be able to operate in much larger frequency ranges than those currently allocated to the RAS in order to meet their scientific goals;

m) that the RAS stations in *considering k)* are afforded a national RQZ, while only a small fraction of other RAS stations are surrounded by RQZs;

n) that current approaches and procedures may not be sufficient to ensure protection of the RAS from emissions produced by the increasing number of non-GSO satellite systems,

noting

a) that Recommendation ITU-R RA.769 provides thresholds for the non-GSO satellite interference received through the far side lobes of radio astronomy telescopes;

b) that Recommendation ITU-R RA.1031 addresses the protection of radio astronomy in shared bands;

c) that Recommendation ITU-R RA.1513 provides the acceptable levels of data loss to radio astronomy observations and percentage-of-time criteria resulting from degradation by interference for frequency bands allocated to the RAS on a primary basis;

d) that Recommendation ITU-R M.1583 provides the calculations for interference between non-GSO MSS or radio navigation-satellite service (RNSS) and radio astronomy telescope sites;

e) that Recommendation ITU-R S.1586 provides the method for calculating unwanted emission levels produced by a non-GSO FSS at radio astronomy sites;

f) that Report ITU-R RA.2259 contains characteristics of national RQZs and measures to establish them,

recognizing

a) that No. **29.12** highlights the susceptibility of radio astronomy to harmful interference from space-borne transmitters;

b) that the spectrum requirements for radio astronomy stations in *considering k)* are fulfilled by the primary and secondary allocations, as well as by national arrangements;

c) that there are no examinations currently performed by the Bureau with regard to RAS protection from satellite systems under Articles **9** or **11**;

d) that the compatibility issues between the RAS and non-GSO systems may be addressed by technical mitigation measures before satellites are launched and operational;

e) that for non-GSO systems the equivalent power flux density (epfd) method, which is developed in Recommendations ITU-R M.1583 and ITU-R S.1586, provides a sufficiently accurate estimate of the total power that is introduced into RAS receivers and can be used to incorporate the effects of other technical parameters;

f) that national regulations for radio astronomy in the RQZ may be different for each administration, leading to varying protection measures;

g) that some non-GSO systems currently operate in frequency bands adjacent to RAS primary allocations;

h) that the specific protection measures for the RAS agreed between administrations are outside the scope of this Resolution,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

1 studies on how the interference from unwanted emissions from a single non-GSO satellite system operating in the adjacent and nearby frequency bands in Table 1 affects the operation of RAS stations in frequency bands allocated to the RAS on a primary basis in Table 1;

2 studies on how the aggregate interference from unwanted emissions from multiple non-GSO satellite systems operating in the adjacent and nearby frequency bands in Table 1 affect the operation of RAS stations in frequency bands allocated to the RAS on a primary basis in Table 1;

3 studies on the possible recognition of the RQZs specified in *considering k)* above, based on their characteristics and existing ITU-R studies;

4 studies on how the aggregate interference from single and multiple non-GSO satellite systems affects the operation of RAS stations in the RQZs specified in *considering k)*;

5 studies on new coexistence measures between non-GSO satellite systems and RAS stations in the RQZs specified in *considering k)*;

6 studies of methods to calculate the necessary separation distances between gateways of non-GSO systems operating in bands adjacent to or near RAS allocations and RAS stations protected by the RQZs specified in *considering k)*,

invites administrations

to participate actively in the studies and provide the technical and operational characteristics of the systems involved and other information required for the studies by submitting contributions to the ITU-R,

invites the 2027 world radiocommunication conference

1 to consider appropriate technical and/or regulatory measures based on the results of the studies mentioned in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* 1;

2 to consider, if deemed appropriate, based on the studies mentioned in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* 3, 4, 5 and 6, potential solutions to characterize the RQZs in *considering k)* in the Radio Regulations and/or in a WRC Resolution,

instructs the Secretary-General

to bring this Resolution to the attention of COPUOS and other international and regional organizations concerned.

TABLE 1

RAS frequency bands to be studied and corresponding active services to be included

Radio astronomy frequency band	Active space service operating in adjacent or nearby frequency band	Active space service (space-to-Earth)	Scope
10.6-10.7 GHz	10.7-10.95 GHz	FSS	*Resolves etc.* 1 and 2
42.5-43.5 GHz	42-42.5 GHz	FSS	*Resolves etc.* 2
76-77.5 GHz	74-76 GHz	FSS, MSS	*Resolves etc.* 2
94.1-95 GHz	95-100 GHz	RNSS, MSS	*Resolves etc.* 2
100-102 GHz	95-100 GHz	RNSS, MSS	*Resolves etc.* 1 and 2

Radio astronomy frequency band	Active space service operating in adjacent or nearby frequency band	Active space service (space-to-Earth)	Scope
114.25-116 GHz	116-119.98 GHz	ISS	*Resolves etc.* 1 and 2
130-134 GHz	123-130 GHz	FSS, MSS, RNSS	*Resolves etc.* 2

ADD

RESOLUTION COM6/12 (WRC-23)

Consideration of regulatory provisions and potential primary allocations to the meteorological aids service (space weather) to accommodate receive-only space weather sensor applications in the Radio Regulations

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that space weather data is important to understand the physical process of providing prediction models for space weather events and their impacts on services critical to the economy, safety and security of administrations and the population of their countries as:

– space weather observations are important for detecting natural phenomena, mainly originating from solar activity and occurring beyond the major portion of the Earth's atmosphere;

– the collection and exchange of space weather data are important to understand the origin of these phenomena and the physical processes;

b) that the importance of space weather radiocommunication applications has been stressed by a number of international bodies, such as the World Meteorological Organization, the Intergovernmental Panel on Climate Change, the United Nations Office for Disaster Risk Reduction, the International Civil Aviation Organization, the United Nations Office for Outer Space Affairs and the United Nations Committee on the Peaceful Uses of Outer Space, and that ITU Radiocommunication Sector (ITU-R) collaboration with these bodies is essential;

c) that these observations could be made from space- and ground-based systems, and guidance in the design of these systems is necessary;

d) that the observational frequencies used by these space weather sensors have been chosen based on the physical properties of the observed phenomena;

e) that some receive-only sensors operate by receiving low-level emissions, including, but not limited to, emissions from the Sun, Earth's atmosphere and other celestial bodies, and may therefore suffer harmful interference in the future;

f) that radio regulatory protection is needed for space weather observation systems that are used operationally in the production of forecasts and warnings of space weather events that can cause harm to important sectors of national economies and security, as well as human welfare;

g) that the bandwidth requirement for observations by receive-only space weather sensors may typically encompass a minimum continuous bandwidth,

noting

a) that Resolution **COM5/1 (WRC-23)**:

– defines space weather;

– designates space weather sensors to the meteorological aids service (MetAids) in the subset MetAids (space weather);

b) that Report ITU-R RS.2456, on space weather sensor systems using radio spectrum, contains:

– a summary of spectrum-reliant space weather sensors; and

– the description of the systems for operational space weather monitoring, prediction and warnings deployed globally;

c) that, within ITU-R, work is ongoing to determine the spectrum requirements of receive-only space weather sensors and their protection criteria in response to Question ITU-R 256/7;

d) that Resolution 136 (Rev. Bucharest, 2022) of the ITU Plenipotentiary Conference, highlights the use of telecommunications/information and communication technologies for monitoring and management in emergency and disaster situations for early warning, prevention, mitigation and relief,

recognizing

a) that no frequency bands have been documented in any manner in the Radio Regulations for space weather sensor applications;

b) that, while data products are used for forecasts and warnings related to public safety, among other purposes, the provisions of Nos. **1.59** and **4.10** do not apply to spectrum-reliant space weather sensors;

c) that some receive-only space weather sensors in operation utilize bands not currently allocated to the MetAids service, and some of them need to continue their current operation;

d) that the current provisions of Article **11** do not allow an administration to notify a frequency assignment to a receive-only terrestrial radio station, except for certain types of stations (see Nos. **11.2**, **11.9** and **11.12**), and that therefore no procedure for notifying receive-only MetAids (space weather) stations is provided;

e) that receive-only space weather sensors are considered in the studies under this resolution on the understanding that these sensors will be deployed only at a limited number of specific locations and not in a ubiquitous manner,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

1 studies on spectrum needs and appropriate protection criteria for receive-only space weather sensors, as well as system characteristics, as appropriate, taking into account *noting a)*;

2 sharing and compatibility studies pertaining to potential new primary allocations to MetAids (space weather) in the following frequency bands for receive-only sensors, taking into account *resolves* 2:

– 27.5-28.0 MHz;

– 29.7-30.2 MHz;

– 32.2-32.6 MHz;

– 37.5-38.325 MHz;

– 73.0-74.6 MHz;

– 608-614 MHz;

3 studies on possible regulatory provisions of the Radio Regulations to accommodate the possibility for an administration that desires to notify a receive-only space weather sensor station to be included in the Master International Frequency Register,

further resolves

1 that no notification of frequency assignments to a station used for space weather observation be made by administrations under MetAids (space weather) until WRC-27 introduces the corresponding allocations in Article **5**;

2 that any possible new primary MetAids (space weather) allocations to be made under *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* 2 shall not claim protection from, nor constrain the future development of, incumbent services in these frequency bands or in adjacent bands,

invites administrations

to participate actively in the studies and provide the information required for the studies listed under *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* by submitting contributions to ITU-R,

invites the 2027 world radiocommunication conference

to take appropriate actions, including potential new primary receive-only MetAids (space weather) allocations, based on the results of the studies under *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference*, taking into account *resolves* 2,

invites relevant international organizations

to participate actively in the relevant ITU-R studies by providing information that should be taken into account in ITU-R studies,

instructs the Secretary-General

to bring this Resolution to the attention of the relevant international organizations.

ADD

RESOLUTION COM6/13 (WRC-23)

Studies on potential new allocations to fixed, mobile, radiolocation, amateur, amateur-satellite, radio astronomy, Earth exploration-satellite (passive and active) and space research (passive) services in the frequency range 275-325 GHz with the consequential update of Nos. 5.149, 5.340, 5.564A and 5.565

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that technologies above 275 GHz are considered as emerging enablers to enhance the radio interface to support high-capacity transmission and scientific research;

b) that sub-terahertz and terahertz spectrum have been discussed for use by various active service applications;

c) that there have been radio observatories and passive remote sensing satellites operating above 275 GHz;

d) that studies on technical and operational characteristics of fixed service and land mobile service (LMS) applications operating in the frequency range 275-450 GHz have been carried out by the ITU Radiocommunication Sector (ITU-R) and resulted in No. **5.564A** being added by WRC-19;

e) that amateur and amateur satellite service applications have been utilized in the frequency range 275-450 GHz in a number of countries;

f) that Recommendation ITU-R RS.2017 provides performance and interference criteria for satellite passive remote sensing up to 1 000 GHz;

g) that protection criteria for the radio astronomy service (RAS) above 275 GHz is included in Report ITU-R RA.2189;

h) that frequency bands above 275 GHz in which emissions are prohibited are not specified by a provision of the Radio Regulations;

i) that propagation characteristics of frequencies above 275 GHz are being studied by ITU-R Study Group 3;

j) that international standards are being developed for equipment operating in the frequency range 275-450 GHz;

k) that it is appropriate to ensure that any frequency allocations above 275 GHz to the fixed, land mobile, radiolocation, amateur, amateur-satellite, radio astronomy and Earth exploration-satellite (passive and active), space research (passive) and any other radiocommunication services should correspond to up-to-date technical and operational characteristics for those applications and take into account compatibility between these services,

noting

a) that Nos. **5.564A** and **5.565** apply to the frequency range 275-450 GHz;

b) that Reports ITU-R F.2416, ITU-R M.2417 and ITU-R RS.2431 provide technical and operational characteristics of fixed service, LMS and Earth exploration-satellite service (EESS) (passive) applications in the frequency range 275-450 GHz, respectively;

c) that Report ITU-R SM.2352 contains technology trends of active services in the frequency range 275-3 000 GHz;

d) that Report ITU-R SM.2540 provides sharing and compatibility study results between land mobile, fixed and passive services in the frequency range 275-450 GHz;

e) that Report ITU-R RS.2194 contains passive bands of scientific interest to the EESS/space research service (SRS) from 275 to 3 000 GHz,

recognizing

a) that the frequency range 275-325 GHz is also identified for other radiocommunication services and that those identifications are used by a variety of incumbent systems in many administrations, and that the protection of these services, including adjacent services, should be studied;

b) that for the determination of the incumbent services, the relevant provisions of the Radio Regulations in force apply;

c) that identifications do not preclude the use of the frequency bands by any application of the services to which the frequency bands are identified and do not establish priority over any other applications of radiocommunication services;

d) that the frequency bands 296-306 GHz, 313-318 GHz and 333-356 GHz may only be used by fixed and land mobile service applications when specific conditions to ensure the protection of EESS) (passive) applications are determined in accordance with Resolution **731 (Rev.WRC-23)**;

e) that in the frequency bands 275-323 GHz, 327-371 GHz, 388-424 GHz and 426-442 GHz, where radio astronomy applications are used, specific conditions (e.g. minimum separation distances and/or avoidance angles) may be necessary to ensure protection of radio astronomy sites from land mobile and/or fixed service applications, on a case-by-case basis in accordance with Resolution **731 (Rev.WRC-23)**,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference

1 studies on the spectrum needs for the fixed, mobile, radiolocation, amateur, amateur-satellite, radio astronomy, Earth exploration-satellite (passive and active) and space research (passive) services in the frequency range 275-325 GHz;

2 studies on sharing and compatibility between services referenced in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference* 1;

3 studies on possible new allocations to services referenced in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference* 1, while ensuring the protection of passive services in the frequency range 275-325 GHz and adjacent frequency bands, taking into account the frequency bands identified in Nos. **5.564A** and **5.565**, and the results of the studies under *resolves to invites the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference* 1 and 2,

invites the 2031 world radiocommunication conference

based on the results of the studies, to consider potential new allocations in the frequency range 275-325 GHz for radiocommunication services referenced in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference* 1 and update Nos. **5.149, 5.340, 5.564A** and **5.565**, as appropriate,

encourages administrations

to participate actively in the studies and provide the information required for the studies listed under *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference* by submitting contributions to the ITU Radiocommunication Sector,

instructs the Secretary-General

to bring this Resolution to the attention of the international and regional organizations concerned.

ADD

RESOLUTION COM6/14 (WRC-23)

[Studies on the possible [frequency bands] for [non-beam and beam] wireless power transmission (WPT) to avoid harmful interference to the radiocommunication services caused by WPT][1]

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that wireless power transmission (WPT) is defined as the transmission of power from a power source to an electrical load wirelessly using an electromagnetic field, excluding transmission for radiocommunications;

b) that a wide variety of technologies and applications of WPT are evolving, planned, or have already been partly put on the market;

c) that such [beam and non-beam] WPT technologies may be useful in a variety of applications, including electric vehicles, Internet of Things (IoT) devices, and wireless charging of mobile or portable devices,

noting

a) that ITU Radiocommunication Sector (ITU-R) Study Group 1 is studying, based on Question ITU-R 210/1, the technical and operational requirements to ensure that radiocommunication services are protected from harmful interference caused by WPT operations, and what kind of applications and electric apparatus WPT are considered to be;

b) that ITU-R Recommendations on frequency ranges for WPT (Recommendations ITU-R SM.2110, ITU-R SM.2129, and ITU-R SM.2151) have been approved, and further studies on a variety of WPT applications and technologies are ongoing in ITU-R;

c) that, according to Nos. **15.12.1** and **15.13.1**, in order to provide protection to radiocommunication services called for in *recognizing c)* administrations should be guided by the latest relevant ITU-R Recommendations;

d) that ITU-R Recommendations provide guidance to administrations,

recognizing

a) that WPT is not a defined radio service in the Radio Regulations;

b) that there are no international regulations to regulate radiation from WPT;

c) that, under Nos. **15.12** and **15.13**, administrations shall take all practicable and necessary steps to ensure that the operation of electrical apparatus or installations, including those for WPT, does not cause harmful interference to a radiocommunication service and, in particular, to a radionavigation or any other safety service;

d) that some administrations regard WPT as an industrial, scientific and medical (ISM) application defined by the Radio Regulations, and that they apply their current regulations to the ISM applications and equipment;

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[1] Further discussion is needed on the scope of this agenda item.

e) that some administrations regard WPT equipment as short-range radiocommunication Devices (SRD), and that they apply their current SRD regulations, although SRD is not defined by the Radio Regulations, but it is discussed in some ITU-R Recommendations and Reports;

f) that, in order not to cause harmful interference to the radiocommunication services, some administrations classify certain applications of WPT as a radio service that is not defined in the Radio Regulations,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference

1 technical, operational and impact studies, taking into account the results of already available studies, to consider suitable frequency ranges for harmonized WPT operations;

2 consideration of spectrum matters necessary to ensure the protection of radiocommunication services and the radio astronomy service to which the frequency bands are allocated on a primary and secondary basis, as well as services in the adjacent bands, and those affected by the harmonics,

invites Member States, Sector Members, Academia, and Associates

to participate in the studies by submitting contributions to ITU-R,

invites the 2031 world radiocommunication conference

to consider, based on the results of ITU-R studies, the possible frequency bands for WPT on the basis of avoiding harmful interference to the radiocommunication services caused by WPT.

ADD

RESOLUTION COM6/15 (WRC-23)

Study of the possible use of the frequency band 12.75-13.25 GHz by aeronautical and maritime earth stations in motion communicating with non-geostationary space stations in the fixed-satellite service (Earth-to-space)

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the frequency band 12.75-13.25 GHz is currently allocated, on a primary basis, to fixed service, mobile service and fixed-satellite service (FSS) (Earth-to-space) and, on a secondary basis, to the deep-space research service (space-to-Earth) worldwide;

b) that the frequency band 12.75-13.25 GHz is used in the FSS by geostationary-satellite networks (GSO) in conformity with the provisions of Appendix **30B** (No. **5.441**) and that there are GSO satellite networks in the FSS that are operating in this frequency band;

c) that the frequency band 12.75-13.25 GHz is used in the FSS by non-geostationary-satellite (non-GSO) systems in conformity with No. **5.441**;

d) that the demand for aeronautical and maritime connectivity could be partially met by allowing aeronautical earth stations in motion (A-ESIMs) and maritime earth stations in motion (M-ESIMs) to communicate with non-GSO space stations in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space);

e) that advances in technology, including the use of antenna tracking techniques, allow A-ESIMs and M-ESIMs to operate within the characteristics of fixed earth stations in the FSS;

f) that the use of the frequency band 12.75-13.25 GHz for A-ESIMs and M-ESIMs operating with non-GSO FSS could contribute, as an additional use of the spectrum, to improving broadband communications for passengers;

g) that A-ESIMs and M-ESIMs referred to in the present Resolution are not to be used for safety-of-life applications;

h) that the frequency band 10.6-10.7 GHz is used for the Earth exploration-satellite service (EESS) (passive) in line with Recommendation ITU-R RS.1861;

i) that all emissions are prohibited in the frequency band 10.68-10.7 GHz according to No. **5.340**,

noting

a) that Resolution **156 (Rev.WRC-23)** addresses the use of earth stations in motion (ESIMs) communicating with GSO space stations in the FSS in the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz;

b) that Resolution **169 (Rev.WRC-23)** addresses the use of ESIMs communicating with GSO space stations in the FSS in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz;

c) that this conference has adopted Resolution **COM5/3 (WRC-23)** which contains the technical operational and regulatory provisions for ESIMs communicating with non-GSO space stations in the FSS in the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth), and the frequency bands 27.5-29.1 GHz and 29.5-30.0 GHz (Earth-to-space);

d) that this conference has adopted Resolution **COM5/2 (WRC-23)**, which contains the technical operational and regulatory provisions for the use of A-ESIMs and M-ESIMs communicating with GSO space stations in the FSS in the frequency band 12.75-13.25 GHz;

e) that the use of non-GSO space stations in the FSS may introduce more complicated sharing scenarios,

recognizing

a) that, in conformity with No. **5.441**, non-GSO systems shall not claim protection from GSO networks operating in conformity with the Radio Regulations and shall operate in such a way that any unacceptable interference that might occur due to their operation is immediately eliminated;

b) that, in conformity with No. **5.441**, the use of the frequency band 12.75-13.25 GHz (Earth-to-space) by a non-GSO satellite system in the FSS is subject to the application of the provisions of No. **9.12** for coordination with other non-GSO satellite systems in the FSS;

c) that Article **21** contains the power flux-density limits at the Earth's surface produced by emissions from non-GSO FSS systems in the space-to-Earth direction to protect fixed and mobile services;

d) that Article **22** contains the equivalent power flux-density limits for non-GSO FSS systems in the frequency band 12.75-13.25 GHz (Earth-to-space) that guarantee the protection of GSO networks;

e) that non-GSO FSS systems that operate in the frequency band 12.75-13.25 GHz (Earth-to-space) may also operate in the frequency band 10.7-10.95 GHz (space-to-Earth) in accordance with No. **5.441**;

f) that the potential interference impact from unwanted emissions produced by non-GSO FSS systems communicating with A-ESIMs and M-ESIMs in the frequency band 10.7-10.95 GHz (space-to-Earth) in accordance with No. **5.441**, into passive sensors of the EESS operating in the adjacent frequency band 10.6-10.7 GHz, should be studied to ensure protection of existing and future use of the frequency band by the EESS (passive);

g) that the current use and future development of existing services in the frequency band should be protected from unacceptable interference caused by operation of A-ESIMs and M-ESIMs communicating with non-GSO space stations in the frequency band;

h) that interference management mechanisms, including necessary mitigation measures, are required for the operation of non-GSO ESIMs to protect other space and terrestrial services to which the frequency band referred to in *considering a)* are allocated,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference

1 studies on the technical and operational characteristics of A-ESIMs and M-ESIMs planning to communicate with the non-GSO space stations in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space);

2 studies on sharing and compatibility between A-ESIMs and M-ESIMs communicating with non-GSO space stations in the FSS and the current and planned stations of existing services with allocations in the frequency band 12.75-13.25 GHz, ensuring that ESIMs will not call for further protection or cause more interference than existing typical earth stations;

3 the development of the technical conditions and regulatory provisions for the operation of A-ESIMs and M-ESIMs communicating with non-GSO space stations in the FSS that operate in the frequency band 12.75-13.25 GHz (Earth-to-space), taking into account the results of the studies

outlined in *resolves to invite the ITU Radiocommunication Sector* t*o complete in time for the 2031 world radiocommunication conference* 1 and 2, while ensuring the protection of incumbent services;

4 sharing and compatibility studies for communications between non-GSO space stations in the FSS and ESIMs with respect to the EESS (passive) allocated in the adjacent frequency band referred to in *recognizing f)*;

5 studies on the development of a new Recommendation for the network control and monitoring centre functionality for ESIM operation;

6 studies on the responsibility of the entities involved in the operation of the A-ESIMs and M-ESIMs addressed by this Resolution,

invites administrations

to participate actively in the studies by sending their contributions to the ITU Radiocommunication Sector,

invites the 2031 world radiocommunication conference

to consider the results of the above-mentioned studies and to adopt the necessary measures accordingly.

ADD

RESOLUTION COM6/16 (WRC-23)

Study of technical and operational issues and regulatory provisions to support inter-satellite service transmissions in the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz for non-geostationary-satellite space stations communicating with geostationary-satellite space stations

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that many non-geostationary-satellite orbit (non-GSO) satellites operate with limited and non-real-time connectivity to earth stations;

b) that inter-satellite service (ISS) communications between such non-GSO satellites and geostationary-satellite orbit (GSO) satellites would enhance the efficiency of operations and that the effective reuse of some frequency bands allocated to the fixed-satellite service (FSS) for transmissions between such space stations may increase the efficiency of use of those frequency bands;

c) that there is growing interest in utilizing ISS links for a variety of applications and that there have been expressions of interest by some administrations in using the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz for ISS transmissions between space stations in those frequency bands,

noting

a) that the use of frequency bands by the FSS in the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz is subject to existing Resolutions, coordination requirements and country footnotes, taking into account, in particular, the protection of incumbent services;

b) that the frequency band 3 700-4 200 MHz is allocated to the fixed and mobile services on a primary basis in Regions 2 and 3;

[*c)*[*] that, in Region 1, the frequency band 3 700-4 200 MHz is allocated to the fixed service on a primary basis and the frequency band 3 700-3 800 MHz is allocated to the mobile service on a primary basis;]

[*d)*[**] that, in Region 2, the frequency band 3 600-3 700 MHz is identified on a regional basis for International Mobile Telecommunications (IMT) and the frequency band 3 700-3 800 MHz is identified for IMT via No. **5.IMT**;]

e) that any future use of the ISS in the frequency band 3 700-4 200 MHz shall not claim protection from terrestrial services operating in conformity with the Radio Regulations;

[* This Region 1 allocation for fixed and mobile services is pending the WRC-23 outcome, and this *recognizing further* should be revised or removed based on the conclusion of WRC-23 agenda item 1.2/1.3.]

[**These Region 2 identifications for IMT are pending the WRC-23 outcome, and this *recognizing further* should be revised or removed based on the conclusion of WRC-23 agenda item 1.2.]

f) that the FSS and fixed and mobile services are allocated globally on a co-primary basis in the frequency band 5 925-6 425 MHz;

g) that the use of the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz by the non-GSO FSS is subject to the application of the provisions Nos. **22.5C** and **22.5D**;

h) that the frequency band 5 925-6 425 MHz may be used for the FSS (Earth-to-space) for the provision of earth stations located on board vessels, subject to Nos. **5.457A** and **5.457B**;

i) that the use of the frequency band 5 925-6 425 MHz for aeronautical mobile telemetry is subject to the application of the provisions of No. **5.457C**,

noting further

that sharing and compatibility studies were performed between ISS links intending to operate between space stations in the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz and current and planned stations of the FSS and other existing services allocated in same frequency bands and adjacent frequency bands, including passive services, with a view to ensuring protection of the primary services,

recognizing

a) that the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz are also allocated to other radiocommunication services on a primary basis, that those allocations are used by a variety of incumbent systems in many administrations and that the protection of these services should be studied;

b) that for the determination of the incumbent services, the relevant provisions of the Radio Regulations in force apply,

recognizing further

a) that any future ISS use in the frequency band 3 700-4 200 MHz shall not claim protection from terrestrial services or other FSS applications operating consistent with the Radio Regulations;

b) that sharing scenarios may vary because of the wide variety of orbital characteristics of the non-GSO FSS space stations,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference

1 studies on spectrum requirements, technical and operational characteristics, and sharing and compatibility, with incumbent [*, **, including secondary,] services, taking into account *noting a)* to *i)*, for the non-GSO space stations that operate or plan to operate ISS links with GSO FSS networks in the following frequency bands:

a) in the Earth-to-space direction in the frequency band 5 925-6 425 MHz, for transmissions from non-GSO user space stations operating at lower orbital altitudes, in communication with GSO FSS service provider space stations; and

b) in the space-to-Earth direction in the frequency band 3 700-4 200 MHz, for transmissions from GSO FSS service provider space stations, toward non-GSO user space stations;

2 to develop technical conditions and regulatory provisions to ensure protection of other services allocated in those frequency bands for the operation of ISS links taking into account the results of the studies called for in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference* 1 above,

invites administrations

to participate actively in the studies and provide the information required for the studies listed under *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference* by submitting contributions to the ITU Radiocommunication Sector (ITU-R),

invites the 2031 world radiocommunication conference

to consider, based on the results of ITU-R studies, to support ISS allocations in the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz, and associated regulatory provisions, to enable links between non-GSO and GSO satellites.

ADD

RESOLUTION COM6/17 (WRC-23)

Studies on frequency-related matters for International Mobile Telecommunications (IMT) identification in the frequency bands [102-109.5 GHz, 151.5-164 GHz, 167-174.8 GHz, 209-226 GHz and 252-275 GHz] for the future development of IMT*

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that International Mobile Telecommunications (IMT) is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;

b) that IMT systems have contributed to global economic and social development;

c) that IMT systems are now evolving to provide diverse usage scenarios and applications, such as enhanced mobile broadband, massive machine-type communications and ultra-reliable and low-latency communications;

d) that ultra-low latency and very high bit-rate applications of IMT will require larger contiguous blocks of spectrum than those available in frequency bands that are currently identified for use by administrations wishing to implement IMT;

e) that it may be suitable to examine higher frequency bands for these larger blocks of spectrum;

f) that there is a need to continually take advantage of technological developments in order to increase the efficient use of spectrum and facilitate spectrum access;

g) that the properties of higher frequency bands, such as shorter wavelength, would better enable the use of advanced antenna systems, including multiple input, multiple output (MIMO) and beam-forming techniques in supporting enhanced broadband;

h) that harmonized worldwide bands and harmonized frequency arrangements for IMT are highly desirable in order to achieve global roaming and the benefits of economies of scale;

i) that identification of frequency bands allocated to the mobile service for IMT may change the sharing situation regarding applications of services to which the frequency band is already allocated and may require additional regulatory actions,

noting

a) that IMT encompasses IMT-2000, IMT-Advanced, IMT-2020, IMT-2030 and future generations of IMT collectively;

b) that Report ITU-R M.2516 addresses future technology trends of terrestrial systems for IMT for 2030 and beyond;

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* The appearance of square brackets around certain frequency bands in this Resolution is understood to mean that WRC-27 will consider and review the inclusion of these frequency bands with square brackets and decide, as appropriate.

c) that there are ongoing studies within the ITU Radiocommunication Sector (ITU-R) on propagation characteristics for mobile systems in higher frequency bands,

recognizing

a) that there is a lead time between the allocation of frequency bands by world radiocommunication conferences and the deployment of systems in those bands, and that timely availability of wide and contiguous blocks of spectrum is therefore important to support the development of IMT;

b) that any identification of frequency bands for IMT should take into account the use of the bands by other services and the evolving needs of these services, including the space research service (passive) in frequency bands 105-109.5 GHz and 217-226 GHz;

c) that there should be no additional regulatory or technical constraints imposed on services to which the band is currently allocated on a primary basis;

d) that frequency bands adjacent to those listed in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference* 2 below are allocated to passive services and that No. **5.340** applies in many of these adjacent frequency bands,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference

1 the appropriate studies to determine the spectrum needs for the terrestrial component of IMT in the frequency bands listed in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference* 2, taking into account:

– technical and operational characteristics of terrestrial IMT systems that would operate in these frequency bands, including the evolution of IMT through advances in technology and spectrally efficient techniques;

– the deployment scenarios envisaged for IMT-2030 systems and the related requirements of high data traffic, such as in dense urban areas and/or at peak times;

– the needs of developing countries and the time-frame in which spectrum would be needed;

2 the appropriate sharing and compatibility[1] studies, taking into account the protection of services to which the band is allocated on a primary basis for the following frequency bands:

– [102-109.5 GHz, 151.5-164 GHz, 167-174.8 GHz, 209-226 GHz and 252-275 GHz],

invites administrations

to participate actively in the studies and provide the information required for the studies listed under *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference* by submitting contributions to ITU-R,

invites the 2031 world radiocommunication conference

to consider, based on the results of studies, the identification of frequency bands for the terrestrial component of IMT; the bands to be considered being limited to part or all of the bands listed in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference* 2.

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[1] Including studies with respect to services in adjacent bands, as appropriate.

ADD

RESOLUTION COM6/18 (WRC-23)

Improving the utilization and channelization of maritime radiocommunication in the MF and HF bands, including potential revisions to Article 52 and Appendix 17

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the ITU Radiocommunication Sector (ITU-R) has finalized studies to remove narrowband direct-printing (NBDP) frequencies for distress and safety communications from Article **5** and Appendices **15** and **17**;

b) that the International Maritime Organization (IMO) decided to remove NBDP for distress and safety communications from the Global Maritime Distress and Safety System (GMDSS) in MF and HF bands;

c) that ITU-R has finalized studies on the implementation of the automatic connection system (ACS) using digital selective calling (DSC) in MF and HF maritime mobile frequency bands;

d) that the implementation of the ACS will ensure simple and reliable access to the required radio links for ship stations;

e) that IMO has implemented the ACS in performance standards for shipborne MF and MF/HF radio installations for GMDSS,

recognizing

a) that Article **52** identifies frequencies and channelling arrangements in the MF band in some Regions;

b) that Appendix **17** identifies frequencies and channelling arrangements in the HF bands for the maritime mobile service (MMS);

c) that some HF bands lack channels in Appendix **17** for inter-ship operation;

d) that the implementation of the ACS may require revision of Article **52** and Appendix **17** channel plans for more working channels on an international basis,

noting

a) that this conference reviewed MF and HF bands in Article **5** and Appendices **15** and **17** to remove NBDP frequencies for distress and safety communications;

b) that this conference reviewed MF and HF bands in Article **5** and Appendix **17** to introduce the ACS;

c) that there is no global inter-ship channel in the MF band, and some HF bands lack channels for inter-ship operation in Appendix **17**,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference

studies on possible revisions to the Article **52** and Appendix **17** channel plans to identify additional working channels on an international basis to improve the use of maritime radiocommunication in the MF and HF bands,

invites the 2031 world radiocommunication conference

to consider, based on the results of studies, possible revisions to the Article **52** and Appendix **17** channel plans in the maritime mobile MF and HF bands to improve use and efficiency,

invites administrations

to participate actively in the studies described in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference* and provide the information required for the studies by submitting contributions to ITU-R,

invites relevant international organizations

to participate actively in the studies by providing requirements and information that should be taken into account in ITU-R studies,

instructs the Secretary-General

to bring this Resolution to the attention of IMO and other international and regional organizations concerned.

ADD

RESOLUTION COM6/19 (WRC-23)

Studies on possible new allocations to the radionavigation-satellite service (space-to-Earth) in the frequency bands [5 030-5 150 MHz and 5 150-5 250 MHz] or parts thereof*

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that radionavigation-satellite service (RNSS) systems and networks are intended to provide accurate information for many positioning, navigation and timing applications;

b) that, with growing user demands and technology improvement, the current RNSS allocations might not be sufficient to respond to requirements for higher positioning accuracy, network availability and robustness in the future;

c) that the frequency band 5 010-5 030 MHz is allocated worldwide to the RNSS (space-to-Earth) on a primary basis;

d) that the frequency band 5 150-5 216 MHz is allocated to the radiodetermination-satellite service (RDSS) (space-to-Earth) under the provisions described in No. **5.446**,

noting

a) that the frequency band 5 030-5 091 MHz is allocated to the aeronautical mobile (R) service (AM(R)S) (see No. **5.443C**), aeronautical mobile-satellite (R) service (AMS(R)S) (see No. **5.443D**) and aeronautical radionavigation service (ARNS) (see No. **5.444**) on a primary basis;

b) that the frequency band 5 091-5 150 MHz is allocated to the fixed-satellite service (FSS) (Earth-to-space) (see No. **5.444A**), aeronautical mobile service (see No. **5.444B**), AMS(R)S (see No. **5.443AA**) and ARNS (see No. **5.444**) on a primary basis;

c) that the frequency band 5 150-5 250 MHz is allocated to the FSS (Earth-to-space), the mobile, except aeronautical mobile, service subject to No. **5.446A** and the ARNS (see No. **5.444**) on a primary basis;

d) that the frequency band 5 250-5 350 MHz is allocated to the Earth exploration-satellite (active), mobile, except aeronautical mobile, (see Nos. **5.446A** and **5.447F**), radiolocation and space research (active) (see No. **5.447D**) services on a primary basis;

e) that the frequency bands 5 150-5 250 MHz and 5 250-5 350 MHz are used by wireless access systems, including radio local area networks, under the mobile service and their operation is subject to Resolution **229 (Rev.WRC-23)**;

f) that the AM(R)S in the frequency band 5 091-5 150 MHz is limited to surface applications at airports and operated in accordance with standards and recommended practices (SARPs) in Annex 10 to the Convention on International Civil Aviation;

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* The appearance of square brackets around certain frequency bands in this Resolution is understood to mean that WRC-27 will consider and review the inclusion of these frequency bands with square brackets and decide, as appropriate.

g) that the ARNS in the frequency band 5 030-5 091 MHz is operated in accordance with SARPs in Annex 10 to the Convention on International Civil Aviation, and that SARPs are under development for the AM(R)S and AMS(R)S in this band,

recognizing

a) that the possible addition of the RNSS (space-to-Earth) in the frequency bands [5 030-5 150 MHz and 5 150-5 250 MHz], or parts thereof, shall ensure protection of, and not impose constraints on, the development of incumbent services in the same and adjacent bands;

b) that the use of the frequency band 5 150-5 216 MHz by the RDSS is limited to feeder links in conjunction with the RDSS operating in the frequency bands 1 610-1 626.5 MHz and/or 2 483.5-2 500 MHz, and that the total power flux-density (pfd) at the Earth's surface shall in no case exceed −159 dB(W/m^2) in any 4 kHz band for all angles of arrival (see No. **5.446**);

c) that the characteristics and protection criteria for the receiving earth stations and also the transmitting space stations of RNSS in the frequency band 5 010-5 030 MHz are presented in Recommendation ITU-R M.2031;

d) that, in order not to cause harmful interference to the microwave landing system operating above 5 030 MHz, the aggregate pfd produced at the Earth's surface in the frequency band 5 030-5 150 MHz by all the space stations within any RNSS system (space-to-Earth) operating in the frequency band 5 010-5 030 MHz shall not exceed −124.5 dB(W/m^2) in a 150 kHz band (see No. **5.443B**);

e) that, in order not to cause harmful interference to the radio astronomy service (RAS) in the frequency band 4 990-5 000 MHz, RNSS systems operating in the frequency band 5 010-5 030 MHz shall comply with the limits in the frequency band 4 990-5 000 MHz defined in Resolution **741 (Rev.WRC-15)** (see No. **5.443B**);

f) that Recommendation ITU-R SM.1535 provides information on the protection of safety services from unwanted emissions,

resolves to invite the ITU Radiocommunication Sector to conduct and complete in time for the 2031 world radiocommunication conference

1 studies on spectrum requirements and technical and operational characteristics for the RNSS, in particular in the space-to-Earth direction between [5 030 and 5 250 MHz];

2 studies on sharing and compatibility between RNSS and the incumbent services allocated in the frequency range [5 030-5 250 MHz] and the adjacent-band services and studies related to the protection of the RAS in the frequency band 4 990-5 000 MHz, taking into account *recognizing a)*,

invites the 2031 world radiocommunication conference

to consider, based on the results of studies, possible allocations to the RNSS (space-to-Earth) in the frequency bands [5 030-5 150 MHz and 5 150-5 250 MHz] or parts thereof,

invites administrations

to participate actively in ITU Radiocommunication Sector (ITU-R) studies and provide the technical and operational characteristics of the systems involved by submitting contributions to ITU-R,

instructs the Secretary-General

to bring this Resolution to the attention of the international and regional organizations concerned.

ADD

RESOLUTION COM6/20 (WRC-23)

Studies towards frequency allocations for the Earth exploration-satellite service (space-to-Earth) within the frequency range [37.5-52.4 GHz]*

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the frequency band 40-40.5 GHz is allocated worldwide to the Earth exploration-satellite service (EESS) (Earth-to-space) on a primary basis;

b) that a frequency allocation to the EESS (space-to-Earth) above 37.5 GHz would allow its use for payload data transmissions in combination with the existing EESS (Earth-to-space) allocation referred to in *considering a)*;

c) that a frequency allocation to the EESS (space-to-Earth) above 37.5 GHz would allow for uplinks and downlinks on the same transponder, increasing efficiency and reducing satellite complexity,

noting

a) that the frequency band 37.5-40.5 GHz is allocated worldwide to the EESS (space-to-Earth) on a secondary basis;

b) that the frequency band 37.5-40.5 GHz is allocated to a number of services on a primary basis,

recognizing

a) the importance of the appropriate regulatory status and certainty to accommodate the requirements of future Earth observation missions;

b) that, in order to meet those requirements, primary allocation to the EESS (space-to-Earth) in certain frequency bands above 37.5 GHz might be required,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference

1 the review of the existing allocation to the EESS (space-to-Earth) in the frequency band [37.5-40.5 GHz], and sharing and compatibility studies as necessary, in order to determine the feasibility of upgrading this frequency allocation to primary status while ensuring the protection of the primary services;

2 the identification of frequency bands within the frequency range [40.5-52.4 GHz], and sharing and compatibility studies as necessary, in order to determine the feasibility of creating new primary allocations to the EESS (space-to-Earth) in these bands, while ensuring the protection of the primary services,

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* The appearance of square brackets around certain frequency bands in this Resolution is understood to mean that WRC-27 will consider and review the inclusion of these frequency bands with square brackets and decide, as appropriate.

invites administrations

to participate actively in the studies by submitting contributions to the ITU Radiocommunication Sector,

invites the 2031 world radiocommunication conference

to consider, based on the results of studies, an upgrade of the secondary allocation to the EESS (space-to-Earth) in the frequency band [37.5-40.5 GHz] or possible new worldwide allocations on a primary basis to the EESS (space-to-Earth) in certain frequency bands within the frequency range [40.5-52.4 GHz],

instructs the Secretary-General

to bring this Resolution to the attention of international and regional organizations concerned.

ADD

RESOLUTION COM6/21 (WRC-23)

Possible secondary allocation to the Earth exploration-satellite service (active) in the frequency bands [3 000-3 100 MHz] and [3 300-3 400 MHz]*

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that spaceborne active radio-frequency sensors can provide unique information on the physical properties of the Earth;

b) that spaceborne active remote sensing requires specific frequency ranges, depending on the physical phenomena to be observed;

c) that there is an interest in using active spaceborne sensors in the 3 GHz frequency range primarily for measurement of ice boundaries, type and age, ocean wave structure, ocean wind speed and direction and mapping of ocean circulation (currents and eddies);

d) that the frequency band 3 100-3 300 MHz is already allocated to the Earth exploration-satellite service (EESS) (active) on a secondary basis and is currently being used for altimeters and synthetic aperture radars (SARs);

e) that a frequency band of at least 400 MHz is preferable to satisfy the requirements for high-resolution SARs;

f) that SARs in the 3 GHz frequency range are not intended to be operated in populated areas of the globe, but primarily over oceans and seas,

recognizing

a) that the frequency band 3 000-3 100 MHz is allocated to the radiolocation service (RLS) and radionavigation service on a primary basis;

b) that the frequency band 3 300-3 400 MHz is allocated to the RLS on a primary basis;

c) that the frequency band 3 300-3 400 MHz is also allocated to the amateur service on a secondary basis in Regions 2 and 3;

d) that the frequency band 3 300-3 400 MHz is also allocated to the fixed and mobile services on a secondary basis in Region 2;

e) that the frequency band 3 300-3 400 MHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis in certain countries under Nos. **5.429A**, **5.429C** and **5.429E**;

f) that the frequency band 3 300-3 400 MHz is identified for the implementation of International Mobile Telecommunications in certain countries in Regions 1 and 2 under Nos. **5.429B** and **5.429D**;

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* The appearance of square brackets around certain frequency bands in this Resolution is understood to mean that WRC-27 will consider and review the inclusion of these frequency bands with square brackets and decide, as appropriate.

g) that, in accordance with No. **5.149**, administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference in the frequency bands 3 332-3 339 MHz and 3 345.8-3 352.5 MHz,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference

studies on spectrum needs and studies on the possibility of sharing between the EESS (active) and incumbent radio services in the frequency bands [3 000-3 100 MHz] and [3 300-3 400 MHz],

invites the 2031 world radiocommunication conference

to consider the results of studies for a possible new secondary allocation to the EESS (active) for spaceborne SARs in the frequency bands [3 000-3 100 MHz] and [3 300-3 400 MHz], taking into account the protection of incumbent services, and take appropriate action,

invites administrations

to participate actively in the studies by submitting contributions to the ITU Radiocommunication Sector.

ADD

RESOLUTION COM6/22 (WRC-23)

Studies on the coexistence between spaceborne synthetic aperture radars operating in the Earth exploration-satellite service (active) and radiodetermination service in the frequency band [9 200-10 400 MHz]*

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the Earth exploration-satellite service (EESS) (active) is used for various active spaceborne sensor applications, among which synthetic aperture radar (SAR) is the most widely used application;

b) that, following the decisions of WRC-07 and WRC-15, the allocation of the EESS (active) was extended from the frequency band 9 500-9 800 MHz to 9 200-10 400 MHz, which is shared with the radiodetermination service, including radiolocation and radionavigation services;

c) that ITU Radiocommunication Sector (ITU-R) studies had concluded that the percentage of time of exceedance of the protection criteria of the radiodetermination service due to SAR emissions of space stations would be low and even lower when taking the processing gain of radar systems into account;

d) that, since 2015, the number of advance publication information and coordination requests for SAR application satellite networks/systems in the frequency band 9 200-10 400 MHz has increased;

e) that the growing usage of spaceborne SAR transmitters, as described in *considering d),* may increase the probability of interference between radiodetermination radars and SAR satellites,

noting

a) that No. **5.474A** stipulates that the use of the frequency bands 9 200-9 300 MHz and 9 900-10 400 MHz by the EESS (active) is subject to agreement to be obtained under No. **9.21** from a number of administrations;

b) that No. **21.16** provides the power flux-density limit at the Earth's surface produced by emissions from the EESS (active) in the frequency band 9 900-10 400 MHz with respect to the protection of the fixed service;

c) that Recommendations ITU-R M.1796 and ITU-R M.1849 contain the technical characteristics and protection criteria for radars operating in the radiodetermination service in the frequency range 8 500-10 680 MHz;

d) that Report ITU-R RS.2313 contains sharing analyses of wideband EESS (active) transmissions with stations in the radio determination service operating in the frequency bands 8 700-9 300 MHz and 9 900-10 500 MHz,

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* The appearance of square brackets around certain frequency bands in this Resolution is understood to mean that WRC-27 will consider and review the inclusion of these frequency bands with square brackets and decide, as appropriate.

recognizing

a) the importance of the continuing operation of SAR satellites and the need for protection for the radiodetermination systems operating in the frequency band 9 200-10 400 MHz;

b) that No. **5.476A** states that in the band 9 300-9 800 MHz, stations in the Earth exploration-satellite service (active) and space research service (active) shall not cause harmful interference to, nor claim protection from, stations of the radionavigation and radiolocation services;

c) that No. **5.474D** states that stations in the Earth exploration-satellite service (active) shall not cause harmful interference to, or claim protection from, stations of the maritime radionavigation and radiolocation services in the frequency band 9 200-9 300 MHz, the radionavigation and radiolocation services in the frequency band 9 900-10 000 MHz and the radiolocation service in the frequency band 10.0-10.4 GHz;

d) that the aeronautical radionavigation service (ARNS) operating in the frequency band 9 000-9 200 MHz and the maritime radionavigation service operating in the frequency band 9 200-9 500 MHz are used by safety service systems, in accordance with Nos. **1.59** and **4.10**;

e) that Recommendation ITU-R M.1796 contains the technical characteristics and protection criteria for radars operating in the radiodetermination service in the frequency range 8 500-10 680 MHz,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2031 world radiocommunication conference

1 studies on the technical and operational characteristics of SARs in the EESS (active) in the frequency band 9 200-10 400 MHz;

2 studies on the coexistence between SARs operating in the EESS (active) and the radiodetermination service in the frequency band 9 200-10 400 MHz,

invites administrations

to participate actively in the studies and provide the information required for the studies listed in *resolves to invite ITU-R to complete in time for the 2031 world radiocommunication conference* by submitting contributions to ITU-R,

resolves to invite the 2031 world radiocommunication conference

to consider the results of the above ITU-R studies and take actions, as appropriate.

ADD

RESOLUTION COM6/23 (WRC-23)

Agenda for the 2027 world radiocommunication conference

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for a world radiocommunication conference (WRC) should be established four to six years in advance and that a final agenda shall be established by the ITU Council two years before the conference;

b) Article 13 of the ITU Constitution, relating to the competence and scheduling of WRCs, and Article 7 of the Convention, relating to their agendas;

c) the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and WRCs,

recognizing

a) that this conference has identified a number of urgent issues requiring further examination by WRC-27;

b) that in preparing this agenda, some items proposed by administrations could not be included and have had to be deferred to future conference agendas,

resolves

to recommend to the Council that a WRC be held in 2027 for a period of four weeks, with the following agenda:

1 on the basis of proposals from administrations, taking account of the results of WRC-23 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the frequency bands under consideration, to consider and take appropriate action in respect of the following items:

1.1 to consider the technical and operational conditions for the use of the frequency bands 47.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space), or parts thereof, by aeronautical and maritime earth stations in motion communicating with space stations in the fixed-satellite service and develop regulatory measures, as appropriate, to facilitate the use of the frequency bands 47.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space), or parts thereof, by aeronautical and maritime earth stations in motion communicating with geostationary space stations and non-geostationary space stations in the fixed-satellite service, in accordance with Resolution **176 (Rev.WRC-23)**;

1.2 to consider possible revisions of sharing conditions in the frequency band 13.75-14 GHz to allow the use of uplink fixed-satellite service earth stations with smaller antenna sizes, in accordance with Resolution **COM6/1 (WRC-23)**;

1.3 to consider studies relating to the use of the frequency band 51.4-52.4 GHz to enable use by gateway earth stations transmitting to non-geostationary-satellite orbit systems in the fixed-satellite service (Earth-to-space), in accordance with Resolution **COM6/3 (WRC-23)**;

1.4 to consider a possible new primary allocation to the fixed-satellite service (space-to-Earth) in the frequency band 17.3-17.7 GHz and a possible new primary allocation to the broadcasting-satellite service (space-to-Earth) in the frequency band 17.3-17.8 GHz in Region 3,

while ensuring the protection of existing primary allocations in the same and adjacent frequency bands, and to consider equivalent power flux-density limits to be applied in Regions 1 and 3 to non-geostationary-satellite systems in the fixed-satellite service (space-to-Earth) in the frequency band 17.3-17.7 GHz, in accordance with Resolution **COM6/24 (WRC-23)**;

1.5 to consider regulatory measures, and implementability thereof, to limit the unauthorized operations of non-geostationary-satellite orbit earth stations in the fixed-satellite and mobile-satellite services and associated issues related to the service area of non-geostationary-satellite orbit satellite systems in the fixed-satellite and mobile-satellite services, in accordance with Resolution **COM6/6 (WRC-23)**;

1.6 to consider technical and regulatory measures for fixed-satellite service satellite networks/systems in the frequency bands 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) for equitable access to these frequency bands, in accordance with Resolution **COM6/7 (WRC-23)**;

1.7 to consider studies on sharing and compatibility and develop technical conditions for the use of International Mobile Telecommunications (IMT) in the frequency bands 4 400-4 800 MHz, 7 125-8 400 MHz (or parts thereof), and 14.8-15.35 GHz taking into account existing primary services operating in these, and adjacent, frequency bands, in accordance with Resolution **COM6/26 (WRC-23)**;

1.8 to consider possible additional spectrum allocations to the radiolocation service on a primary basis in the frequency range 231.5-275 GHz and possible new identifications for radiolocation service applications in the frequency bands within the frequency range 275-700 GHz for millimetric and sub-millimetric wave imaging systems, in accordance with Resolution **663 (Rev.WRC-23)**;

1.9 to consider appropriate regulatory actions to update Appendix **26** to the Radio Regulations in support of aeronautical mobile (OR) high frequency modernization, in accordance with Resolution **COM6/2** (**WRC-23**);

1.10 to consider developing power flux-density and equivalent isotropically radiated power limits for inclusion in Article **21** of the Radio Regulations for the fixed-satellite, mobile-satellite and broadcasting-satellite services to protect the fixed and mobile services in the frequency bands 71-76 GHz and 81-86 GHz, in accordance with Resolution **775 (Rev.WRC-23)**;

1.11 to consider the technical and operational issues, and regulatory provisions, for space-to-space links among non-geostationary and geostationary satellites in the frequency bands 1 518-1 544 MHz, 1 545-1 559 MHz, 1 610-1 645.5 MHz, 1 646.5-1 660 MHz, 1 670-1 675 MHz and 2 483.5-2 500 MHz allocated to the mobile-satellite service, in accordance with Resolution **249 (Rev.WRC-23)**;

1.12 to consider, based on the results of studies, possible allocations to the mobile-satellite service and possible regulatory actions in the frequency bands 1 427-1 432 MHz (space-to-Earth), 1 645.5-1 646.5 MHz (space-to-Earth) (Earth-to-space), 1 880-1 920 MHz (space-to-Earth) (Earth-to-space) and 2 010-2 025 MHz (space-to-Earth) (Earth-to-space) required for the future development of low-data-rate non-geostationary mobile-satellite systems, in accordance with Resolution **COM6/8 (WRC-23)**;

1.13 to consider studies on possible new allocations to the mobile-satellite service for direct connectivity between space stations and International Mobile Telecommunications (IMT) user equipment to complement terrestrial IMT network coverage, in accordance with Resolution **COM6/9 (WRC-23)**;

1.14 to consider possible additional allocations to the mobile-satellite service, in accordance with Resolution **COM6/10 (WRC-23)**;

1.15 to consider studies on frequency-related matters, including possible new or modified space research service (space-to-space) allocations, for future development of communications on the lunar surface and between lunar orbit and the lunar surface, in accordance with Resolution **COM6/4 (WRC-23)**;

1.16 to consider studies on the technical and regulatory provisions necessary to protect radio astronomy operating in specific Radio Quiet Zones and, in frequency bands allocated to the radio astronomy service on a primary basis globally, from aggregate radio-frequency interference caused by non-geostationary-satellite orbit systems, in accordance with Resolution **COM6/11 (WRC-23)**;

1.17 to consider regulatory provisions for receive-only space weather sensors and their protection in the Radio Regulations, taking into account the results of ITU Radiocommunication Sector studies, in accordance with Resolution **COM6/12 (WRC-23)**;

1.18 to consider, based on the results of ITU Radiocommunication Sector studies, possible regulatory measures regarding the protection of the Earth exploration-satellite service (passive) and the radio astronomy service in certain frequency bands above 76 GHz from unwanted emissions of active services, in accordance with Resolution **COM6/5 (WRC-23)**;

1.19 to consider possible primary allocations in all Regions to the Earth exploration-satellite service (passive) in the frequency bands 4 200-4 400 MHz and 8 400-8 500 MHz, in accordance with Resolution **COM4/8 (WRC-23),**

2 to examine the revised ITU Radiocommunication Sector Recommendations incorporated by reference in the Radio Regulations communicated by the Radiocommunication Assembly, in accordance with the *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 the *resolves* of that Resolution;

3 to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the conference;

4 in accordance with Resolution **95 (Rev.WRC-19)**, to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation;

5 to review, and take appropriate action on, the Report from the Radiocommunication Assembly submitted in accordance with Nos. 135 and 136 of the ITU Convention;

6 to identify those items requiring urgent action by the radiocommunication study groups in preparation for the next world radiocommunication conference;

7 to consider possible changes, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, on advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution **86 (Rev.WRC-07)**, in order to facilitate the rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit;

8 to consider and take appropriate action on requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, taking into account Resolution **26 (Rev.WRC-23)**;

9 to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the ITU Convention:

9.1 on the activities of the ITU Radiocommunication Sector since WRC-23[1];

9.2 on any difficulties or inconsistencies encountered in the application of the Radio Regulations[2]; and

9.3 on action in response to Resolution **80 (Rev.WRC-07)**;

10 to recommend to the ITU Council items for inclusion in the agenda for the next world radiocommunication conference, and items for the preliminary agenda of future conferences, in accordance with Article 7 of the ITU Convention and Resolution **804 (Rev.WRC-23)**,

further resolves

to activate the Conference Preparatory Meeting (CPM),

invites the ITU Council

to finalize the agenda and arrange for the convening of WRC-27, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau

1 to make the necessary arrangements to convene meetings of the CPM and to prepare a report to WRC-27;

2 to submit a draft report on any difficulties or inconsistencies encountered in the application of the Radio Regulations referred in agenda item 9.2 to the second session of the CPM and to submit the final report at least five months before the next WRC,

instructs the Secretary-General

to communicate this Resolution to international and regional organizations concerned.

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[1] This WRC's standing agenda sub-item is strictly limited to the Report of the Director on ITU-R activities since the last WRC; and any topics outside 1.1-1.19 as listed above shall be strictly avoided, particularly those topics which require any changes/amendments to the Radio Regulations.

[2] This WRC's standing agenda sub-item is strictly limited to the Report of the Director on any difficulties or inconsistencies encountered in the application of the Radio Regulations and the comments from administrations. Administrations are invited to inform the Director of the Radiocommunication Bureau of any difficulties or inconsistencies encountered in the Radio Regulations.

ADD

RESOLUTION COM6/24 (WRC-23)

Possible new primary allocation to the fixed-satellite service (space-to-Earth) in the frequency band 17.3-17.7 GHz and possible new primary allocation to the broadcasting-satellite service (space-to-Earth) in the frequency band 17.3-17.8 GHz in Region 3, and consideration of equivalent power flux-density limits to be applied in Regions 1 and 3 to non-geostationary-satellite systems in the fixed-satellite service (space-to-Earth) in the frequency band 17.3-17.7 GHz

The World Radiocommunication Conference (Dubai, 2023),

considering

a) the need to encourage the development and implementation of new technologies in the fixed-satellite service (FSS) for broadband applications and in the broadcasting-satellite service (BSS) for ultra-high-definition television (UHDTV) applications;

b) that FSS systems based on the use of new technologies associated with geostationary-satellite orbit (GSO) and non-geostationary-satellite orbit (non-GSO) systems are capable of providing high-capacity and low-cost means of broadband communication even to the most isolated regions of the world, and BSS systems are capable of providing high-quality and low-cost means of wideband broadcasting;

c) that, due to the orbital characteristics of non-GSO satellite systems, the constellations are capable of providing services globally, and there is therefore a need for harmonized Radio Regulations;

d) that the Radio Regulations should enable the introduction of new applications of radiocommunication technology to ensure the operation of as many systems as possible in order to ensure efficient use of the spectrum;

e) that there is a mismatch in usable downlink bandwidth in the FSS in Region 3 in the frequency range 17-20 GHz associated with the uplink frequency range of 27-30 GHz;

f) that, in Region 3, the frequency band 17.3-18.1 GHz is allocated on a primary basis to the FSS (Earth-to-space), subject to the application of No. **5.516**;

g) that there are no relevant provisions applying to the non-GSO FSS in the frequency band 17.7-17.8 GHz;

h) that, under the present Resolution, the equivalent power flux-density (epfd) limits in *noting e)* are to be considered as a reference, without the intent of a modification at WRC-27 for Region 2;

noting

a) that technology has been developed to provide more efficient use of the spectrum and to enable both bidirectional and same-directional sharing;

b) that bidirectional sharing between the FSS (Earth-to-space) and the FSS (space-to-Earth) is already considered in Regions 1 and 2 for the frequency band 17.3-17.7 GHz;

c) that extending the FSS (space-to-Earth) allocation in the frequency band 17.3-17.7 GHz and the BSS (space-to-Earth) allocation in the frequency band 17.3-17.8 GHz to Region 3 will contribute to global harmonization;

d) that there are other primary services, including the fixed and mobile services, in the band 17.7-17.8 GHz in Region 3;

e) that Article **22** (Tables **22-1B**, **22-3** and **22-4B**) contains epfd limits to ensure the protection of GSO satellite networks from non-GSO FSS satellite systems in the frequency band 17.3-17.7 GHz in Region 2,

resolves

that the studies referred to in *invites the ITU Radiocommunication Sector to conduct and complete in time for the 2027 world radiocommunication conference* below shall protect radiocommunication services to which the frequency band is allocated on a primary basis, including the fixed and mobile services, in particular assignments to the BSS feeder links contained in Appendix **30A**,

invites the ITU Radiocommunication Sector to conduct and complete in time for the 2027 world radiocommunication conference

1 studies on sharing and compatibility between the FSS (space-to-Earth), the BSS (space-to-Earth) and the FSS (Earth-to-space) designated by No. **5.516** in order to consider a possible new primary allocation to the FSS (space-to-Earth) in the frequency band 17.3-17.7 GHz for Region 3 and to the BSS (space-to-Earth) in the frequency band 17.3-17.8 GHz for Region 3, while ensuring the protection of existing primary allocations in the same and adjacent frequency bands, and without adversely affecting the existing allocations to the FSS (Earth-to-space) designated by No. **5.516**, including assignments to the BSS feeder links contained in Appendix **30A**;

2 consideration of the applicability of Region 2 non-GSO FSS epfd limits (see *noting e)*) pertaining to the frequency band 17.3-17.7 GHz to Regions 1 and 3, so as to ensure the protection of GSO networks,

invites the 2027 world radiocommunication conference

to consider the results of the above ITU Radiocommunication Sector (ITU-R) studies and take necessary actions, as appropriate, with respect to the following issues:

1) a possible new primary allocation to the FSS (space-to-Earth) in the frequency band 17.3-17.7 GHz for Region 3;

2) a possible new primary allocation to the BSS (space-to-Earth) in the frequency band 17.3-17.8 GHz for Region 3;

3) ensuring the protection of existing primary allocations in the same and adjacent frequency bands, without adversely affecting the existing allocations to the fixed and mobile services in the frequency band 17.7-17.8 GHz and to the FSS (Earth-to-space) as designated by No. **5.516**, including assignments to the BSS feeder links contained in Appendix **30A**;

4) the application of Region 2 epfd limits to non-GSO FSS systems (as given in *noting e)*) operating in the frequency band 17.3-17.7 GHz in Regions 1 and 3,

invites administrations

to participate actively in the studies described in *resolves to invite the ITU Radiocommunication Sector to conduct and complete in time for the 2027 world radiocommunication conference* and provide the technical and operational characteristics of the systems involved by submitting contributions to ITU-R.

ADD

RESOLUTION COM6/25 (WRC-23)

Preliminary agenda for the 2031 world radiocommunication conference*

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for WRC-31 should be established four to six years in advance;

b) Article 13 of the ITU Constitution, relating to the competence and scheduling of world radiocommunication conferences (WRCs), and Article 7 of the Convention, relating to their agendas;

c) the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and WRCs,

resolves to give the view

that the following items should be included in the preliminary agenda for WRC-31:

1 to take appropriate action in respect of those urgent issues that were specifically requested by WRC-27;

2 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, and taking account of the results of WRC-27, to consider and take appropriate action in respect of the following items:

2.1 to consider potential new allocations to the fixed, mobile, radiolocation, amateur, amateur-satellite, radio astronomy, Earth exploration-satellite (passive and active) and space research (passive) services in the frequency range 275-325 GHz in the Table of Frequency Allocations of the Radio Regulations, with the consequential update of Nos. **5.149**, **5.340**, **5.564A** and **5.565**, in accordance with Resolution **COM6/13 (WRC-23)**;

2.2 [to consider the possible [frequency bands] for [non-beam and beam] wireless power transmission to avoid harmful interference to the radiocommunication services caused by wireless power transmission, in accordance with Resolution **COM6/14 (WRC-23)**];

2.3 to consider the use of aeronautical and maritime earth stations in motion communicating with non-geostationary space stations in the fixed-satellite service (Earth-to-space) in the frequency band 12.75-13.25 GHz, in accordance with Resolution **COM6/15 (WRC-23)**;

2.4 to consider, based on the results of ITU Radiocommunication Sector studies, support for inter-satellite service allocations in the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz, and associated regulatory provisions, to enable links between non-geostationary orbit satellites and geostationary orbit satellites, in accordance with Resolution **COM6/16 (WRC-23)**;

2.5 to consider a possible primary allocation in the frequency bands [694-960 MHz, or parts thereof, in Region 1], 890-942 MHz, or parts thereof, in Region 2, and [3 400-3 700 MHz, or parts thereof, in Region 3] to the aeronautical mobile service for the use of International Mobile

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* For further consideration at WRC-27, given the divergent views regarding the frequency bands to be studied and the means to ensure the full protection of all incumbent services concerned.

Telecommunications (IMT) user equipment in terrestrial IMT networks by non-safety applications, in accordance with Resolution **251 (Rev.WRC-23)**;

2.6 to consider the identification of the frequency bands [102-109.5 GHz, 151.5-164 GHz, 167-174.8 GHz, 209-226 GHz and 252-275 GHz] for International Mobile Telecommunications, in accordance with Resolution **COM6/17 (WRC-23)**;

2.7 to consider improving the utilization of VHF maritime radiocommunication, in accordance with Resolution **363 (Rev.WRC-23)**;

2.8 to consider improving the utilization and channelization of maritime radiocommunication in the MF and HF bands, including potential revisions of Article **52** and Appendix **17**, in accordance with Resolution **COM6/18 (WRC-23)**;

2.9 to consider possible allocations to the radionavigation-satellite service (space-to-Earth) in the frequency bands [5 030-5 150 MHz and 5 150-5 250 MHz] or parts thereof, in accordance with Resolution **COM6/19 (WRC-23)**;

2.10 to consider a possible new primary allocation to the Earth exploration-satellite service (Earth-to-space) in the frequency band 22.55-23.15 GHz, in accordance with Resolution **664 (Rev.WRC-23);**

2.11 to consider an upgrade of the secondary allocation to the Earth exploration-satellite service (space-to-Earth) in the frequency band [37.5-40.5 GHz] or possible new worldwide frequency allocations on a primary basis to the Earth exploration-satellite service (space-to-Earth) in certain frequency bands within the frequency range [40.5-52.4 GHz], in accordance with Resolution **COM6/20 (WRC-23)**;

2.12 to consider possible new allocations to the Earth exploration-satellite service (active) in the frequency bands [3 000-3 100 MHz] and [3 300-3 400 MHz] on a secondary basis, in accordance with Resolution **COM6/21 (WRC-23)**;

2.13 to consider studies on coexistence between spaceborne synthetic aperture radars operating in the Earth exploration-satellite service (active) and the radiodetermination service in the frequency band 9 200-10 400 MHz, with possible actions as appropriate, in accordance with Resolution **COM6/22 (WRC-23)**;

2.14 to review spectrum use and needs of applications of broadcasting and mobile services and consider possible regulatory actions in the frequency band 470-694 MHz or parts thereof, in accordance with Resolution **235 (Rev.WRC-23)**;

3 to examine the revised ITU Radiocommunication Sector 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;

4 to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the conference;

5 in accordance with Resolution **95 (Rev.WRC-19)**, to review the Resolutions and Recommendations of previous conferences with a view to their possible revision, replacement or abrogation;

6 to review, and take appropriate action on, the Report from the Radiocommunication Assembly submitted in accordance with Nos. 135 and 136 of the ITU Convention;

7 to identify those items requiring urgent action by the Radiocommunication Study Groups;

8 to consider possible changes, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, on advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution **86 (Rev.WRC-07)**, in order to facilitate the rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit;

9 to consider and take appropriate action on requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, taking into account Resolution **26 (Rev.WRC-23)**;

10 to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the ITU Convention:

10.1 on the activities of the Radiocommunication Sector since WRC-27[1];

10.2 on any difficulties or inconsistencies encountered in the application of the Radio Regulations[2]; and

10.3 on action in response to Resolution **80 (Rev.WRC-07)**;

11 to recommend to the ITU Council items for inclusion in the agenda for the next world radiocommunication conference, and items for the preliminary agenda of future conferences, in accordance with Article 7 of the ITU Convention and Resolution **804 (Rev.WRC-23)**,

invites the ITU Council

to finalize the agenda and arrange for the convening of WRC-31, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau

1 to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting (CPM) and to prepare a report to WRC-31;

2 to submit a draft Report on any difficulties or inconsistencies encountered in the application of the Radio Regulations, as referred to in agenda item 10.2, to the second session of the CPM and to submit the final Report at least five months before the next WRC,

instructs the Secretary-General

to communicate this Resolution to international and regional organizations concerned.

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[1] This WRC's standing sub-item is strictly limited to the Report of the Director on ITU-R activities since the last WRC; and any topics outside 2.1-2.14 as listed above shall be strictly avoided, particularly those topics which require any changes/amendments to the Radio Regulations.

[2] This agenda sub-item is strictly limited to the Report of the Director on any difficulties or inconsistencies encountered in the application of the Radio Regulations and the comments from administrations. Administrations are invited to inform the Director of the Radiocommunication Bureau of any difficulties or inconsistencies encountered in the Radio Regulations.

ADD

RESOLUTION COM6/26 (WRC-23)

Sharing and compatibility studies and development of technical conditions for the use of International Mobile Telecommunications (IMT) in the frequency bands 4 400-4 800 MHz, 7 125-8 400 MHz (or parts thereof), and 14.8-15.35 GHz for the terrestrial component of IMT

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that International Mobile Telecommunications (IMT) is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;

b) that the continuous development of IMT and other mobile broadband systems contribute to global economic and social development by providing diverse usage scenarios and a wide range of applications;

c) that ultra-low latency and very high bit-rate applications of IMT will require contiguous blocks of spectrum for use by administrations wishing to implement IMT;

d) that there continues to be an increase in the data-traffic demand for mobile communications beyond 2030 to satisfy numerous connections and user experience, especially in areas of high user density;

e) that the ITU Radiocommunication Sector (ITU-R) is working on the development of IMT-2030 and beyond;

f) that the appropriate choices of contiguous frequency bands to provide coverage, capacity and performance are necessary and are important to the cost-effective implementation of future systems, taking into account the radio-wave propagation characteristics and implementation complexity and cost factors;

g) that harmonized worldwide/regional frequency bands and frequency arrangements for IMT are highly desirable in order to achieve global roaming and the benefits of economies of scale;

h) that the implementation of IMT may differ among administrations in different frequency bands identified for IMT;

i) the need to protect existing services and to allow for their continued development when considering frequency bands for possible additional allocations to any service;

j) that continuation of studies regarding additional spectrum identification for IMT is needed in order to provide proper conditions for use of IMT, which provides sharing and compatibility with other incumbent applications, and then to give flexibility for administrations to select the frequency bands among those bands identified for IMT;

noting

a) that relevant information relating to terrestrial IMT technology and previous sharing studies are contained in Recommendations ITU-R M.2083, ITU-R M.2150, ITU-R M.2160, ITU-R M.2101 and ITU-R M.2116 and Reports ITU-R M.2410, ITU-R M.2320, ITU-R M.2516, ITU-R M.2370 and ITU-R M.2376;

b) that Resolution ITU-R 65 addresses the principles for the process of development of IMT-2020 and IMT-2030;

c) that IMT encompasses IMT-2000, IMT-Advanced, IMT-2020 and IMT-2030 collectively, as described in Resolution ITU-R 56;

d) that Question ITU-R 77/5 considers the needs of developing countries in the development and implementation of IMT;

e) that Question ITU-R 229/5 seeks to address the further development of IMT;

f) that Question ITU-R 262/5 addresses the study of usage of IMT systems for specific applications;

g) that relevant ITU-R Recommendations provide information on propagation models that may be relevant to the studies,

recognizing

a) that there is a lead time between the allocation of frequency bands by WRCs and the deployment of systems in those bands, and that timely availability of wide and contiguous blocks of spectrum is therefore important to support the development of IMT;

b) that, in order to ensure the future development of IMT, it is important to ensure the timely identification of additional spectrum;

c) that any identification of frequency bands for IMT should take into account the use of the frequency band(s) and adjacent frequency bands by other services and the evolving needs of these services;

d) that administrations may have different spectrum requirements for IMT depending on national conditions and particular circumstances;

e) that the frequency bands 4 400-4 800 MHz, 7 125-8 400 MHz (or parts thereof), and 14.8-15.35 GHz are also allocated to the radiocommunication services on a primary basis and that those allocations are used by a variety of incumbent systems in many administrations;

f) that No. **5.6B12** identifies the frequency band 6 425-7 025 MHz for IMT for certain countries of Region 3, and that some other countries in Region 3 could propose adding their names to this footnote in accordance with Resolution **26 (Rev.WRC-23)**,

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

1 the appropriate studies of technical, operational and regulatory issues pertaining to the possible use of the terrestrial component of IMT in the frequency bands listed in *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* 2, taking into account:

– evolving needs to meet emerging demand for IMT;

– technical and operational characteristics of terrestrial IMT systems that would operate in these specific frequency bands, including the evolution of IMT through advances in technology and spectrally efficient techniques;

– the deployment scenarios envisaged for IMT systems and the related requirements of balanced coverage and capacity;

– the needs of developing countries; and

– the time-frame in which spectrum would be needed;

2 sharing and compatibility studies, with a view to ensuring the protection of services to which the frequency band is allocated on a primary basis, including protection of stations operating in international waters or airspace which cannot be registered in the MIFR, without imposing additional regulatory or technical constraints on those services, and also on services in adjacent bands, for the frequency bands:

– 4 400-4 800 MHz;

– 7 125-8 400 MHz; and

– 14.8-15.35 GHz,

invites administrations

to participate actively in the studies and provide the information required for the studies listed under *resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* by submitting contributions to ITU-R,

invites the 2027 world radiocommunication conference

to consider, based on results of studies, the identification of frequency band(s):

– 4 400-4 800 MHz, or parts thereof, in Region 1 and Region 3;

– 7 125-8 400 MHz, or part thereof, in Region 2 and Region 3;

– 7 125-7 250 MHz and 7 750-8 400, or part thereof, in Region 1;

– 14.8-15.35 GHz,

for the terrestrial component of IMT.

Agenda item 4

MOD

RECOMMENDATION 34 (REV.WRC-23)

Principles for the allocation of frequency bands

The World Radiocommunication Conference (Dubai,2023),

considering

a) that the Radio Regulations contain an international Table of Frequency Allocations covering the radio-frequency spectrum;

b) that it may be desirable, in certain cases, to allocate frequency bands to the most broadly defined services of Article **1** in order to improve flexibility of use but without detriment to other services;

c) that the development of common worldwide allocations is desirable in order to improve and harmonize utilization of the radio-frequency spectrum;

d) that adherence to these principles for the allocation of spectrum will allow the Table of Frequency Allocations to focus on matters of regulatory significance while enabling greater flexibility in national spectrum use;

e) that technological developments occur at a rapid pace and administrations desire to take advantage of such developments to increase spectrum efficiency and facilitate spectrum access;

f) that the needs of developing countries need to be taken into account;

g) that Recommendation ITU-R SM.1133 provides a guide to the use of broadly-defined services;

h) that radiocommunications play a significant role in achieving national, as well as regional and global priorities, including those found in relevant ITU Plenipotentiary Conference and WRC Resolutions,

recognizing

that Resolution **26 (Rev.WRC-19)** provides guidelines for the use of footnotes, including additions, modifications or deletions,

recommends that future world radiocommunication conferences

1 should, wherever possible, allocate frequency bands to the most broadly defined services with a view to providing the maximum flexibility to administrations in spectrum use, taking into account safety, technical, operational, economic and other relevant factors;

2 should, wherever possible, allocate frequency bands on a worldwide basis (aligned services, categories of service and frequency band limits) taking into account safety, technical, operational, economic and other relevant factors;

3 should, wherever possible, keep the number of footnotes in Article **5** to a minimum when allocating frequency bands through footnotes, in line with Resolution **26 (Rev.WRC-19)**;

4 should take into account relevant studies by the Radiocommunication Sector and report(s) of the relevant Conference Preparatory Meeting(s) (CPM), as appropriate, considering also

contributions by members, including technical and operational developments, forecasts and usages as per the agenda of the WRC,

recommends administrations

in making proposals to world radiocommunication conferences, to take account of *recommends* 1 to 4 and *considering a)* to *g)*,

invites administrations

to actively participate in ITU-R studies, providing their technical and operational developments, forecasts and usages,

instructs the Director of the Radiocommunication Bureau and requests the ITU-R study groups

1 when carrying out technical studies relating to a frequency band, to examine the compatibility of broadly defined services with the existing utilizations and the possibility of aligning allocations on a worldwide basis, having regard to *considerings a)* to *g)* and *recommends* 1 to 4 above;

2 to conduct these studies, with the participation of the International Civil Aviation Organization (ICAO), the International Maritime Organization (IMO), the World Meteorological Organization (WMO) and other international organizations concerned, where appropriate;

3 to submit a report to future world radiocommunication conferences containing the results of these studies,

invites ITU-R

to identify areas for study and to undertake the studies necessary to determine the impact on existing services of those agenda items of future world radiocommunication conferences which involve broadening the scope of existing service allocations,

instructs the Secretary-General

to communicate this Recommendation to ICAO, IMO, WMO and other international organizations concerned, where appropriate,

invites the Director of the Radiocommunication Bureau

to bring this Recommendation to the attention of ITU-T and ITU-D.

MOD

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 earth stations on board vessels (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.

MOD

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),

considering

a) that mobile-satellite service (MSS) systems may provide service to a wide area;

b) that integrated MSS systems employ a satellite component and a ground component where the ground component is complementary to the satellite component and operates as, and is, an integral part of the MSS system. In such systems, the ground component is controlled by the satellite resource and network management system. Further, the ground component uses the same portions of MSS frequency bands as the associated operational mobile-satellite system;

c) that MSS systems have a limited capacity for providing reliable radiocommunication services in urban areas on account of natural or man-made obstacles and that the ground component of an integrated MSS system can mitigate blockage areas, as well as allow for indoor service coverage;

d) that MSS systems can improve coverage of rural areas, thus being one element that can bridge the digital divide in terms of geography;

e) that MSS systems are suitable for public protection and disaster relief communications, as stated in Resolution **646 (Rev.WRC-19)**;

f) that 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 are allocated on a primary basis to the mobile-satellite service and to other services but that none of these bands are allocated to the mobile service on a primary basis except by country footnote;

g) that within their territories in some of the frequency bands identified in *considering f)*, some administrations have authorized or plan to authorize integrated MSS systems;

h) that ITU-R has performed frequency sharing studies and has determined that the coexistence between independent systems in the MSS and systems in the mobile services in the same spectrum without harmful interference is not feasible in the same or adjacent geographical area,

recognizing

a) that ITU-R has not performed studies on sharing, technical or regulatory issues with regard to integrated MSS systems, but that some administrations have performed such studies;

b) that the radionavigation-satellite service in the 1 559-1 610 MHz band and the radio astronomy service in the frequency bands 1 610.6-1 613.8 MHz and 1 660-1 670 MHz need to be protected from harmful interference;

c) that the MSS in the 1 525-1 559 MHz and 1 626.5-1 660.5 MHz bands needs to be protected from harmful interference that may be caused due to co-channel and/or adjacent channel operation of the ground component of integrated MSS systems;

d) that Nos. **5.353A** and **5.357A** are applicable to MSS systems in different portions of the frequency bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz with respect to the spectrum requirements and prioritization of communications for the Global Maritime Distress and Safety System and the aeronautical mobile-satellite (R) service;

e) that, subject to satisfactory measures being taken to protect RNSS systems, integrated MSS systems may be deployed in the 1 980-2 010 MHz, 2 170-2 200 MHz, 2 483.5-2 500 MHz bands in all three Regions and also in the 2 010-2 025 MHz band in Region 2, all of which bands are allocated both to the MSS and MS services, without the need for ITU-R studies,

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;

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,

recommends

to invite ITU-R to conduct studies on the possible use of integrated MSS 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, as appropriate, taking into account the need to protect existing and planned systems, as well as the above *considering*, *recognizing* and *noting*, and in particular *recognizing a)*, *b)* and *c)*,

invites administrations

to participate as necessary in the ITU-R studies taking into account *recognizing a)*.

MOD

RECOMMENDATION 707 (REV.WRC-23)

Relating to the use of the frequency band 32.3-33 GHz shared between the inter-satellite service and the radionavigation service

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the band 32.3-33 GHz is allocated to the inter-satellite service and the radionavigation service;

b) that there are safety aspects associated with the radionavigation service;

c) that No. **5.548** has been incorporated into Article **5**;

d) that Recommendation ITU-R S.1151 provides the criteria for sharing between the inter-satellite service and the radionavigation service at 33 GHz,

recommends

that a future competent world radiocommunication conference consider the result of the ITU-R studies referred to in *considering d)* above with a view to the inclusion of such sharing criteria in Article **21**.

SUP

RESOLUTION 75 (REV.WRC-12)

Development of the technical basis for determining the coordination area for coordination of a receiving earth station in the space research service (deep space) with transmitting stations of high-density applications in the fixed service in the 31.8-32.3 GHz and 37-38 GHz bands

SUP

RESOLUTION 160 (WRC-15)

Facilitating access to broadband applications delivered by high-altitude platform stations

SUP

RESOLUTION 161 (WRC-15)

Studies relating to spectrum needs and possible allocation of the frequency band 37.5-39.5 GHz to the fixed-satellite service

Agenda item 1.8

SUP

RESOLUTION 171 (WRC-19)

Review and possible revision of Resolution 155 (Rev.WRC-19) and No. 5.484B in the frequency bands to which they apply

Agenda item 1.15

SUP

RESOLUTION 172 (WRC-19)

Operation of earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service in the frequency band 12.75-13.25 GHz (Earth-to-space)

Agenda item 1.16

SUP

RESOLUTION 173 (WRC-19)

Use of the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by earth stations in motion communicating with non-geostationary space stations in the fixed-satellite service

Agenda item 1.19

SUP

RESOLUTION 174 (WRC-19)

Primary allocation to the fixed-satellite service in the space-to-Earth direction in the frequency band 17.3-17.7 GHz in Region 2

Agenda item 9.1(9.1-c)

SUP

RESOLUTION 175 (WRC-19)

Use of International Mobile Telecommunications systems for fixed wireless broadband in the frequency bands allocated to the fixed service on a primary basis

Agenda item 10

SUP

RESOLUTION 177 (WRC-19)

Studies relating to spectrum needs and possible allocation of the frequency band 43.5-45.5 GHz to the fixed-satellite service

SUP

RESOLUTION 178 (WRC-19)

Studies of technical and operational issues and regulatory provisions for non-geostationary fixed-satellite service satellite system feeder links in the frequency bands 71-76 GHz (space-to-Earth and proposed new Earth-to-space) and 81-86 GHz (Earth-to-space)

Agenda item 1.2

SUP

RESOLUTION 245 (WRC-19)

Studies on frequency-related matters for the terrestrial component of International Mobile Telecommunications identification in the frequency bands 3 300-3 400 MHz, 3 600-3 800 MHz, 6 425-7 025 MHz, 7 025-7 125 MHz and 10.0-10.5 GHz

Agenda item 1.3

SUP

RESOLUTION 246 (WRC-19)

Studies to consider possible allocation of the frequency band 3 600-3 800 MHz to the mobile, except aeronautical mobile, service on a primary basis within Region 1

Agenda item 1.4

SUP

RESOLUTION 247 (WRC-19)

Facilitating mobile connectivity in certain frequency bands below 2.7 GHz using high-altitude platform stations as International Mobile Telecommunications base stations

Agenda item 1.18

SUP

RESOLUTION 248 (WRC-19)

Studies relating to spectrum needs and potential new allocations to the mobile-satellite service in the frequency bands 1 695-1 710 MHz, 2 010-2 025 MHz, 3 300-3 315 MHz and 3 385-3 400 MHz for future development of narrowband mobile-satellite systems

Agenda item 10

SUP

RESOLUTION 250 (WRC-19)

Studies on possible allocations to the land mobile service (excluding International Mobile Telecommunications) in the frequency band 1 300-1 350 MHz for use by administrations for the future development of terrestrial mobile-service applications

Agenda item 1.11

SUP

RESOLUTION 361 (REV.WRC-19)

Consideration of possible regulatory actions to support modernization of the Global Maritime Distress and Safety System and the implementation of e-navigation

Agenda item 9.1

SUP

RESOLUTION 427 (WRC-19)

Updating provisions related to aeronautical services in the Radio Regulations

Agenda item 1.7

SUP

RESOLUTION 428 (WRC-19)

Studies on a possible new allocation to the aeronautical mobile-satellite (R) service within the frequency band 117.975-137 MHz in order to support aeronautical VHF communications in the Earth-to-space and space-to-Earth directions

Agenda item 1.9

SUP

RESOLUTION 429 (WRC-19)

Consideration of regulatory provisions for updating Appendix 27 of the Radio Regulations in support of aeronautical HF modernization

Agenda item 1.10

SUP

RESOLUTION 430 (WRC-19)

Studies on frequency-related matters, including possible additional allocations, for the possible introduction of new non-safety aeronautical mobile applications

Agenda item 1.12

SUP

RESOLUTION 656 (REV.WRC-19)

Possible secondary allocation to the Earth exploration-satellite service (active) for spaceborne radar sounders in the range of frequencies around 45 MHz

Agenda item 9.1(9.1-a)

SUP

RESOLUTION 657 (REV.WRC-19)

Protection of radio spectrum-reliant space weather sensors used for global prediction and warnings

Agenda item 1.13

SUP

RESOLUTION 661 (WRC-19)

Examination of a possible upgrade to primary status of the secondary allocation to the space research service in the frequency band 14.8-15.35 GHz

Agenda item 1.14

SUP

RESOLUTION 662 (WRC-19)

Review of frequency allocations for the Earth exploration-satellite service (passive) in the frequency range 231.5-252 GHz and consideration of possible adjustment according to observation requirements of passive microwave sensors

Agenda item 1.6

SUP

RESOLUTION 772 (WRC-19)

Consideration of regulatory provisions to facilitate the introduction of sub-orbital vehicles

Agenda item 1.17

SUP

RESOLUTION 773 (WRC-19)

Study of technical and operational issues and regulatory provisions for satellite-to-satellite links in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz

Agenda item 9.1(9.1-b)

SUP

RESOLUTION 774 (WRC-19)

Studies on technical and operational measures to be applied in the frequency band 1 240-1 300 MHz to ensure the protection of the radionavigation-satellite service (space-to-Earth)

Agenda item 10

SUP

RESOLUTION 776 (WRC-19)

Conditions for the use of the frequency bands 71-76 GHz and 81-86 GHz by stations in the satellite services to ensure compatibility with passive services

Agenda item 4

SUP

RESOLUTION 811 (WRC-19)

Agenda for the 2023 world radiocommunication conference

Agenda item 10

SUP

RESOLUTION 812 (WRC-19)

Preliminary agenda for the 2027 World Radiocommunication Conference*

Agenda item 4

SUP

RESOLUTION 904 (WRC-07)

Transitional measures for coordination between the mobile-satellite service (Earth-to-space) and the space research (passive) service in the band 1 668-1 668.4 MHz for a specific case

Agenda item 9.2

SUP

RESOLUTION 907 (REV.WRC-15)

Use of modern electronic means of communication for administrative correspondence related to advance publication, coordination and notification of satellite networks including that related to Appendices 30, 30A and 30B, earth stations and radio astronomy stations

SUP

RESOLUTION 908 (REV.WRC-15)

Electronic submission and publication of satellite network filings