ITU-R

Provisional Final Acts
World Radiocommunication Conference (WRC-15)

2 – 27 November 2015

International Telecommunication Union

Provisional Final Acts

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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 **COM5/1 (WRC-15)**. (WRC-15)

Section IV – Radio stations and systems

ADD

1.108A *meteorological aids land station:* A *station* in the *meteorological aids service* not intended to be used while in motion. (WRC-15)

ADD

1.108B *meteorological aids mobile station:* A *station* in the *meteorological aids service* intended to be used while in motion or during halts at unspecified points. (WRC-15)

ARTICLE 2

Nomenclature

Section I – Frequency and wavelength bands

MOD

2.1 The radio spectrum shall be subdivided into nine frequency bands, which shall be designated by progressive whole numbers in accordance with the following table. As the unit of frequency is the hertz (Hz), frequencies shall be expressed:

– in kilohertz (kHz), up to and including 3 000 kHz;

– in megahertz (MHz), above 3 MHz, up to and including 3 000 MHz;

– in gigahertz (GHz), above 3 GHz, up to and including 3 000 GHz.

However, where adherence to these provisions would introduce serious difficulties, for example in connection with the notification and registration of frequencies, the lists of frequencies and related matters, reasonable departures may be made[1]. (WRC-15)

Band number	Symbols	Frequency range (lower limit exclusive, upper limit inclusive)	Corresponding metric subdivision
4	VLF	3 to 30 kHz	Myriametric waves
5	LF	30 to 300 kHz	Kilometric waves
6	MF	300 to 3 000 kHz	Hectometric waves
7	HF	3 to 30 MHz	Decametric waves
8	VHF	30 to 300 MHz	Metric waves
9	UHF	300 to 3 000 MHz	Decimetric waves
10	SHF	3 to 30 GHz	Centimetric waves
11	EHF	30 to 300 GHz	Millimetric waves
12		300 to 3 000 GHz	Decimillimetric waves

NOTE 1: "Band N" (N = band number) extends from 0.3×10^N Hz to 3×10^N Hz.

NOTE 2: Prefix: k = kilo (10^3), M = mega (10^6), G = giga (10^9).

Section II – Dates and times

MOD

2.5 Whenever a date is used in connection with Coordinated Universal Time (UTC), this date shall be that at the prime meridian, the prime meridian corresponding to zero degrees geographical longitude. (WRC-15)

ARTICLE 4

Assignment and use of frequencies

ADD

4.24 Space research systems intended to operate in deep space may also use the space research service (deep space) allocations, with the same status as those allocations, when the spacecraft is near the Earth, such as during launch, early orbit, flying by the Earth and returning to the Earth. (WRC-15)

ARTICLE 5

Frequency allocations

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

MOD

5.54B *Additional allocation:* in Algeria, Saudi Arabia, Bahrain, Egypt, the United Arab Emirates, the Russian Federation, Iran (Islamic Republic of), Iraq, Kuwait, Lebanon, Morocco, Qatar, the Syrian Arab Republic, Sudan and Tunisia, the frequency band 8.3-9 kHz is also allocated to the radionavigation, fixed and mobile services on a primary basis. (WRC-15)

MOD

5.55 *Additional allocation:* in Armenia, the Russian Federation, Georgia, Kyrgyzstan, Tajikistan and Turkmenistan, the frequency band 14-17 kHz is also allocated to the radionavigation service on a primary basis. (WRC-15)

MOD

5.68 *Alternative allocation:* in Congo (Rep. of the), the Dem. Rep. of the Congo and South Africa, the frequency band 160-200 kHz is allocated to the fixed service on a primary basis. (WRC-15)

MOD

5.93 *Additional allocation:* in Armenia, Azerbaijan, Belarus, the Russian Federation, Georgia, Hungary, Kazakhstan, Latvia, Lithuania, Mongolia, Nigeria, Uzbekistan, Poland, Kyrgyzstan, Slovakia, Tajikistan, Chad, Turkmenistan and Ukraine, the frequency bands 1 625-1 635 kHz, 1 800-1 810 kHz and 2 160-2 170 kHz are also allocated to the fixed and land mobile services on a primary basis, subject to agreement obtained under No. **9.21**. (WRC-15)

MOD

5.96 In Germany, Armenia, Austria, Azerbaijan, Belarus, Croatia, Denmark, Estonia, the Russian Federation, Finland, Georgia, Hungary, Ireland, Iceland, Israel, Kazakhstan, Latvia, Liechtenstein, Lithuania, Malta, Moldova, Norway, Uzbekistan, Poland, Kyrgyzstan, Slovakia, the Czech Rep., the United Kingdom, Sweden, Switzerland, Tajikistan, Turkmenistan and Ukraine, administrations may allocate up to 200 kHz to their amateur service in the frequency bands 1 715-1 800 kHz and 1 850-2 000 kHz. However, when allocating the frequency bands within this range to their amateur service, administrations shall, after prior consultation with administrations of neighbouring countries, take such steps as may be necessary to prevent harmful interference from their amateur service to the fixed and mobile services of other countries. The mean power of any amateur station shall not exceed 10 W. (WRC-15)

MOD

5.98 *Alternative allocation*: in Armenia, Azerbaijan, Belarus, Belgium, Cameroon, Congo (Rep. of the), Denmark, Egypt, Eritrea, Spain, Ethiopia, the Russian Federation, Georgia, Greece, Italy, Kazakhstan, Lebanon, Lithuania, the Syrian Arab Republic, Kyrgyzstan, Somalia, Tajikistan, Tunisia, Turkmenistan and Turkey, the frequency band 1 810-1 830 kHz is allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis. (WRC-15)

MOD

5.102 *Alternative allocation:* in Bolivia, Chile, Paraguay and Peru, the frequency band 1 850-2 000 kHz is allocated to the fixed, mobile except aeronautical mobile, radiolocation and radionavigation services on a primary basis. (WRC-15)

MOD

5.119 *Additional allocation:* in Peru, the frequency band 3 500-3 750 kHz is also allocated to the fixed and mobile services on a primary basis. (WRC-15)

MOD

5.122 *Alternative allocation:* in Bolivia, Chile, Ecuador, Paraguay and Peru, the frequency band 3 750-4 000 kHz is allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis. (WRC-15)

MOD

5.132B *Alternative allocation:* in Armenia, Belarus, Moldova, Uzbekistan and Kyrgyzstan, the frequency band 4 438-4 488 kHz is allocated to the fixed and mobile, except aeronautical mobile (R), services on a primary basis. (WRC-15)

MOD

5 003-7 450 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 275-5 351.5	FIXED MOBILE except aeronautical mobile	
5 351.5-5 366.5	FIXED MOBILE except aeronautical mobile Amateur ADD 5.A14	
5 366.5-5 450	FIXED MOBILE except aeronautical mobile	

ADD

5.A14 Stations in the amateur service using the frequency band 5 351.5-5 366.5 kHz shall not exceed a maximum radiated power of 15 W (e.i.r.p.). However, in Region 2 in Mexico, stations in the amateur service using the frequency band 5 351.5-5 366.5 kHz shall not exceed a maximum radiated power of 20 W (e.i.r.p.). In the following Region 2 countries: Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Dominica, El Salvador, Ecuador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Saint Lucia, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela, as well as the overseas territories of the Netherlands in Region 2, stations in the amateur service using the frequency band 5 351.5-5 366.5 kHz shall not exceed a maximum radiated power of 25 W (e.i.r.p.). (WRC-15)

MOD

5.133A *Alternative allocation:* in Armenia, Belarus, Moldova, Uzbekistan and Kyrgyzstan, the frequency bands 5 250-5 275 kHz and 26 200-26 350 kHz are allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis. (WRC-15)

MOD

5.140 *Additional allocation:* in Angola, Iraq, Somalia and Togo, the frequency band 7 000-7 050 kHz is also allocated to the fixed service on a primary basis. (WRC-15)

MOD

5.141B *Additional allocation:* in Algeria, Saudi Arabia, Australia, Bahrain, Botswana, Brunei Darussalam, China, Comoros, Korea (Rep. of), Diego Garcia, Djibouti, Egypt, United Arab Emirates, Eritrea, Guinea, Indonesia, Iran (Islamic Republic of), Japan, Jordan, Kuwait, Libya, Mali, Morocco, Mauritania, Niger, New Zealand, Oman, Papua New Guinea, Qatar, the Syrian Arab Republic, Singapore, Sudan, South Sudan, Tunisia, Viet Nam and Yemen, the frequency band 7 100-7 200 kHz is also allocated to the fixed and the mobile, except aeronautical mobile (R), services on a primary basis. (WRC-15)

MOD

5.145B *Alternative allocation:* in Armenia, Belarus, Moldova, Uzbekistan and Kyrgyzstan, the frequency bands 9 305-9 355 kHz and 16 100-16 200 kHz are allocated to the fixed service on a primary basis. (WRC-15)

MOD

5.149A *Alternative allocation:* in Armenia, Belarus, Moldova, Uzbekistan and Kyrgyzstan, the frequency band 13 450-13 550 kHz is allocated to the fixed service on a primary basis and to the mobile, except aeronautical mobile (R), service on a secondary basis. (WRC-15)

MOD

5.158 *Alternative allocation:* in Armenia, Belarus, Moldova, Uzbekistan and Kyrgyzstan, the frequency band 24 450-24 600 kHz is allocated to the fixed and land mobile services on a primary basis. (WRC-15)

MOD

5.159 *Alternative allocation:* in Armenia, Belarus, Moldova, Uzbekistan and Kyrgyzstan, the frequency band 39-39.5 MHz is allocated to the fixed and mobile services on a primary basis. (WRC-15)

MOD

5.161B *Alternative allocation:* in Albania, Germany, Armenia, Austria, Belarus, Belgium, Bosnia and Herzegovina, Cyprus, Vatican, Croatia, Denmark, Spain, Estonia, Finland, France, Greece, Hungary, Ireland, Iceland, Italy, Latvia, The Former Yugoslav Rep. of Macedonia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Monaco, Montenegro, Norway, Uzbekistan, Netherlands, Portugal, Kyrgyzstan, Slovakia, Czech Rep., Romania, United Kingdom, San Marino, Slovenia, Sweden, Switzerland, Turkey and Ukraine, the frequency band 42-42.5 MHz is allocated to the fixed and mobile services on a primary basis. (WRC-15)

MOD

47-75.2 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
...	**50-54** AMATEUR 5.162A 5.167 5.167A 5.168 5.170	

MOD

5.164 *Additional allocation:* in Albania, Algeria, Germany, Austria, Belgium, Bosnia and Herzegovina, Botswana, Bulgaria, Côte d'Ivoire, Croatia, Denmark, Spain, Estonia, Finland, France, Gabon, Greece, Ireland, Israel, Italy, Jordan, Lebanon, Libya, Liechtenstein, Lithuania, Luxembourg, Madagascar, Mali, Malta, Morocco, Mauritania, Monaco, Montenegro, Nigeria, Norway, the Netherlands, Poland, Syrian Arab Republic, Slovakia, Czech Rep., Romania, the United Kingdom, Serbia, Slovenia, Sweden, Switzerland, Swaziland, Chad, Togo, Tunisia and Turkey, the frequency band 47-68 MHz, in South Africa the frequency band 47-50 MHz, and in Latvia the frequency band 48.5-56.5 MHz, are also allocated to the land mobile service on a primary basis. However, stations of the land mobile service in the countries mentioned in connection with each frequency band referred to in this footnote shall not cause harmful interference to, or claim protection from, existing or planned broadcasting stations of countries other than those mentioned in connection with the frequency band. (WRC-15)

SUP

5.166

MOD

5.167 *Alternative allocation:* in Bangladesh, Brunei Darussalam, India, Iran (Islamic Republic of), Pakistan and Singapore, the frequency band 50-54 MHz is allocated to the fixed, mobile and broadcasting services on a primary basis. (WRC-15)

MOD

5.167A *Additional allocation:* in Indonesia and Thailand, the frequency band 50-54 MHz is also allocated to the fixed, mobile and broadcasting services on a primary basis. (WRC-15)

MOD

5.170 *Additional allocation:* in New Zealand, the frequency band 51-54 MHz is also allocated to the fixed and mobile services on a primary basis. (WRC-15)

MOD

5.172 *Different category of service:* in the French overseas departments and communities in Region 2 and Guyana, the allocation of the frequency band 54-68 MHz to the fixed and mobile services is on a primary basis (see No. **5.33**). (WRC-15)

MOD

5.173 *Different category of service:* in the French overseas departments and communities in Region 2 and Guyana, the allocation of the frequency band 68-72 MHz to the fixed and mobile services is on a primary basis (see No. **5.33**). (WRC-15)

MOD

5.185 *Different category of service:* in the United States, the French overseas departments and communities in Region 2, Guyana and Paraguay, 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-15)

MOD

5.201 *Additional allocation:* in Armenia, Azerbaijan, Belarus, Bulgaria, Estonia, the Russian Federation, Georgia, Hungary, Iran (Islamic Republic of), Iraq (Republic of), Japan, Kazakhstan, Moldova, Mongolia, Mozambique, Uzbekistan, Papua New Guinea, Poland, Kyrgyzstan, Romania, Tajikistan, Turkmenistan and Ukraine, 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-15)

MOD

5.202 *Additional allocation:* in Saudi Arabia, Armenia, Azerbaijan, Belarus, Bulgaria, the United Arab Emirates, the Russian Federation, Georgia, Iran (Islamic Republic of), Jordan, Oman, Uzbekistan, Poland, the Syrian Arab Republic, Kyrgyzstan, Romania, Tajikistan, Turkmenistan and Ukraine, 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-15)

MOD

5.208B[*] In the frequency bands:

137-138 MHz,
387-390 MHz,
400.15-401 MHz,
1 452-1 492 MHz,
1 525-1 610 MHz,
1 613.8-1 626.5 MHz,
2 655-2 690 MHz,
21.4-22 GHz,

Resolution **739 (Rev.WRC-15)** applies. (WRC-15)

MOD

5.211 *Additional allocation:* in Germany, Saudi Arabia, Austria, Bahrain, Belgium, Denmark, the United Arab Emirates, Spain, Finland, Greece, Guinea, Ireland, Israel, Kenya, Kuwait, The Former Yugoslav Republic of Macedonia, Lebanon, Liechtenstein, Luxembourg, Mali, Malta, Montenegro, Norway, the Netherlands, Qatar, Slovakia, the United Kingdom, Serbia, Slovenia, Somalia, Sweden, Switzerland, Tanzania, Tunisia and Turkey, the frequency band 138-144 MHz is also allocated to the maritime mobile and land mobile services on a primary basis. (WRC-15)

MOD

148-223 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
149.9-150.05	MOBILE-SATELLITE (Earth-to-space) 5.209 MOD 5.220	

MOD

148-223 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
156.8375-161.9375 FIXED MOBILE except aeronautical mobile 5.226	**156.8375-161.9375** FIXED MOBILE 5.226	
161.9375-161.9625 FIXED MOBILE except aeronautical mobile Maritime mobile-satellite (Earth-to-space) ADD 5.A116 5.226	**161.9375-161.9625** FIXED MOBILE Maritime mobile-satellite (Earth-to-space) ADD 5.A116 5.226	
161.9875-162.0125 FIXED MOBILE except aeronautical mobile Maritime mobile-satellite (Earth-to-space) ADD 5.A116 5.226 5.229	**161.9875-162.0125** FIXED MOBILE Maritime mobile-satellite (Earth-to-space) ADD 5.A116 5.226	

MOD

148-223 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
162.0375-174 FIXED MOBILE except aeronautical mobile 5.226 5.229	**162.0375-174** FIXED MOBILE 5.226 5.230 5.231	
174-223 BROADCASTING	**174-216** BROADCASTING Fixed Mobile	**174-223** FIXED MOBILE BROADCASTING

ADD

5.A116 The use of the frequency bands 161.9375-161.9625 MHz and 161.9875-162.0125 MHz by the maritime mobile-satellite (Earth-to-space) service is limited to the systems which operate in accordance with Appendix **18**. (WRC-15)

MOD

5.220 The use of the frequency bands 149.9-150.05 MHz and 399.9-400.05 MHz by the mobile-satellite service is subject to coordination under No. **9.11A**. (WRC-15)

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, 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, The Former Yugoslav Republic of Macedonia, Lesotho, Latvia, Lebanon, Libya, Liechtenstein, Lithuania, Luxembourg, 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, Kyrgyzstan, Dem. People's Rep. of Korea, Slovakia, Romania, the United Kingdom, Senegal, Serbia, Sierra Leone, Singapore, Slovenia, Sudan, Sri Lanka, South Africa, Sweden, Switzerland, Swaziland, Tanzania, Chad, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Ukraine, Viet Nam, Yemen, Zambia and Zimbabwe. (WRC-15)

SUP

5.222

SUP

5.223

SUP

5.224A

SUP

5.224B

SUP

5.232

SUP

5.234

MOD

5.256A *Additional allocation:* in China, the Russian Federation and Kazakhstan, the frequency band 258-261 MHz is also allocated to the space research service (Earth-to-space) and space operation service (Earth-to-space) on a primary basis. Stations in the space research service (Earth-to-space) and space operation service (Earth-to-space) shall not cause harmful interference to, or claim protection from, or constrain the use and development of, the mobile service systems and mobile-satellite service systems operating in the frequency band. Stations in space research service (Earth-to-space) and space operation service (Earth-to-space) shall not constrain the future development of fixed service systems of other countries. (WRC-15)

MOD

335.4-410 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
399.9-400.05	MOBILE-SATELLITE (Earth-to-space) 5.209 MOD 5.220	

MOD

335.4-410 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
403-406	METEOROLOGICAL AIDS Fixed Mobile except aeronautical mobile ADD 5.A911	
406-406.1	MOBILE-SATELLITE (Earth-to-space) 5.266 5.267 ADD 5.A911	
406.1-410	FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY 5.149 ADD 5.A911	

ADD

5.A911 In the frequency band 403-410 MHz, Resolution **205 (Rev.WRC-15)** applies. (WRC-15)

SUP

5.260

MOD

410-460 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
410-420	FIXED MOBILE except aeronautical mobile SPACE RESEARCH (space-to-space) MOD 5.268	

MOD

410-460 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
456-459	FIXED MOBILE 5.286AA 5.271 MOD 5.287 5.288	

MOD

5.268 Use of the frequency band 410-420 MHz by the space research service is limited to space-to-space communication links with an orbiting, manned space vehicle. The power flux-density at the surface of the Earth produced by emissions from transmitting stations of the space research service (space-to-space) in the frequency band 410-420 MHz shall not exceed -153 dB(W/m^2) for $0° \le \delta \le 5°$, $-153 + 0.077\ (\delta - 5)$ dB(W/m^2) for $5° \le \delta \le 70°$ and -148 dB(W/m^2) for $70° \le \delta \le 90°$, where δ is the angle of arrival of the radio-frequency wave and the reference bandwidth is 4 kHz. In this frequency band, stations of the space research service (space-to-space) shall not claim protection from, nor constrain the use and development of, stations of the fixed and mobile services. No. **4.10** does not apply. (WRC-15)

MOD

5.275 *Additional allocation:* in Croatia, Estonia, Finland, Libya, The Former Yugoslav Republic of Macedonia, Montenegro and Serbia, the frequency bands 430-432 MHz and 438-440 MHz are also allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis. (WRC-15)

MOD

5.276 *Additional allocation:* in Afghanistan, Algeria, Saudi Arabia, Bahrain, Bangladesh, Brunei Darussalam, Burkina Faso, Djibouti, Egypt, the United Arab Emirates, Ecuador, Eritrea, Ethiopia, Greece, Guinea, India, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Italy, Jordan, Kenya, Kuwait, Libya, Malaysia, Niger, Nigeria, Oman, Pakistan, the Philippines, Qatar, the Syrian Arab Republic, the Dem. People's Rep. of Korea, Singapore, Somalia, Sudan, Switzerland, Thailand, Togo, Turkey and Yemen, the frequency band 430-440 MHz is also allocated to the fixed service on a primary basis and the frequency bands 430-435 MHz and 438-440 MHz are also

allocated, except in Ecuador, to the mobile, except aeronautical mobile, service on a primary basis. (WRC-15)

MOD

5.279A The use of the frequency band 432-438 MHz by sensors in the Earth exploration-satellite service (active) shall be in accordance with Recommendation ITU-R RS.1260-1. Additionally, the Earth exploration-satellite service (active) in the frequency band 432-438 MHz shall not cause harmful interference to the aeronautical radionavigation service in China. 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-15)

MOD

5.286AA The frequency band 450-470 MHz is identified for use by administrations wishing to implement International Mobile Telecommunications (IMT). See Resolution **224 (Rev.WRC-15)**. 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-15)

MOD

5.287 Use of the frequency bands 457.5125-457.5875 MHz and 467.5125-467.5875 MHz by the maritime mobile service is limited to on-board communication stations. The characteristics of the equipment and the channelling arrangement shall be in accordance with Recommendation ITU-R M.1174-3. The use of these frequency bands in territorial waters is subject to the national regulations of the administration concerned. (WRC-15)

MOD

5.288 In the territorial waters of the United States and the Philippines, the preferred frequencies for use by on-board communication stations shall be 457.525 MHz, 457.550 MHz, 457.575 MHz and 457.600 MHz paired, respectively, with 467.750 MHz, 467.775 MHz, 467.800 MHz and 467.825 MHz. The characteristics of the equipment used shall conform to those specified in Recommendation ITU-R M.1174-3. (WRC-15)

MOD

460-890 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
460-470	FIXED MOBILE 5.286AA Meteorological-satellite (space-to-Earth) MOD 5.287 5.288 5.289 5.290	

MOD

460-890 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
470-694 BROADCASTING 5.149 5.291A 5.294 5.296 5.300 5.304 5.306 5.311A MOD 5.312	**470-512** BROADCASTING Fixed Mobile 5.292 MOD 5.293	**470-585** FIXED MOBILE BROADCASTING 5.291 5.298
694-790 MOBILE except aeronautical mobile MOD 5.312A MOD 5.317A BROADCASTING 5.300 5.311A MOD 5.312	**512-608** BROADCASTING MOD 5.297	**585-610** FIXED MOBILE BROADCASTING RADIONAVIGATION 5.149 5.305 5.306 5.307
790-862 FIXED MOBILE except aeronautical mobile MOD 5.316B MOD 5.317A BROADCASTING MOD 5.312 5.319	**608-614** RADIO ASTRONOMY Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)	**610-890** FIXED MOBILE MOD 5.313A MOD 5.317A BROADCASTING
862-890 FIXED MOBILE except aeronautical mobile MOD 5.317A BROADCASTING 5.322 5.319 5.323	**614-698** BROADCASTING Fixed Mobile MOD 5.293 5.309 5.311A **698-806** MOBILE MOD 5.317A BROADCASTING Fixed MOD 5.293 5.309 5.311A **806-890** FIXED MOBILE MOD 5.317A BROADCASTING 5.317 5.318	5.149 5.305 5.306 5.307 5.311A 5.320

MOD

460-890 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
470-694 BROADCASTING 5.149 5.291A 5.294 5.296 5.300 5.304 5.306 5.311A MOD 5.312	**470-512** BROADCASTING Fixed Mobile 5.292 MOD 5.293 ADD 5.idR2a	**470-585** FIXED MOBILE ADD 5.idR3 BROADCASTING 5.291 5.298
694-790 MOBILE except aeronautical mobile MOD 5.312A MOD 5.317A BROADCASTING 5.300 5.311A MOD 5.312	**512-608** BROADCASTING MOD 5.297 ADD 5.idR2a	**585-610** FIXED MOBILE ADD 5.idR3 BROADCASTING RADIONAVIGATION 5.149 5.305 5.306 5.307
790-862 FIXED MOBILE except aeronautical mobile MOD 5.316B MOD 5.317A BROADCASTING MOD 5.312 5.319	**608-614** RADIO ASTRONOMY Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)	**610-890** FIXED MOBILE MOD 5.313A MOD 5.317A ADD 5.idR3 BROADCASTING
862-890 FIXED MOBILE except aeronautical mobile MOD 5.317A BROADCASTING 5.322 5.319 5.323	**614-698** BROADCASTING Fixed Mobile MOD 5.293 5.309 5.311A ADD 5.idR2b ADD 5.allocateR2	
	698-806 MOBILE MOD 5.317A BROADCASTING Fixed MOD 5.293 5.309 5.311A	
	806-890 FIXED MOBILE MOD 5.317A BROADCASTING 5.317 5.318	5.149 5.305 5.306 5.307 5.311A 5.320

ADD

5.idR2a In the Bahamas, Barbados, Canada, the United States and Mexico, the frequency band 470-608 MHz, or portions thereof, is identified for International Mobile Telecommunications (IMT) – see Resolution **224 (Rev.WRC-15)**. 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. In Mexico, the use of IMT in this frequency band will not start before 31 December 2018 and may be extended if agreed by the neighbouring countries. (WRC-15)

ADD

5.idR2b In the Bahamas, Barbados, Belize, Canada, Colombia, the United States and Mexico, the frequency band 614-698 MHz, or portions thereof, is identified for International Mobile Telecommunications (IMT) – see Resolution **224 (Rev.WRC-15)**. 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. In Belize and Mexico, the use of IMT in this frequency band will not start before 31 December 2018 and may be extended if agreed by the neighbouring countries. (WRC-15)

ADD

5.allocateR2 *Additional allocation:* in Belize and Colombia, the frequency band 614-698 MHz is also 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-15)

MOD

5.291A *Additional allocation:* in Germany, Austria, Denmark, Estonia, Liechtenstein, the Czech Rep., Serbia and Switzerland, the frequency band 470-494 MHz is also allocated to the radiolocation service on a secondary basis. This use is limited to the operation of wind profiler radars in accordance with Resolution **217 (WRC-97)**. (WRC-15)

MOD

5.292 *Different category of service:* in Argentina, Uruguay and Venezuela, the allocation of the frequency band 470-512 MHz to the mobile service is on a primary basis (see No. **5.33**), subject to agreement obtained under No. **9.21**. (WRC-15)

MOD

5.293 *Different category of service:* in Canada, Chile, Cuba, the United States, Guyana, Jamaica 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-15)

MOD

5.294 *Additional allocation:* in Saudi Arabia, Cameroon, Côte d'Ivoire, Egypt, Ethiopia, Israel, Libya, 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-15)

MOD

5.296 *Additional allocation:* in Albania, 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, Finland, France, Gabon, Georgia, Ghana, Hungary, Iraq, Ireland, Iceland, Israel, Italy, Jordan, Kenya, Kuwait, Lesotho, Latvia, The Former Yugoslav Republic of Macedonia, Lebanon, Libya, Liechtenstein, Lithuania, Luxembourg, Malawi, Mali, Malta, Morocco, Mauritius, Mauritania, Moldova, Monaco, Mozambique, Namibia, Niger, Nigeria, Norway, Oman, Uganda, the Netherlands, Poland, Portugal, Qatar, the Syrian Arab Republic, Slovakia, the Czech Republic, the United Kingdom, Rwanda, San Marino, Serbia, Sudan, South Africa, Sweden, Switzerland, Swaziland, 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-15)

MOD

5.297 *Additional allocation:* in Canada, Costa Rica, Cuba, El Salvador, the United States, Guatemala, Guyana and Jamaica, the frequency band 512-608 MHz is also allocated to the fixed and mobile services on a primary basis, subject to agreement obtained under No. **9.21**. In the Bahamas, Barbados and Mexico, the frequency band 512-608 MHz is also allocated to the mobile service on a primary basis, subject to agreement obtained under No. **9.21**. (WRC-15)

MOD

5.300 *Additional allocation:* in Saudi Arabia, Cameroon, Egypt, United Arab Emirates, Israel, Jordan, Libya, Oman, 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-15)

MOD

5.309 *Different category of service*: in El Salvador, the allocation of the frequency band 614-806 MHz to the fixed service is on a primary basis (see No. **5.33**), subject to agreement obtained under No. **9.21**. (WRC-15)

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, in Bulgaria the frequency bands 646-686 MHz, 726-758 MHz, 766-814 MHz and 822-862 MHz, and in Poland the frequency band 860-862 MHz until 31 December 2017, are also allocated to the aeronautical radionavigation service on a primary basis. (WRC-15)

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 **COM4/4 (WRC-15)**. See also Resolution **224 (Rev.WRC-15)**. (WRC-15)

MOD

5.313A The frequency band, or portions of the frequency band 698-790 MHz, in Australia, Bangladesh, Brunei Darussalam, Cambodia, China, Korea (Rep. of), Fiji, India, Indonesia, Japan, Kiribati, Lao P.D.R., Malaysia, Myanmar (Union of), New Zealand, Pakistan, Papua New Guinea, Philippines, Solomon Islands, Samoa, Singapore, Thailand, Tonga, Tuvalu, Vanuatu and Viet Nam, are identified for use by these administrations wishing to implement 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. In China, the use of IMT in this frequency band will not start until 2015. (WRC-15)

SUP

5.313B

SUP

5.314

SUP

5.315

SUP

5.316

SUP

5.316A

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-15)** and **749 (Rev.WRC-15)** shall apply, as appropriate. (WRC-15)

MOD

5.317 *Additional allocation*: in Region 2 (except Brazil, the United States and Mexico), the frequency band 806-890 MHz is also allocated to the mobile-satellite service on a primary basis, subject to agreement obtained under No. **9.21**. The use of this service is intended for operation within national boundaries. (WRC-15)

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-15)**, **COM4/4 (WRC-15)** and **749 (Rev.WRC-15)**, 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−15)

MOD

890-1 300 MHz

Allocation to services	
960-1 164	AERONAUTICAL MOBILE (R) 5.327A AERONAUTICAL RADIONAVIGATION 5.328 ADD 5.A25

ADD

5.A25 The frequency band 1 087.7-1 092.3 MHz is also allocated to the aeronautical mobile-satellite (R) service (Earth-to-space) on a primary basis, limited to the space station reception of Automatic Dependent Surveillance-Broadcast (ADS-B) emissions from aircraft transmitters that operate in accordance with recognized international aeronautical standards. Stations operating in the aeronautical mobile-satellite (R) service shall not claim protection from stations operating in the aeronautical radionavigation service. Resolution **COM4/2 (WRC-15)** shall apply. (WRC-15)

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, Mexico, Paraguay, Uruguay and Venezuela, the frequency band 902-928 MHz is allocated to the land mobile service on a primary basis. In Colombia, the frequency band 902-905 MHz is allocated to the land mobile service on a primary basis. (WRC-2015)

MOD

5.327A The use of the frequency band 960-1 164 MHz by the aeronautical mobile (R) service is limited to systems that operate in accordance with recognized international aeronautical standards. Such use shall be in accordance with Resolution **417 (Rev.WRC-15)**. (WRC-15)

MOD

1 300-1 525 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>1 427-1 429</td><td colspan="2">SPACE OPERATION (Earth-to-space)
FIXED
MOBILE except aeronautical mobile ADD 5.R1a ADD 5.R2a ADD 5.R3g
MOD 5.338A 5.341</td></tr>
<tr><td>1 429-1 452
FIXED
MOBILE except aeronautical mobile ADD 5.R1a
MOD 5.338A 5.341 5.342</td><td colspan="2">1 429-1 452
FIXED
MOBILE 5.343 ADD 5.R2a ADD 5.R3g
MOD 5.338A 5.341</td></tr>
<tr><td>1 452-1 492
FIXED
MOBILE except aeronautical mobile ADD 5.R1b
BROADCASTING
BROADCASTING-SATELLITE 5.208B
5.341 5.342 5.345</td><td colspan="2">1 452-1 492
FIXED
MOBILE 5.343 ADD 5.R3h ADD 5.R2a
BROADCASTING
BROADCASTING-SATELLITE 5.208B
5.341 5.344 5.345</td></tr>
<tr><td>1 492-1 518
FIXED
MOBILE except aeronautical mobile ADD 5.R1a
5.341 5.342</td><td>1 492-1 518
FIXED
MOBILE 5.343 ADD 5.R2a
5.341 5.344</td><td>1 492-1 518
FIXED
MOBILE ADD 5.R3g
5.341</td></tr>
</table>

ADD

5.R1a In Region 1, the frequency bands 1 427-1 452 MHz and 1 492-1 518 MHz are identified for use by administrations wishing to implement International Mobile Telecommunications (IMT) in accordance with Resolution **223 (Rev.WRC-15)**. This identification does not preclude the use of these frequency bands by any other 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 respect to the aeronautical mobile service used for aeronautical telemetry in accordance with No. **5.342**. (WRC-15)

ADD

5.R2a In Region 2, the frequency band 1 427-1 518 MHz is identified for use by administrations wishing to implement International Mobile Telecommunications (IMT) in accordance with Resolution **223 (Rev.WRC-15)**. This identification does not preclude the use of this frequency band by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. (WRC-15)

ADD

5.R3g The frequency bands 1 427-1 452 MHz and 1 492-1 518 MHz are identified for use by administrations in Region 3 wishing to implement International Mobile Telecommunications (IMT) in accordance with Resolution **223 (Rev.WRC-15)**. The use of these frequency bands by the above administrations for the implementation of IMT in the frequency bands 1 429-1 452 MHz and 1 492-1 518 MHz is subject to agreement obtained under No. **9.21** from countries using stations of the aeronautical mobile service. This identification does not preclude the use of these frequency bands by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. (WRC-15)

ADD

5.R1b In Angola, Botswana, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Gambia, Liberia, Madagascar, Malawi, Mali, Mozambique, Senegal, Zambia, Mauritius, Seychelles, Burundi, Kenya, Rwanda, Tanzania, Uganda, Gabon, Guinea, Burkina Faso, Ghana, Benin, Cameroon, South Africa, Jordan, Kuwait, Lesotho, Lebanon, Niger, Nigeria, Oman, Sudan, South Sudan, Zimbabwe, Togo, Palestine*, Qatar, Morocco, Swaziland, Namibia, Mauritania, Bahrain, Djibouti, Egypt, Algeria, Saudi Arabia, United Arab Emirates and Iraq, 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-15)**. 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 **COM4/7 (WRC-15)**. (WRC-15)

ADD

5.R3h The frequency band 1 452-1 492 MHz is identified for use by administrations in Region 3 wishing to implement International Mobile Telecommunications (IMT) in accordance

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* The use of 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. Busan, 2014) and taking into account the Israeli-Palestinian Interim Agreement of 28 September 1995.

with Resolution **223 (Rev.WRC-15)** and Resolution **COM4/8 (WRC-15)**. The use of this frequency band by the above administrations for the implementation of IMT is subject to agreement obtained under No. **9.21** from countries using stations of the aeronautical mobile 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-15)

MOD

5.338A In the frequency bands 1 350-1 400 MHz, 1 427-1 452 MHz, 22.55-23.55 GHz, 30-31.3 GHz, 49.7-50.2 GHz, 50.4-50.9 GHz, 51.4-52.6 GHz, 81-86 GHz and 92-94 GHz, Resolution **750 (Rev.WRC-15)** applies. (WRC-15)

MOD

5.342 *Additional allocation:* in Armenia, Azerbaijan, Belarus, the Russian Federation, Uzbekistan, Kyrgyzstan and Ukraine, the frequency band 1 429-1 535 MHz is also allocated to the aeronautical mobile service on a primary basis, exclusively for the purposes of aeronautical telemetry within the national territory. As of 1 April 2007, the use of the frequency band 1 452-1 492 MHz is subject to agreement between the administrations concerned. (WRC-15)

MOD

1 525-1 610 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 559-1 610	AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.208B 5.328B 5.329A 5.341	

MOD

5.352A In the frequency band 1 525-1 530 MHz, stations in the mobile-satellite service, except stations in the maritime mobile-satellite service, shall not cause harmful interference to, or claim protection from, stations of the fixed service in Algeria, Saudi Arabia, Egypt, France and French overseas communities of Region 3, Guinea, India, Israel, Italy, Jordan, Kuwait, Mali, Morocco, Mauritania, Nigeria, Oman, Pakistan, the Philippines, Qatar, Syrian Arab Republic, Viet Nam and Yemen notified prior to 1 April 1998. (WRC-15)

MOD

5.359 *Additional allocation:* in Germany, Saudi Arabia, Armenia, Azerbaijan, Belarus, Benin, Cameroon, the Russian Federation, France, 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, Turkmenistan and Ukraine, 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-15)

SUP

5.362B

SUP

5.362C

MOD

5.382 *Different category of service:* in Saudi Arabia, Armenia, Azerbaijan, Bahrain, Belarus, Congo (Rep. of the), Egypt, the United Arab Emirates, Eritrea, Ethiopia, the Russian Federation, Guinea, Iraq, Israel, Jordan, Kazakhstan, Kuwait, the Former Yugoslav Republic of Macedonia, Lebanon, Mauritania, Moldova, Mongolia, Oman, Uzbekistan, Poland, Qatar, the Syrian Arab Republic, Kyrgyzstan, Somalia, Tajikistan, Turkmenistan, Ukraine and Yemen, the allocation of the frequency band 1 690-1 700 MHz to the fixed and mobile, except aeronautical mobile, services is on a primary basis (see No. **5.33**), and in the Dem. People's Rep. of Korea, the allocation of the frequency band 1 690-1 700 MHz to the fixed service is on a primary basis (see No. **5.33**) and to the mobile, except aeronautical mobile, service on a secondary basis. (WRC-15)

MOD

5.384A The frequency bands 1 710-1 885 MHz, 2 300-2 400 MHz or 2 500-2 690 MHz, and portions thereof, are identified for use by administrations wishing to implement International Mobile Telecommunications (IMT) in accordance with Resolution **223 (Rev.WRC-15)**. 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-15)

MOD

5.386 *Additional allocation:* the frequency band 1 750-1 850 MHz is also allocated to the space operation (Earth-to-space) and space research (Earth-to-space) services in Region 2 (except in Mexico), in Australia, Guam, India, Indonesia and Japan on a primary basis, subject to agreement obtained under No. **9.21**, having particular regard to troposcatter systems. (WRC-15)

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-15)** (see also Resolution **223 (Rev.WRC-15)**). (WRC-15)

MOD

5.391 In making assignments to the mobile service in the frequency bands 2 025-2 110 MHz and 2 200-2 290 MHz, administrations shall not introduce high-density mobile systems, as described in Recommendation ITU-R SA.1154-0, and shall take that Recommendation into account for the introduction of any other type of mobile system. (WRC-15)

MOD

5.393 *Additional allocation:* in Canada, the United States and India, the frequency band 2 310-2 360 MHz is also allocated to the broadcasting-satellite service (sound) and complementary terrestrial sound broadcasting service on a primary basis. Such use is limited to digital audio broadcasting and is subject to the provisions of Resolution **528 (Rev.WRC-15)**, with the exception of *resolves* 3 in regard to the limitation on broadcasting-satellite systems in the upper 25 MHz. (WRC-15)

MOD

5.401 In Angola, Australia, Bangladesh, China, Eritrea, Ethiopia, India, Iran (Islamic Republic of), Lebanon, Liberia, Libya, Madagascar, Mali, Pakistan, Papua New Guinea, Syrian Arab Republic, Dem. Rep. of the Congo, Sudan, Swaziland, Togo and Zambia, the frequency band 2 483.5-2 500 MHz was already allocated on a primary basis to the radiodetermination-satellite service before WRC-12, subject to agreement obtained under No. **9.21** from countries not listed in this provision. Systems in the radiodetermination-satellite service for which complete coordination information has been received by the Radiocommunication Bureau before 18 February 2012 will retain their regulatory status, as of the date of receipt of the coordination request information. (WRC-15)

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 rowspan="2">2 520-2 655
FIXED 5.410
MOBILE except aeronautical mobile 5.384A
BROADCASTING-SATELLITE 5.413 5.416</td><td rowspan="2">2 520-2 655
FIXED 5.410
FIXED-SATELLITE (space-to-Earth) 5.415
MOBILE except aeronautical mobile 5.384A
BROADCASTING-SATELLITE 5.413 5.416</td><td>2 520-2 535
FIXED 5.410
FIXED-SATELLITE (space-to-Earth) 5.415
MOBILE except aeronautical mobile 5.384A
BROADCASTING-SATELLITE 5.413 5.416
5.403 5.414A 5.415A</td></tr>
<tr><td>2 535-2 655
FIXED 5.410
MOBILE except aeronautical mobile 5.384A
BROADCASTING-SATELLITE 5.413 5.416</td></tr>
<tr><td>5.339 5.405 5.412 5.418B 5.418C</td><td>5.339 5.418B 5.418C</td><td>5.339 MOD 5.418 5.418A 5.418B 5.418C</td></tr>
</table>

SUP

5.417A

SUP

5.417B

SUP

5.417C

SUP

5.417D

MOD

5.418 *Additional allocation:* in India, the frequency band 2 535-2 655 MHz is also allocated to the broadcasting-satellite service (sound) and complementary terrestrial broadcasting service on a primary basis. Such use is limited to digital audio broadcasting and is subject to the provisions of Resolution **528 (Rev.WRC-15)**. The provisions of No. **5.416** and Table **21-4** of Article **21**, do not apply to this additional allocation. Use of non-geostationary-satellite systems in the broadcasting-satellite service (sound) is subject to Resolution **539 (Rev.WRC-15)**. Geostationary broadcasting-satellite service (sound) systems for which complete Appendix **4** coordination information has been received after 1 June 2005 are limited to systems intended for national coverage. The power flux-density at the Earth's surface produced by emissions from a geostationary broadcasting satellite

service (sound) space station operating in the frequency band 2 630-2 655 MHz, and for which complete Appendix **4** coordination information has been received after 1 June 2005, shall not exceed the following limits, for all conditions and for all methods of modulation:

-130 dB(W/(m^2 · MHz)) for $0° \le \theta \le 5°$

$-130 + 0.4\ (\theta - 5)$ dB(W/(m^2 · MHz)) for $5° < \theta \le 25°$

-122 dB(W/(m^2 · MHz)) for $25° < \theta \le 90°$

where θ is the angle of arrival of the incident wave above the horizontal plane, in degrees. These limits may be exceeded on the territory of any country whose administration has so agreed. As an exception to the limits above, the pfd value of -122 dB(W/(m^2 · MHz)) shall be used as a threshold for coordination under No. **9.11** in an area of 1 500 km around the territory of the administration notifying the broadcasting-satellite service (sound) system.

In addition, an administration listed in this provision shall not have simultaneously two overlapping frequency assignments, one under this provision and the other under No. **5.416** for systems for which complete Appendix **4** coordination information has been received after 1 June 2005. (WRC-15)

MOD

2 700-4 800 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
4 200-4 400	AERONAUTICAL MOBILE (R) ADD 5.A117 AERONAUTICAL RADIONAVIGATION MOD 5.438 5.439 5.440 ADD 5.B117	

ADD

5.A117 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 **COM4/1 (WRC-15)**. (WRC-15)

ADD

5.B117 Passive sensing in the Earth exploration-satellite and space research services may be authorized in the frequency band 4 200-4 400 MHz on a secondary basis. (WRC-15)

MOD

2 700-4 800 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
3 300-3 400 RADIOLOCATION 5.149 MOD 5.429 MOD 5.430 ADD 5.R1a ADD 5.R1b	**3 300-3 400** RADIOLOCATION Amateur Fixed Mobile 5.149 ADD 5.B11 ADD 5.C11	**3 300-3 400** RADIOLOCATION Amateur 5.149 MOD 5.429

MOD

2 700-4 800 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
3 300-3 400 RADIOLOCATION 5.149 5.429 5.430	**3 300-3 400** RADIOLOCATION Amateur Fixed Mobile 5.149	**3 300-3 400** RADIOLOCATION Amateur 5.149 5.429 ADD 5.R3d ADD 5.R3e

MOD

2 700-4 800 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
3 400-3 600 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MOD 5.430A Radiolocation 5.431	**3 400-3 500** FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MOD 5.431A ADD 5.IMT Amateur Radiolocation 5.433 5.282	**3 400-3 500** FIXED FIXED-SATELLITE (space-to-Earth) Amateur Mobile 5.432 MOD 5.432B Radiolocation 5.433 5.282 5.432A
	3 500-3 600 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile ADD 5.IMT Radiolocation 5.433	**3 500-3 600** FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MOD 5.433A Radiolocation 5.433

3 600-4 200 FIXED FIXED-SATELLITE (space-to-Earth) Mobile	**3 600-3 700** FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile ADD 5.IMT2 Radiolocation 5.433	**3 600-3 700** FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile Radiolocation 5.435
	3 700-4 200 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile	

MOD

2 700-4 800 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
		3 600-3 700 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile Radiolocation 5.435
		3 700-4 200 FIXED FIXED-SATELLITE (space to-Earth) MOBILE except aeronautical mobile

ADD

5.R1a *Additional allocation*: in Angola, Benin, Botswana, Burkina Faso, Burundi, Ghana, Guinea, Guinea-Bissau, Lesotho, Liberia, Malawi, Mauritania, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sudan, South Sudan, South Africa, Swaziland, 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-15)

ADD

5.R1b In the following countries of Region 1 south of 30° parallel north: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Congo (Rep. of the), Côte d'Ivoire, Egypt, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Malawi, Mauritania, Mozambique, Namibia, Niger, Nigeria, Uganda, the Dem. Rep. of the Congo, Rwanda, Sudan, South Sudan, South Africa, Swaziland, 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-15)**. 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-15)

ADD

5.B11 *Different category of service*: in Argentina, Brazil, Colombia, Costa Rica, Ecuador, Guatemala, Mexico, Paraguay and Uruguay, the frequency band 3 300-3 400 MHz is allocated to the mobile, except aeronautical mobile, service on a primary basis. In Argentina, Brazil, Guatemala and Mexico, the frequency band 3 300-3 400 MHz is also allocated to the fixed service on a primary basis. Stations in the fixed and mobile services 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-15)

ADD

5.C11 In the following countries in Region 2: Argentina, Colombia, Costa Rica, Ecuador, Mexico and Uruguay, 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-15)**. This use in Argentina and Uruguay is subject to the application of No. **9.21**. 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-15)

ADD

5.R3d *Additional allocation*: in Papua New Guinea, 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-15)

ADD

5.R3e In the following countries in Region 3: Cambodia, India, Lao P.D.R., Pakistan, Philippines 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-15)**. 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-15)

ADD

5.IMT In Region 2, the frequency band 3 400-3 600 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. 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 an IMT system, it shall seek agreement under No. **9.21** with other administrations and ensure that the power flux-density (pfd) produced at 3 m above ground does not exceed −154.5 dB(W/(m^2 · 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, including IMT systems, in the frequency band 3 400-3 600 MHz shall not claim more protection from space stations than that provided in Table **21-4** of the Radio Regulations (Edition of 2004). (WRC-15)

ADD

5.IMT2 In Canada, Colombia, Costa Rica and the United States, the frequency band 3 600-3 700 MHz, or portions thereof, is identified for use by 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. 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 an IMT system, it shall seek agreement under No. **9.21** with other administrations and ensure that the power flux-density (pfd) produced at 3 m above ground does not exceed −154.5 dB(W/(m^2 · 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, including IMT systems, in the frequency band 3 600-3 700 MHz shall not claim more protection from space stations than that provided in Table **21-4** of the Radio Regulations (Edition of 2004). (WRC-15)

MOD

5.428 *Additional allocation:* in Azerbaijan, Kyrgyzstan and Turkmenistan, the frequency band 3 100-3 300 MHz is also allocated to the radionavigation service on a primary basis. (WRC-15)

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, Egypt, the United Arab Emirates, India, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Japan, Jordan, Kenya, Kuwait, Lebanon, Libya, Malaysia, Oman, Uganda, Pakistan, Qatar, the Syrian Arab Republic, the Dem. Rep. of the Congo, the Dem. People's Rep. of Korea, Sudan and Yemen, the frequency band 3 300-3 400 MHz is also allocated to the fixed and mobile services on a primary basis. The countries bordering the Mediterranean shall not claim protection for their fixed and mobile services from the radiolocation service. (WRC-15)

MOD

5.430 *Additional allocation:* in Azerbaijan, Kyrgyzstan and Turkmenistan, the frequency band 3 300-3 400 MHz is also allocated to the radionavigation service on a primary basis. (WRC-15)

MOD

5.430A The allocation of the frequency band 3 400-3 600 MHz to the mobile, except aeronautical mobile, service is subject to agreement obtained under No. **9.21**. This frequency band 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. The provisions of Nos. **9.17** and **9.18** shall also apply in the coordination phase. 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 · 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) and with the assistance of the Bureau if so requested. In case of disagreement, 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 3 400-3 600 MHz shall not claim more protection from space stations than that provided in Table **21-4** of the Radio Regulations (Edition of 2004). (WRC-15)

MOD

5.431 *Additional allocation:* in Germany and Israel, the frequency band 3 400-3 475 MHz is also allocated to the amateur service on a secondary basis. (WRC-15)

MOD

5.431A In Region 2, the allocation of the frequency band 3 400-3 500 MHz to the mobile, except aeronautical mobile, service on a primary basis is subject to agreement obtained under No. **9.21**. (WRC-15)

MOD

5.432B *Different category of service:* in Australia, Bangladesh, China, French overseas communities of Region 3, India, Iran (Islamic Republic of), New Zealand, Philippines and Singapore, the frequency band 3 400-3 500 MHz is allocated to the mobile, except aeronautical mobile, service on a primary basis, subject to agreement obtained under No. **9.21** with other administrations and 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 · 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 3 400-3 500 MHz shall not claim more protection from space stations than that provided in Table **21-4** of the Radio Regulations (Edition of 2004). (WRC-15)

MOD

5.433A In Australia, Bangladesh, China, French overseas communities of Region 3, Korea (Rep. of), India, Iran (Islamic Republic of), Japan, New Zealand, Pakistan and Philippines, 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 · 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-15)

MOD

5.438 Use of the frequency band 4 200-4 400 MHz by the aeronautical radionavigation service is reserved exclusively for radio altimeters installed on board aircraft and for the associated transponders on the ground. (WRC-15)

MOD

4 800-5 570 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 091-5 150	FIXED-SATELLITE (Earth-to-space) MOD 5.444A AERONAUTICAL MOBILE MOD 5.444B AERONAUTICAL MOBILE-SATELLITE (R) 5.443AA AERONAUTICAL RADIONAVIGATION MOD 5.444	

MOD

4 800-5 570 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
4 800-4 990	FIXED MOBILE 5.440A 5.442 ADD 5.A11 Radio astronomy 5.149 5.339 5.443	

MOD

4 800-5 570 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
4 800-4 990	FIXED MOBILE 5.440A 5.442 ADD 5.R3f Radio astronomy 5.149 5.339 5.443	

ADD

5.A11 In Uruguay, the frequency band 4 800-4 900 MHz, or portions thereof, is identified for the implementation 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. The use of this frequency band for the implementation of IMT is subject to agreement obtained with neighbouring countries, and IMT stations shall not claim protection from stations of other applications of the mobile service. Such use shall be in accordance with Resolution **223 (Rev.WRC-15)**. (WRC-15)

ADD

5.R3f In Cambodia, Lao P.D.R. and Viet Nam, 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 this frequency band for the implementation of IMT 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 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. This criterion is subject to review at WRC-19. See Resolution **223 (Rev.WRC-15)**. This identification shall be effective after WRC-19. (WRC-15)

MOD

5.442 In the frequency bands 4 825-4 835 MHz and 4 950-4 990 MHz, the allocation to the mobile service is restricted to the mobile, except aeronautical mobile, service. In Region 2 (except Brazil, Cuba, Guatemala, Mexico, Paraguay, Uruguay and Venezuela), and in Australia, the frequency band 4 825-4 835 MHz is also allocated to the aeronautical mobile service, limited to aeronautical mobile telemetry for flight testing by aircraft stations. Such use shall be in accordance with Resolution **416 (WRC-07)** and shall not cause harmful interference to the fixed service. (WRC-15)

MOD

5.443B In order not to cause harmful interference to the microwave landing system operating above 5 030 MHz, the aggregate power flux-density produced at the Earth's surface in the frequency band 5 030-5 150 MHz by all the space stations within any radionavigation-satellite service 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. In order not to cause harmful interference to the radio astronomy service in the frequency band 4 990-5 000 MHz, radionavigation-satellite service 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)**. (WRC-15)

MOD

5.444 The frequency band 5 030-5 150 MHz is to be used for the operation of the international standard system (microwave landing system) for precision approach and landing. In the frequency band 5 030-5 091 MHz, the requirements of this system shall have priority over other uses of this frequency band. For the use of the frequency band 5 091-5 150 MHz, No. **5.444A** and Resolution **114 (Rev.WRC-15)** apply. (WRC-15)

MOD

5.444A The use of the allocation to the fixed-satellite service (Earth-to-space) in the frequency band 5 091-5 150 MHz is limited to feeder links of non-geostationary satellite systems in the mobile-satellite service and is subject to coordination under No. **9.11A**. The use of the frequency band 5 091-5 150 MHz by feeder links of non-geostationary satellite systems in the mobile-satellite service shall be subject to application of Resolution **114 (Rev.WRC-15)**. Moreover, to ensure that the aeronautical radionavigation service is protected from harmful interference, coordination is required for feeder-link earth stations of the non-geostationary satellite systems in the mobile-satellite service which are separated by less than 450 km from the territory of an administration operating ground stations in the aeronautical radionavigation service. (WRC-15)

MOD

5.444B The use of the frequency band 5 091-5 150 MHz by the aeronautical mobile service is limited to:

– systems operating in the aeronautical mobile (R) service and in accordance with international aeronautical standards, limited to surface applications at airports. Such use shall be in accordance with Resolution **748 (Rev.WRC-15)**;

– aeronautical telemetry transmissions from aircraft stations (see No. **1.83**) in accordance with Resolution **418 (Rev.WRC-15)**. (WRC-15)

MOD

5.446 *Additional allocation:* in the countries listed in No. **5.369**, the frequency band 5 150-5 216 MHz is also allocated to the radiodetermination-satellite service (space-to-Earth) on a primary basis, subject to agreement obtained under No. **9.21**. In Region 2 (except in Mexico), the frequency band is also allocated to the radiodetermination-satellite service (space-to-Earth) on a primary basis. In Regions 1 and 3, except those countries listed in No. **5.369** and Bangladesh, the frequency band is also allocated to the radiodetermination-satellite service (space-to-Earth) on a secondary basis. The use by the radiodetermination-satellite service is limited to feeder links in conjunction with the radiodetermination-satellite service operating in the frequency bands 1 610-1 626.5 MHz and/or 2 483.5-2 500 MHz. The total power flux-density 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. (WRC-15)

MOD

5.447E *Additional allocation:* The frequency band 5 250-5 350 MHz is also allocated to the fixed service on a primary basis in the following countries in Region 3: Australia, Korea (Rep. of), India, Indonesia, Iran (Islamic Republic of), Japan, Malaysia, Papua New Guinea, the Philippines, Dem. People's Rep. of Korea, Sri Lanka, Thailand and Viet Nam. The use of this frequency band by the fixed service is intended for the implementation of fixed wireless access systems and shall comply with Recommendation ITU-R F.1613-0. In addition, the fixed service shall not claim protection from the radiodetermination, Earth exploration-satellite (active) and space research (active) services, but the provisions of No. **5.43A** do not apply to the fixed service with respect to the Earth exploration-satellite (active) and space research (active) services. After implementation of fixed wireless access systems in the fixed service with protection for the existing radiodetermination systems, no more stringent constraints should be imposed on the fixed wireless access systems by future radiodetermination implementations. (WRC-15)

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). These services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in Recommendations ITU-R M.1638-0 and ITU-R RS.1632-0. (WRC-15)

MOD

5.450A In the frequency band 5 470-5 725 MHz, stations in the mobile service shall not claim protection from radiodetermination services. Radiodetermination services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in Recommendation ITU-R M.1638-0. (WRC-15)

MOD

5 570-7 250 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 725-5 830 FIXED-SATELLITE (Earth-to-space) RADIOLOCATION Amateur 5.150 5.451 5.453 5.455	**5 725-5 830** RADIOLOCATION Amateur 5.150 5.453 5.455	
5 830-5 850 FIXED-SATELLITE (Earth-to-space) RADIOLOCATION Amateur Amateur-satellite (space-to-Earth) 5.150 5.451 5.453 5.455	**5 830-5 850** RADIOLOCATION Amateur Amateur-satellite (space-to-Earth) 5.150 5.453 5.455	

MOD

5 570-7 250 MHz

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

MOD

5 570-7 250 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
7 145-7 190	FIXED MOBILE SPACE RESEARCH (deep space) (Earth-to-space) 5.458 MOD 5.459	
7 190-7 235	EARTH EXPLORATION-SATELLITE (Earth-to-space) ADD 5.A111 ADD 5.B111 FIXED MOBILE SPACE RESEARCH (Earth-to-space) MOD 5.460 5.458 MOD 5.459	
7 235-7 250	EARTH EXPLORATION-SATELLITE (Earth-to-space) ADD 5.A111 FIXED MOBILE 5.458	

MOD

5 570-7 250 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 5.458 5.458A 5.458B	

ADD

5.A111 The use of the frequency band 7 190-7 250 MHz (Earth-to-space) by the Earth exploration-satellite service shall be limited to tracking, telemetry and command for the operation of spacecraft. Space stations operating in the Earth exploration-satellite service (Earth-to-space) in the frequency band 7 190-7 250 MHz shall not claim protection from existing and future stations in the fixed and mobile services, and No. **5.43A** does not apply. No. **9.17** applies. Additionally, to ensure protection of the existing and future deployment of fixed and mobile services, the location of earth stations supporting spacecraft in the Earth exploration-satellite service in non-geostationary orbits or geostationary orbit shall maintain a separation distance of at least 10 km and 50 km, respectively, from the respective border(s) of neighbouring countries, unless a shorter distance is otherwise agreed between the corresponding administrations. (WRC-15)

ADD

5.B111 Space stations on the geostationary orbit operating in the Earth exploration-satellite service (Earth-to-space) in the frequency band 7 190-7 235 MHz shall not claim protection from existing and future stations of the space research service, and No. **5.43A** does not apply. (WRC-15)

SUP

5.456

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-03)**. 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 (WRC-03)** shall apply. (WRC-15)

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 (WRC-03)** 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 (WRC-03)**. (WRC-15)

MOD

5.457C In Region 2 (except Brazil, Cuba, French overseas departments and communities, Guatemala, Mexico, Paraguay, Uruguay and Venezuela), the frequency band 5 925-6 700 MHz may be used for aeronautical mobile telemetry for flight testing by aircraft stations (see No. **1.83**). Such use shall be in accordance with Resolution **416 (WRC-07)** and shall not cause harmful interference to, or claim protection from, the fixed-satellite and fixed services. Any such use does not preclude the use of this frequency band by other mobile 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. (WRC-15)

SUP

5.458C

MOD

5.459 *Additional allocation:* in the Russian Federation, the frequency bands 7 100-7 155 MHz and 7 190-7 235 MHz are also allocated to the space operation service (Earth-to-space) on a primary basis, subject to agreement obtained under No. **9.21**. In the frequency band 7 190-7 235 MHz, with respect to the Earth exploration-satellite service (Earth-to-space), No. **9.21** does not apply. (WRC-15)

MOD

5.460 No emissions from space research service (Earth-to-space) systems intended for deep space shall be effected in the frequency band 7 190-7 235 MHz. Geostationary satellites in the space research service operating in the frequency band 7 190-7 235 MHz shall not claim protection from existing and future stations of the fixed and mobile services and No. **5.43A** does not apply. (WRC-15)

MOD

7 250-8 500 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
7 300-7 375	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.461	
7 375-7 450	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MARITIME MOBILE-SATELLITE (space-to-Earth) ADD 5.A192 ADD 5.B192	
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) ADD 5.A192 ADD 5.B192 5.461A	
7 550-7 750	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MARITIME MOBILE-SATELLITE (space-to-Earth) ADD 5.A192 ADD 5.B192	

ADD

5.A192 The use of the frequency band 7 375-7 750 MHz by the maritime mobile-satellite service is limited to geostationary-satellite networks. (WRC-15)

ADD

5.B192 In the frequency band 7 375-7 750 MHz, earth stations in the maritime mobile-satellite service shall not claim protection from, nor constrain the use and development of, stations in the fixed and mobile, except aeronautical mobile, services. No. **5.43A** does not apply. (WRC-15)

MOD

8 500-10 000 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
9 200-9 300	EARTH EXPLORATION-SATELLITE (active) ADD 5.A112 ADD 5.C112 ADD 5.D112 RADIOLOCATION MARITIME RADIONAVIGATION 5.472 5.473 5.474 ADD 5.B112	

MOD

8 500-10 000 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
9 900-10 000	EARTH EXPLORATION-SATELLITE (active) ADD 5.A112 ADD 5.C112 ADD 5.D112 RADIOLOCATION Fixed 5.477 5.478 5.479 ADD 5.B112	

ADD

5.A112 The use of the frequency bands 9 200-9 300 MHz and 9 900-10 400 MHz by the Earth exploration-satellite service (active) is limited to systems requiring necessary bandwidth greater than 600 MHz that cannot be fully accommodated within the frequency band 9 300-9 900 MHz. Such use is subject to agreement to be obtained under No. **9.21** from Algeria, Saudi Arabia, Bahrain, Egypt, Indonesia, Iran (Islamic Republic of), Lebanon and Tunisia. An administration that has not replied under No. **9.52** is considered as not having agreed to the coordination request. In this case, the notifying administration of the satellite system operating in the Earth exploration-satellite service (active) may request the assistance of the Bureau under Sub-Section IID of Article **9**. (WRC-15)

ADD

5.C112 Stations operating in the Earth exploration-satellite (active) service shall comply with Recommendation ITU-R RS.2066-0. (WRC-15)

ADD

5.D112 Stations operating in the Earth exploration-satellite (active) service shall comply with Recommendation ITU-R RS.2065-0. (WRC-15)

ADD

5.B112 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. (WRC-15)

MOD

5.468 *Additional allocation:* in Saudi Arabia, Bahrain, Bangladesh, Brunei Darussalam, Burundi, Cameroon, China, Congo (Rep. of the), Djibouti, Egypt, the United Arab Emirates, Gabon, Guyana, Indonesia, Iran (Islamic Republic of), Iraq, Jamaica, Jordan, Kenya, Kuwait, Lebanon, Libya, Malaysia, Mali, Morocco, Mauritania, Nepal, Nigeria, Oman, Uganda, Pakistan, Qatar, Syrian Arab Republic, the Dem. People's Rep. of Korea, Senegal, Singapore, Somalia, Sudan, Swaziland, Chad, Togo, Tunisia and Yemen, the frequency band 8 500-8 750 MHz is also allocated to the fixed and mobile services on a primary basis. (WRC-15)

MOD

5.471 *Additional allocation:* in Algeria, Germany, Bahrain, Belgium, China, Egypt, the United Arab Emirates, France, Greece, Indonesia, Iran (Islamic Republic of), Libya, the Netherlands, Qatar and Sudan, the frequency bands 8 825-8 850 MHz and 9 000-9 200 MHz are also allocated to the maritime radionavigation service, on a primary basis, for use by shore-based radars only. (WRC-15)

MOD

5.477 *Different category of service:* in Algeria, Saudi Arabia, Bahrain, Bangladesh, Brunei Darussalam, Cameroon, Djibouti, Egypt, the United Arab Emirates, Eritrea, Ethiopia, Guyana, India, Indonesia, Iran (Islamic Republic of), Iraq, Jamaica, Japan, Jordan, Kuwait, Lebanon, Liberia, Malaysia, Nigeria, Oman, Uganda, Pakistan, Qatar, Syrian Arab Republic, the Dem. People's Rep. of Korea, Singapore, Somalia, Sudan, South Sudan, Trinidad and Tobago, and Yemen, the allocation of the frequency band 9 800-10 000 MHz to the fixed service is on a primary basis (see No. **5.33**). (WRC-15)

MOD

10-11.7 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
10-10.4 EARTH EXPLORATION-SATELLITE (active) ADD 5.A112 ADD 5.C112 ADD 5.D112 FIXED MOBILE RADIOLOCATION Amateur 5.479 ADD 5.B112	**10-10.4** EARTH EXPLORATION-SATELLITE (active) ADD 5.A112 ADD 5.C112 ADD 5.D112 RADIOLOCATION Amateur 5.479 5.480 ADD 5.B112	**10-10.4** EARTH EXPLORATION-SATELLITE (active) ADD 5.A112 ADD 5.C112 ADD 5.D112 FIXED MOBILE RADIOLOCATION Amateur 5.479 ADD 5.B112

10.4-10.45 FIXED MOBILE RADIOLOCATION Amateur	**10.4-10.45** RADIOLOCATION Amateur 5.480	**10.4-10.45** FIXED MOBILE RADIOLOCATION Amateur

MOD

10-11.7 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
10.7-10.95 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 (Earth-to-space) 5.484 MOBILE except aeronautical mobile	**10.7-10.95** FIXED FIXED-SATELLITE (space-to-Earth) 5.441 MOBILE except aeronautical mobile	
10.95-11.2 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A ADD 5.A15 (Earth-to-space) 5.484 MOBILE except aeronautical mobile	**10.95-11.2** FIXED FIXED-SATELLITE (space-to-Earth) 5.484A ADD 5.A15 MOBILE except aeronautical mobile	
11.2-11.45 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 (Earth-to-space) 5.484 MOBILE except aeronautical mobile	**11.2-11.45** FIXED FIXED-SATELLITE (space-to-Earth) 5.441 MOBILE except aeronautical mobile	
11.45-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.484 ADD 5.A15 MOBILE except aeronautical mobile	**11.45-11.7** FIXED FIXED-SATELLITE (space-to-Earth) 5.484A ADD 5.A15 MOBILE except aeronautical mobile	

ADD

5.A15 Resolution **COM4/5 (WRC-15)** shall apply. (WRC-15)

MOD

5.480 *Additional allocation:* in Argentina, Brazil, Chile, Cuba, El Salvador, Ecuador, Guatemala, Honduras, Paraguay, the Netherlands Antilles, Peru and Uruguay, the frequency band 10-10.45 GHz is also allocated to the fixed and mobile services on a primary basis. In Colombia, Costa Rica, Mexico and Venezuela, the frequency band 10-10.45 GHz is also allocated to the fixed service on a primary basis. (WRC-15)

MOD

5.481 *Additional allocation:* in Algeria, Germany, Angola, Brazil, China, Côte d'Ivoire, El Salvador, Ecuador, Spain, Guatemala, Hungary, Japan, Kenya, Morocco, Nigeria, Oman, Uzbekistan, Pakistan, Paraguay, Peru, the Dem. People's Rep. of Korea, Romania and Uruguay, the frequency band 10.45-10.5 GHz is also allocated to the fixed and mobile services on a primary basis. In Costa Rica, the frequency band 10.45-10.5 GHz is also allocated to the fixed service on a primary basis. (WRC-15)

MOD

11.7-14 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>13.4-13.65
EARTH EXPLORATION-SATELLITE (active)
FIXED-SATELLITE (space-to-Earth) ADD 5.A161 ADD 5.X161
RADIOLOCATION
SPACE RESEARCH ADD 5.B161 ADD 5.B161A
Standard frequency and time signal-satellite (Earth-to-space)
5.499 5.500 5.501 5.501B ADD 5.C161</td><td colspan="2">13.4-13.65
EARTH EXPLORATION-SATELLITE (active)
RADIOLOCATION
SPACE RESEARCH ADD 5.B161 ADD 5.B161A
Standard frequency and time signal-satellite (Earth-to-space)
5.499 5.500 5.501 5.501B</td></tr>
<tr><td>13.65-13.75</td><td colspan="2">EARTH EXPLORATION-SATELLITE (active)
RADIOLOCATION
SPACE RESEARCH MOD 5.501A
Standard frequency and time signal-satellite (Earth-to-space)
5.499 5.500 5.501 5.501B</td></tr>
</table>

ADD

5.A161 The use of the frequency band 13.4-13.65 GHz by the fixed-satellite service (space-to-Earth) is limited to geostationary-satellite systems and is subject to agreement obtained under No. **9.21** with respect to satellite systems operating in the space research service (space-to-space) to relay data from space stations in the geostationary-satellite orbit to associated space stations in non-geostationary satellite orbits for which advance publication information has been received by the Bureau by 27 November 2015. (WRC-15)

ADD

5.X161 Administrations shall not preclude the deployment and operation of transmitting earth stations in the standard frequency and time signal-satellite service (Earth-to-space) allocated on a secondary basis in the frequency band 13.4-13.65 GHz due to the primary allocation to FSS (space-to-Earth). (WRC-15)

ADD

5.B161 The allocation of the frequency band 13.4-13.65 GHz to the space research service on a primary basis is limited to:

– satellite systems operating in the space research service (space-to-space) to relay data from space stations in the geostationary-satellite orbit to associated space stations in non-geostationary satellite orbits for which advance publication information has been received by the Bureau by 27 November 2015,

– active spaceborne sensors,

– satellite systems operating in the space research service (space-to-Earth) to relay data from space stations in the geostationary-satellite orbit to associated earth stations.

Other uses of the frequency band by the space research service are on a secondary basis. (WRC-15)

ADD

5.B161A In the frequency band 13.4-13.65 GHz, satellite systems in the space research service (space-to-Earth) and/or the space research service (space-to-space) shall not cause harmful interference to, nor claim protection from, stations in the fixed, mobile, radiolocation and Earth exploration-satellite (active) services. (WRC-15)

ADD

5.C161 In the frequency band 13.4-13.65 GHz, geostationary-satellite networks in the fixed-satellite service (space-to-Earth) shall not claim protection from space stations in the Earth exploration-satellite service (active) operating in accordance with these Regulations, and No. **5.43A** does not apply. The provisions of No. **22.2** do not apply to the Earth exploration-satellite service (active) with respect to the fixed-satellite service (space-to-Earth) in this frequency band. (WRC-15)

MOD

11.7-14 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="3">11.7-12.5
FIXED
MOBILE except aeronautical mobile
BROADCASTING
BROADCASTING-SATELLITE 5.492

5.487 5.487A</td><td>11.7-12.1
FIXED 5.486
FIXED-SATELLITE (space-to-Earth) 5.484A 5.488 ADD 5.A15
Mobile except aeronautical mobile 5.485</td><td rowspan="2">11.7-12.2
FIXED
MOBILE except aeronautical mobile
BROADCASTING
BROADCASTING-SATELLITE 5.492

5.487 5.487A</td></tr>
<tr><td>12.1-12.2
FIXED-SATELLITE (space-to-Earth) 5.484A 5.488 ADD 5.A15
5.485 5.489</td></tr>
<tr><td>12.2-12.7
FIXED
MOBILE except aeronautical mobile
BROADCASTING
BROADCASTING-SATELLITE 5.492

5.487A 5.488 5.490</td><td>12.2-12.5
FIXED
FIXED-SATELLITE (space-to-Earth) ADD 5.A15
MOBILE except aeronautical mobile
BROADCASTING
5.487 5.484A</td></tr>
<tr><td>12.5-12.75
FIXED-SATELLITE (space-to-Earth) 5.484A ADD 5.A15 (Earth-to-space)

5.494 5.495 5.496</td><td>12.7-12.75
FIXED
FIXED-SATELLITE (Earth-to-space)
MOBILE except aeronautical mobile</td><td>12.5-12.75
FIXED
FIXED-SATELLITE (space-to-Earth) 5.484A ADD 5.A15
MOBILE except aeronautical mobile
BROADCASTING-SATELLITE 5.493</td></tr>
</table>

MOD

5.486 *Different category of service:* in the United States, the allocation of the frequency band 11.7-12.1 GHz to the fixed service is on a secondary basis (see No. **5.32**). (WRC-15)

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, 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-15)

MOD

5.495 *Additional allocation:* in France, Greece, Monaco, Montenegro, Uganda, Romania and Tunisia, the frequency band 12.5-12.75 GHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a secondary basis. (WRC-15)

MOD

5.500 *Additional allocation:* in Algeria, Saudi Arabia, Bahrain, Brunei Darussalam, Cameroon, 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, 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-15)

MOD

5.501A The allocation of the frequency band 13.65-13.75 GHz to the space research service on a primary basis is limited to active spaceborne sensors. Other uses of the frequency band by the space research service are on a secondary basis. (WRC-15)

MOD

14-15.4 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>14-14.25</td><td colspan="2">FIXED-SATELLITE (Earth-to-space) MOD 5.457A 5.457B 5.484A 5.506 5.506B
RADIONAVIGATION 5.504
Mobile-satellite (Earth-to-space) 5.504B 5.504C 5.506A
Space research
5.504A 5.505</td></tr>
<tr><td>14.25-14.3</td><td colspan="2">FIXED-SATELLITE (Earth-to-space) MOD 5.457A 5.457B 5.484A 5.506 5.506B
RADIONAVIGATION 5.504
Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.508A
Space research
5.504A 5.505 5.508</td></tr>
<tr><td>14.3-14.4
FIXED
FIXED-SATELLITE (Earth-to-space) MOD 5.457A 5.457B 5.484A 5.506 5.506B
MOBILE except aeronautical mobile
Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A
Radionavigation-satellite
5.504A</td><td>14.3-14.4
FIXED-SATELLITE (Earth-to-space) MOD 5.457A 5.484A 5.506 5.506B
Mobile-satellite (Earth-to-space) 5.506A
Radionavigation-satellite

5.504A</td><td>14.3-14.4
FIXED
FIXED-SATELLITE (Earth-to-space) MOD 5.457A 5.484A 5.506 5.506B
MOBILE except aeronautical mobile
Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A
Radionavigation-satellite
5.504A</td></tr>
</table>

14.4-14.47	FIXED FIXED-SATELLITE (Earth-to-space) MOD 5.457A 5.457B 5.484A 5.506 5.506B MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Space research (space-to-Earth) 5.504A
14.47-14.5	FIXED FIXED-SATELLITE (Earth-to-space) MOD 5.457A 5.457B 5.484A 5.506 5.506B MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Radio astronomy 5.149 5.504A

MOD

14-15.4 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
14-14.25	FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B ADD 5.A15 RADIONAVIGATION 5.504 Mobile-satellite (Earth-to-space) 5.504B 5.504C 5.506A Space research 5.504A 5.505	
14.25-14.3	FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B ADD 5.A15 RADIONAVIGATION 5.504 Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.508A Space research 5.504A 5.505 5.508	
14.3-14.4 FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B ADD 5.A15 MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Radionavigation-satellite 5.504A	**14.3-14.4** FIXED-SATELLITE (Earth-to-space) 5.457A 5.484A 5.506 5.506B ADD 5.A15 Mobile-satellite (Earth-to-space) 5.506A Radionavigation-satellite 5.504A	**14.3-14.4** FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.484A 5.506 5.506B ADD 5.A15 MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Radionavigation-satellite 5.504A
14.4-14.47	FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B ADD 5.A15 MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Space research (space-to-Earth) 5.504A	

MOD

14-15.4 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
14.5-14.75	FIXED FIXED-SATELLITE (Earth-to-space) MOD 5.510 ADD 5.A16 ADD 5.B16 ADD 5.D16 ADD 5.E16 ADD 5.F16 MOBILE Space research ADD 5.C16	
14.75-14.8 FIXED FIXED-SATELLITE (Earth-to-space) MOD 5.510 MOBILE Space research ADD 5.C16		**14.75-14.8** FIXED FIXED-SATELLITE (Earth-to-space) MOD 5.510 ADD 5.A16 ADD 5.B16 ADD 5.D16 ADD 5.E16 ADD 5.F16 MOBILE Space research ADD 5.C16

ADD

5.A16 The use of the frequency bands 14.5-14.75 GHz in countries listed in Resolution **PLEN/1 (WRC-15)** and 14.5-14.8 GHz in countries listed in Resolution **PLEN/2 (WRC-15)** by the fixed-satellite service (Earth-to-space) not for feeder links for the broadcasting-satellite service is limited to geostationary-satellites. (WRC-15)

ADD

5.B16 For the use of the frequency bands 14.5-14.75 GHz in countries listed in Resolution **PLEN/1 (WRC-15)** and 14.5-14.8 GHz in countries listed in Resolution **PLEN/2 (WRC-15)** by the fixed-satellite service (Earth-to-space) not for feeder links for the broadcasting-satellite service, the fixed-satellite service earth stations shall have a minimum antenna diameter of 6 m and a maximum power spectral density of −44.5 dBW/Hz at the input of the antenna. The earth stations shall be notified at known locations on land. (WRC-15)

ADD

5.D16 Before an administration brings into use an earth station in the fixed-satellite service (Earth-to-space) not for feeder links for the broadcasting-satellite service in the frequency bands 14.5-14.75 GHz (in countries listed in Resolution **PLEN/1 (WRC-15)**) and 14.5-14.8 GHz (in countries listed in Resolution **PLEN/2 (WRC-15)**), it shall ensure that the power flux-density produced by this earth station does not exceed −151.5 dB(W/(m^2 · 4 kHz)) produced at all altitudes from 0 m to 19 000 m above sea level at 22 km seaward from all coasts, defined as the low-water mark, as officially recognized by each coastal State. (WRC-15)

ADD

5.E16 In the frequency bands 14.50-14.75 GHz in countries listed in Resolution **PLEN/1 (WRC-15)** and 14.50-14.8 GHz in countries listed in Resolution **PLEN/2 (WRC-15)**, the location of earth stations in the fixed-satellite service (Earth-to-space) not for feeder links for the

broadcasting-satellite service shall maintain a separation distance of at least 500 km from the border(s) of other countries unless shorter distances are explicitly agreed by those administrations. No. **9.17** does not apply. When applying this provision, administrations should consider the relevant parts of these Regulations and the latest relevant ITU-R Recommendations. (WRC-15)

ADD

5.F16 In the frequency bands 14.50-14.75 GHz in countries listed in Resolution **PLEN/1 (WRC-15)** and 14.50-14.8 GHz in countries listed in Resolution **PLEN/2 (WRC-15)**, earth stations in the fixed-satellite service (Earth-to-space) not for feeder links for the broadcasting-satellite service shall not constrain the future deployment of the fixed and mobile services. (WRC-15)

ADD

5.C16 The frequency band 14.5-14.8 GHz is also allocated to the space research service on a primary basis. However, such use is limited to the satellite systems operating in the space research service (Earth-to-space) to relay data to space stations in the geostationary-satellite orbit from associated earth stations. Stations in the space research service shall not cause harmful interference to, or claim protection from, stations in the fixed and mobile services and in the fixed-satellite service limited to feeder links for the broadcasting-satellite service and associated space operations functions using the guardbands under Appendix **30A** and feeder links for the broadcasting-satellite service in Region 2. Other uses of this frequency band by the space research service are on a secondary basis. (WRC-15)

MOD

5.504B Aircraft earth stations operating in the aeronautical mobile-satellite service in the frequency band 14-14.5 GHz shall comply with the provisions of Annex 1, Part C of Recommendation ITU-R M.1643-0, with respect to any radio astronomy station performing observations in the 14.47-14.5 GHz frequency band located on the territory of Spain, France, India, Italy, the United Kingdom and South Africa. (WRC-15)

MOD

5.504C In the frequency band 14-14.25 GHz, the power flux-density produced on the territory of the countries of Saudi Arabia, Bahrain, Botswana, Côte d'Ivoire, Egypt, Guinea, India, Iran (Islamic Republic of), Kuwait, Nigeria, Oman, the Syrian Arab Republic 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-15)

MOD

5.505 *Additional allocation:* in Algeria, Saudi Arabia, Bahrain, Botswana, Brunei Darussalam, Cameroon, China, Congo (Rep. of the), Korea (Rep. of), Djibouti, Egypt, the United Arab Emirates, Gabon, Guinea, India, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Japan,

Jordan, Kuwait, Lebanon, Malaysia, Mali, Morocco, Mauritania, Oman, the Philippines, Qatar, the Syrian Arab Republic, the Dem. People's Rep. of Korea, Singapore, Somalia, Sudan, South Sudan, Swaziland, Chad, Viet Nam and Yemen, the frequency band 14-14.3 GHz is also allocated to the fixed service on a primary basis. (WRC-15)

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-03)** from these countries. (WRC-15)

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, France, 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-15)

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, France, 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-15)

MOD

5.510 Except for use in accordance with Resolution **PLEN/1 (WRC-15)** and Resolution **PLEN/2 (WRC-15)**, the use of the frequency band 14.5-14.8 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. This use is reserved for countries outside Europe. Uses other than feeder links for the broadcasting-satellite service are not authorized in Regions 1 and 2 in the frequency band 14.75-14.8 GHz. (WRC-15)

MOD

15.4-18.4 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
15.4-15.43	RADIOLOCATION 5.511E 5.511F AERONAUTICAL RADIONAVIGATION	
15.43-15.63	FIXED-SATELLITE (Earth-to-space) MOD 5.511A RADIOLOCATION 5.511E 5.511F AERONAUTICAL RADIONAVIGATION 5.511C	
15.63-15.7	RADIOLOCATION 5.511E 5.511F AERONAUTICAL RADIONAVIGATION	

MOD

5.511A Use of the frequency band 15.43-15.63 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links of non-geostationary systems in the mobile-satellite service, subject to coordination under No. **9.11A**. (WRC-15)

MOD

5.511C Stations operating in the aeronautical radionavigation service shall limit the effective e.i.r.p. in accordance with Recommendation ITU-R S.1340-0. The minimum coordination distance required to protect the aeronautical radionavigation stations (No. **4.10** applies) from harmful interference from feeder-link earth stations and the maximum e.i.r.p. transmitted towards the local horizontal plane by a feeder-link earth station shall be in accordance with Recommendation ITU-R S.1340-0. (WRC-15)

SUP

5.511D

MOD

5.512 *Additional allocation:* in Algeria, Saudi Arabia, Austria, Bahrain, Bangladesh, Brunei Darussalam, Cameroon, Congo (Rep. of the), Egypt, El Salvador, the United Arab Emirates, Eritrea, Finland, Guatemala, India, Indonesia, Iran (Islamic Republic of), Jordan, Kenya, Kuwait, Lebanon, Libya, Malaysia, Mali, Morocco, Mauritania, Montenegro, Nepal, Nicaragua, Niger, Oman, Pakistan, Qatar, Syrian Arab Republic, the Dem. Rep. of the Congo, Singapore, Somalia, Sudan, South Sudan, Chad, Togo and Yemen, the frequency band 15.7-17.3 GHz is also allocated to the fixed and mobile services on a primary basis. (WRC-15)

MOD

5.514 *Additional allocation:* in Algeria, Saudi Arabia, Bahrain, Bangladesh, Cameroon, 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, 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-15)

MOD

5.521 *Alternative allocation:* in the United Arab Emirates and Greece, 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-15)

MOD

18.4-22 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
21.4-22 FIXED MOBILE BROADCASTING-SATELLITE 5.208B 5.530A 5.530B 5.530D	**21.4-22** FIXED MOBILE 5.530A	**21.4-22** FIXED MOBILE BROADCASTING-SATELLITE 5.208B 5.530A 5.530B 5.530D 5.531

MOD

18.4-22 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B ADD 5.5X ADD 5.A15 Mobile-satellite (space-to-Earth) 5.524	**19.7-20.1** FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B ADD 5.5X ADD 5.A15 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 5.516B ADD 5.5X ADD 5.A15 Mobile-satellite (space-to-Earth) 5.524
20.1-20.2	FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B ADD 5.5X ADD 5.A15 MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528	

ADD

5.5X The operation of earth stations in motion communicating with the FSS is subject to Resolution **COM5/2 (WRC-15)**. (WRC-15)

MOD

5.524 *Additional allocation:* in Afghanistan, Algeria, Saudi Arabia, Bahrain, Brunei Darussalam, Cameroon, China, Congo (Rep. of the), Costa Rica, 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, 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-15)

MOD

5.530A Unless otherwise agreed between the administrations concerned, any station in the fixed or mobile services of an administration shall not produce a power flux-density in excess of −120.4 dB(W/(m^2 · MHz)) at 3 m above the ground of any point of the territory of any other administration in Regions 1 and 3 for more than 20% of the time. In conducting the calculations, administrations should use the most recent version of Recommendation ITU-R P.452 (see also the most recent version of Recommendation ITU-R BO.1898). (WRC-15)

SUP

5.530C

MOD

24.75-29.9 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 ADD 5.5X ADD 5.A15 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 5.516B 5.539 ADD 5.5X ADD 5.A15 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 5.516B 5.539 ADD 5.5X ADD 5.A15 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542

MOD

5.536B In Saudi Arabia, Austria, Bahrain, Belgium, Brazil, China, Korea (Rep. of), Denmark, Egypt, United Arab Emirates, Estonia, Finland, Hungary, India, Iran (Islamic Republic of), Ireland, Israel, Italy, Jordan, Kenya, Kuwait, Lebanon, Libya, Lithuania, Moldova, Norway, Oman, Uganda, Pakistan, the Philippines, Poland, Portugal, the Syrian Arab Republic, Dem. People's Rep. of

Korea, Slovakia, the Czech Rep., Romania, the United Kingdom, Singapore, Sweden, Tanzania, Turkey, 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. (WRC-15)

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 5.516B 5.539 ADD 5.5X ADD 5.A15 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	

MOD

5.543A In Bhutan, Cameroon, Korea (Rep. of), the Russian Federation, India, Indonesia, Iran (Islamic Republic of), Iraq, Japan, Kazakhstan, Malaysia, Maldives, Mongolia, Myanmar, Uzbekistan, Pakistan, the Philippines, Kyrgyzstan, the Dem. People's Rep. of Korea, Sudan, Sri Lanka, Thailand and Viet Nam, the allocation to the fixed service in the frequency band 31-31.3 GHz may also be used by systems using high altitude platform stations (HAPS) in the ground-to-HAPS direction. The use of the frequency band 31-31.3 GHz by systems using HAPS is limited to the territory of the countries listed above and shall not cause harmful interference to, nor claim protection from, other types of fixed-service systems, systems in the mobile service and systems operated under No. **5.545**. Furthermore, the development of these services shall not be constrained by HAPS. Systems using HAPS in the frequency band 31-31.3 GHz shall not cause harmful interference to the radio astronomy service having a primary allocation in the frequency band 31.3-31.8 GHz, taking into account the protection criterion as given in the most recent version of Recommendation ITU-R RA.769. In order to ensure the protection of satellite passive services, the level of unwanted power density into a HAPS ground station antenna in the frequency band 31.3-31.8 GHz shall be limited to −106 dB(W/MHz) under clear-sky conditions, and may be increased up to −100 dB(W/MHz) under rainy conditions to mitigate fading due to rain, provided the effective impact on the passive satellite does not exceed the impact under clear-sky conditions. See Resolution **145 (Rev.WRC-12)**. (WRC-15)

MOD

5.551H The equivalent power flux-density (epfd) produced in the frequency band 42.5-43.5 GHz by all space stations in any non-geostationary-satellite system in the fixed-satellite service (space-to-Earth), or in the broadcasting-satellite service operating in the frequency band 42-42.5 GHz, shall not exceed the following values at the site of any radio astronomy station for more than 2% of the time:

−230 dB(W/m^2) in 1 GHz and −246 dB(W/m^2) in any 500 kHz of the frequency band 42.5-43.5 GHz at the site of any radio astronomy station registered as a single-dish telescope; and

−209 dB(W/m^2) in any 500 kHz of the frequency band 42.5-43.5 GHz at the site of any radio astronomy station registered as a very long baseline interferometry station.

These epfd values shall be evaluated using the methodology given in Recommendation ITU-R S.1586-1 and the reference antenna pattern and the maximum gain of an antenna in the radio astronomy service given in Recommendation ITU-R RA.1631-0 and shall apply over the whole sky and for elevation angles higher than the minimum operating angle θ_{min} of the radiotelescope (for which a default value of 5° should be adopted in the absence of notified information).

These values shall apply at any radio astronomy station that either:

– was in operation prior to 5 July 2003 and has been notified to the Bureau before 4 January 2004; or

– was notified before the date of receipt of the complete Appendix **4** information for coordination or notification, as appropriate, for the space station to which the limits apply.

Other radio astronomy stations notified after these dates may seek an agreement with administrations that have authorized the space stations. In Region 2, Resolution **743 (WRC-03)** shall apply. The limits in this footnote may be exceeded at the site of a radio astronomy station of any country whose administration so agreed. (WRC-15)

MOD

66-81 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
77.5-78	AMATEUR AMATEUR-SATELLITE RADIOLOCATION ADD 5.A118 Radio astronomy Space research (space-to-Earth) 5.149	

ADD

5.A118 The use of the frequency band 77.5-78 GHz by the radiolocation service shall be limited to short-range radar for ground-based applications, including automotive radars. The technical characteristics of these radars are provided in the most recent version of Recommendation ITU-R M.2057. The provisions of No. **4.10** do not apply. (WRC-15)

MOD

5.562D *Additional allocation*: In Korea (Rep. of), the frequency bands 128-130 GHz, 171-171.6 GHz, 172.2-172.8 GHz and 173.3-174 GHz are also allocated to the radio astronomy service on a primary basis. Radio astronomy stations in Korea (Rep. of) operating in the frequency bands referred to in this footnote shall not claim protection from, or constrain the use and development of, services in other countries operating in accordance with the Radio Regulations. (WRC-15)

MOD

ARTICLE 9

Procedure for effecting coordination with or obtaining agreement of other administrations[1, 2, 3, MOD 4, 5, 6, 7, 8, 8*bis*] (WRC-15)

MOD

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[4] **A.9.4** Resolution **49 (Rev.WRC-15)** or Resolution **552 (Rev.WRC-15)**, as appropriate, shall also be applied with respect to those satellite networks and satellite systems that are subject to it. (WRC-15)

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

General

MOD

9.1 Before initiating any action under Article **11** in respect of frequency assignments for a satellite network or a satellite system not subject to the coordination procedure described in Section II of Article **9** below, an administration, or one[9] acting on behalf of a group of named administrations, shall send to the Bureau a general description of the network or system for advance publication in the International Frequency Information Circular (BR IFIC) not earlier than seven years and preferably not later than two years before the planned date of bringing into use of the network or system (see also No. **11.44**). The characteristics to be provided for this purpose are listed in Appendix **4**. The notification information may also be communicated to the Bureau at the same time, but shall be considered as having been received by the Bureau not earlier than six months after the date of publication of the advance publication information. (WRC-15)

ADD

9.1A Upon receipt of the complete information sent under No. **9.30**, the Bureau shall publish, using the basic characteristics of the coordination request, a general description of the network or system for advance publication in a Special Section of the BR IFIC. The characteristics to be published for this purpose are listed in Appendix **4**. (WRC-15)

MOD

9.2 Amendments to the information sent in accordance with the provisions of No. **9.1** shall also be sent to the Bureau as soon as they become available. The use of an additional frequency band, or modification of the orbital location for a space station using the geostationary-satellite orbit, the modification of the reference body or the modification of the direction of transmission for a space station using a non-geostationary-satellite orbit, as well as the use of inter-

satellite links of a geostationary space station communicating with a non-geostationary space station which are not subject to the coordination procedure under Section II of Article 9, will require the application of the advance publication procedure.. (WRC-15)

ADD

9.2C Modifications to coordination information that include the use of an additional frequency band or modification of the orbital location for a space station using the geostationary-satellite orbit will require application of the procedure in No. **9.1A**. (WRC-15)

SUP

Sub-Section IB − Advance publication of information on satellite networks or satellite systems that are subject to coordination procedure under Section II

SUP

9.5B

SUP

[11] **9.5B.1**

SUP

9.5C

SUP

9.5D

Section II − Procedure for effecting coordination[12, 13]

Sub-Section IIB − Acknowledgement of receipt of a request for coordination

MOD

9.47 If there is no acknowledgement of receipt within 30 days after the Bureau's action under No. **9.46**, the Bureau shall immediately send a reminder providing an additional 15-day period for the response. In the absence of such an acknowledgement within 15 days, it shall be deemed that the administration which has failed to acknowledge receipt has undertaken: (WRC-15

Sub-Section IIC − Action upon a request for coordination

MOD

9.50 An administration having received a request for coordination under Nos. **9.7** to **9.21**, or having been included in the procedure following action under No. **9.41**, shall promptly examine the matter with regard to interference which may be caused to or, in certain cases, by its own assignments[23], identified in accordance with Appendix **5**[24, ADD 24*bis*]. (WRC-15)

ADD

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[24*bis*] **9.50.3** See also No. **9.52.1**. (WRC-15)

MOD

9.52 If an administration, following its action under No. **9.50**, does not agree to the request for coordination, it shall, within four months of the date of publication of the BR IFIC under No. **9.38**, or of the date of dispatch of the coordination data under No. **9.29**, inform the requesting administration of its disagreement[ADD 24*ter*] and shall provide information concerning its own assignments upon which that disagreement is based. It shall also make such suggestions as it is able to offer with a view to satisfactory resolution of the matter. A copy of that information shall be sent to the Bureau. Where the information relates to terrestrial stations or earth stations operating in the opposite direction of transmission within the coordination area of an earth station, only that information relating to existing radiocommunication stations or to those to be brought into use within the next three months for terrestrial stations, or three years for earth stations, shall be treated as notifications under Nos. **11.2** or **11.9**. (WRC-15)

ADD

_____

[24*ter*] **9.52.1** An administration believing that 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** 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-15)

Sub-Section IID − Action in the event of no reply, no decision or disagreement on a request for coordination

MOD

9.62 If the administration concerned fails to respond within 30 days of the Bureau's action under No. **9.61**, the Bureau shall immediately send a reminder providing an additional

15-day period for the response. If the administration still fails to respond after the Bureau's reminder within the 15 days, the provisions of Nos. **9.48** and **9.49** shall apply. (WRC-15)

MOD

ARTICLE 11

Notification and recording of frequency assignments[1, MOD2, 3, 4, 5, 6, 7, 7*bis*] (WRC-15)

MOD

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[2] **A.11.2** Resolution **49 (Rev.WRC-15)** or Resolution **552 (Rev.WRC-15)**, as appropriate, shall also be applied with respect to those satellite networks and satellite systems that are subject to it. (WRC-15)

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

MOD

11.32A *c)* with respect to the probability of harmful interference that may be caused to or by assignments recorded with a favourable finding under Nos. **11.36** and **11.37** or **11.38**, or recorded in application of No. **11.41**, or published under Nos. **9.38** or **9.58** but not yet notified, as appropriate, for those cases for which the notifying administration states that the procedure for coordination under Nos. **9.7**, **9.7A**, **9.7B**, **9.11**, **9.12**, **9.12A**, **9.13** or **9.14**, could not be successfully completed (see also No. **9.65**);[14, ADD14*bis*] or (WRC-15)

ADD

[14*bis*] **11.32A.2** For the application of No. **11.32A** with respect to the procedure for coordination under No. **9.7** in the frequency bands 5 725-5 850 MHz (Region 1), 5 850-6 725 MHz and 7 025-7 075 MHz (Earth-to-space) for satellite networks having a nominal orbital separation in the geostationary-satellite orbit of more than 7°, and in the frequency bands 10.95-11.2 GHz, 11.45-11.7 GHz, 11.7-12.2 GHz (Region 2), 12.2-12.5 GHz (Region 3), 12.5-12.7 GHz (Regions 1 and 3) and 12.7-12.75 GHz (space-to-Earth) and 13.75-14.5 GHz (Earth-to-space) for satellite networks having a nominal orbital separation in the geostationary-satellite orbit of more than 6°, Resolution **COM5/5 (WRC-15)** shall apply. For other cases, the methodology shall be identified and included in the Rules of Procedure, if so required. (WRC-15)

MOD

11.44 The notified date[MOD 20, 21, ADD 21bis] of bringing into use of any frequency assignment to a space station of a satellite network 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. **9.1A** 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-15)

MOD

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[20] **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-15)** or Resolution **552 (Rev.WRC-15)** 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. **9.1A**. If the first notice for recording of the assignments in question under No. **11.15** related to No. **9.1** or No. **9.1A** 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-15)

ADD

[21*bis*] **11.44.3** and **11.44B.1** Upon receipt of this information and whenever it appears from reliable information available that a notified assignment has not been brought into use in accordance with No. **11.44** and/or No. **11.44B**, as the case may be, the consultation procedures and subsequent applicable course of action prescribed in No. **13.6** shall apply, as appropriate. (WRC-15)

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[ADD 21*bis*, ADD 22*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 **COM5/4 (WRC-15)** shall apply. (WRC-15)

ADD

22*bis* **11.44B.2** A frequency assignment to a space station in the geostationary-satellite orbit with a notified date of bringing into use more than 120 days prior to the date of receipt of the notification information shall also be considered as having been brought into use if the notifying administration confirms, when submitting the notification information for this assignment, that a space station in the geostationary-satellite orbit with the capability of transmitting or receiving that frequency assignment has been deployed and maintained for a continuous period of time from the notified date of bringing into use until the date of receipt of the notification information for this frequency assignment. (WRC-15)

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. **9.1A** 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-15)** or Resolution **552 (Rev.WRC-15)**, as appropriate, the corresponding information published under Nos. **9.1A**, **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-15)**. (WRC-15)

MOD

11.49 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, subject to the provisions of No. **11.49.1** when 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 [MOD 22] 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. (WRC-15)

MOD

_____

[22] **11.49.1** 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 so inform the Bureau within 30 days from the end of the 90-day period. Resolution **COM5/4 (WRC-15)** shall apply. (WRC-15)

ARTICLE 13

Instructions to the Bureau

Section II − Maintenance of the Master Register and of World Plans by the Bureau

MOD

13.6 *b)* whenever it appears from reliable information available that a recorded assignment has not been brought into use, or is no longer in use, or continues to be in use but not in accordance with the notified required characteristics as specified in Appendix **4**, the Bureau shall consult the notifying administration and request clarification as to whether the assignment was brought into use in accordance with the notified characteristics or continues to be in use in accordance with the notified characteristics. Such a request shall include the reason for the query. In the event of a response and subject to the agreement of the notifying administration the Bureau shall cancel, suitably modify, or retain the basic characteristics of the entry. If the notifying administration does not respond within three months, the Bureau shall issue a reminder. In the event the notifying administration does not respond within one month of the first reminder, the Bureau shall issue a second reminder. In the event the notifying administration does not respond within one month of the second reminder, action taken by the Bureau to cancel the entry shall be subject to a decision of the Board. In the event of non-response or disagreement by the notifying administration, the entry will continue to be taken into account by the Bureau when conducting its examinations until the decision to cancel or modify the entry is made by the Board. In the event of a response, the Bureau shall inform the notifying administration of the conclusion reached by the Bureau within three months of the administration's response. When the Bureau is not in a position to comply with the three-month deadline referred to above, the Bureau shall so inform the notifying administration together with the reasons therefor. In case of disagreement between the notifying administration and the Bureau, the matter shall be carefully investigated by the Board, including taking into account submissions of additional supporting materials from administrations through the Bureau within the deadlines as established by the Board. The application of this provision shall not preclude the application of other provisions of the Radio Regulations. (WRC-15)

ARTICLE 16

International monitoring

MOD

16.2 The international monitoring system comprises only those monitoring stations which have been so nominated by administrations in the information sent to the Secretary-General in accordance with Resolution ITU-R 23 and the most recent version of Recommendation ITU-R SM.1139. These stations may be operated by an administration or, in accordance with an authorization granted by the appropriate administration, by a public or private enterprise, by a common monitoring service established by two or more countries, or by an international organization. (WRC-15)

ARTICLE 19

Identification of stations

Section III − Formation of call signs

MOD

19.48 *b)* combinations in Recommendation ITU-R M.1172-0 that are reserved for the abbreviations to be used in the radiocommunication services. (WRC-15)

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 Recommendations ITU-R M.476-5 and ITU-R M.625-4, their call numbers shall be assigned by the responsible administrations in accordance with the provisions below. (WRC-15)

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.585-7. In accordance with No. **20.16**, administrations shall notify the Radiocommunication Bureau immediately when assigning maritime mobile service identities. (WRC-15)

MOD

19.102 3) The types of maritime mobile service identities shall be as described in Annex 1 of Recommendation ITU-R M.585-7. (WRC-15)

19.108 *B − Maritime identification digits (MIDs)*

MOD

19.108A § 41 The maritime identification digits $M_1I_2D_3$ are an integral part of the maritime mobile service identity and denote, in principle, the administration responsible for the station so identified. In some cases, $M_1I_2D_3$ may denote a geographical area under the responsibility of a specific administration. Furthermore, as indicated in the most recent version of Recommendation ITU-R M.585, some maritime identification digits are reserved for maritime devices and do not correspond either to an administration or to a geographical area. (WRC-15)

19.110 *C − Maritime mobile service identities* (WRC-07)

MOD

19.111 § 43 1) Administrations shall follow Annex 1 of Recommendation ITU-R M.585-7 concerning the assignment and use of maritime mobile service identities. (WRC-15)

ARTICLE 21

Terrestrial and space services sharing frequency bands above 1 GHz

Section I − Choice of sites and frequencies

MOD

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[1] **21.2.1** For their own protection receiving stations in the fixed or mobile service operating in frequency bands shared with space radiocommunication services (space-to-Earth) should also avoid directing their antennas towards the geostationary-satellite orbit if their sensitivity is sufficiently high that interference from space station transmissions may be significant. In particular, in the frequency bands 13.4-13.65 GHz and 21.4-22 GHz, it is recommended to maintain a minimum separation angle of 1.5° with respect to the direction of the geostationary-satellite orbit. (WRC-15)

Section II − Power limits for terrestrial stations

MOD

TABLE **21-2** (Rev.WRC-15)

Frequency band	Service	Limit as specified in Nos.
1 427-1 429 MHz 1 610-1 645.5 MHz (No. **5.359**) 1 646.5-1 660 MHz (No. **5.359**) 1 980-2 010 MHz 2 010-2 025 MHz (Region 2) 2 025-2 110 MHz 2 200-2 290 MHz 2 655-2 670 MHz[5] (Regions 2 and 3) 2 670-2 690 MHz[5] (Regions 2 and 3) 5 670-5 725 MHz (Nos. **5.453** and **5.455**) 5 725-5 755 MHz[5] (Region 1 countries listed in Nos. **5.453** and **5.455**) 5 755-5 850 MHz[5] (Region 1 countries listed in Nos. **5.453** and **5.455**) 5 850-7 075 MHz 7 145-7 235 MHz* 7 900-8 400 MHz	Fixed-satellite Meteorological-satellite Space research Space operation Earth exploration-satellite Mobile-satellite	**21.2**, **21.3**, **21.4** and **21.5**

Section III − Power limits for earth stations

MOD

TABLE **21-3** (Rev.WRC-15)

Frequency band		Services
2 025-2 110 MHz		Earth exploration-satellite Fixed-satellite Meteorological-satellite Mobile-satellite Space operation Space research
5 670-5 725 MHz	(for the countries listed in No. **5.454** with respect to the countries listed in Nos. **5.453** and **5.455**)	
5 725-5 755 MHz[6]	(for Region 1 with respect to the countries listed in Nos. **5.453** and **5.455**)	
5 755-5 850 MHz[6]	(for Region 1 with respect to the countries listed in Nos. **5.453** and **5.455**)	
5 850-7 075 MHz		
7 190-7 250 MHz		
7 900-8 400 MHz		
10.7-11.7 GHz[6]	(for Region 1)	
12.5-12.75 GHz[6]	(for Region 1 with respect to the countries listed in No. **5.494**)	
12.7-12.75 GHz[6]	(for Region 2)	

* For this frequency band only the limits of Nos. **21.3** and **21.5** apply.

12.75-13.25 GHz		
14.0-14.25 GHz	(with respect to the countries listed in No. **5.505**)	
14.25-14.3 GHz	(with respect to the countries listed in Nos. **5.505**, **5.508** and **5.509**)	
14.3-14.4 GHz[6]	(for Regions 1 and 3)	
14.4-14.8 GHz		

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

MOD

TABLE **21-4** (*continued*) (Rev.WRC-15)

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°**	
8 025-8 500 MHz	Earth exploration-satellite (space-to-Earth) Space research (space-to-Earth)	−150	−150 + 0.5(δ − 5)	−140	4 kHz
9 900-10 400 MHz	Earth exploration-satellite (active)	**0°-5.7°**	**5.7°-53°**	**53°-90°**	1 MHz
		−113[xx]	−109 + 25 log(δ − 5)[xx]	−66.6[xx]	
10.7-11.7 GHz	Fixed-satellite (space-to-Earth) (geostationary-satellite orbit)	**0°-5°**	**5°-25°**	**25°-90°**	4 kHz
		−150	−150 + 0.5(δ − 5)	−140	

[xx] **21.16.XX** The pfd values given for EESS (active) are mean pfd values defined as follows:

$$pfd(\delta) = P + 10\log(\tau) + 10\log(PRF) - 30 - 10\log(Bc) + G_t(\delta) - 10\log\left(4\pi d^2(\delta)\right)$$

where:

P: RF peak power at the input of the antenna of the SAR satellite (dBW)

τ: SAR pulse length (μs)

PRF: SAR pulse repetition frequency (kHz)

δ: elevation angle of the EESS SAR satellite above ground, in the vertical plane (perpendicular to the satellite orbit) (°)

Bc: SAR emission bandwidth (MHz)

$G_t(\delta)$: transmit antenna gain of the SAR satellite in the vertical plane (perpendicular to the satellite orbit) for the elevation angle δ considered (dBi)

$d(\delta)$: distance between the SAR satellite and the ground for the elevation angle δ considered (m). (WRC-15)

MOD

TABLE **21-4** (Rev.WRC-15)

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°**	
12.2-12.75 GHz [7] (Region 3) 12.5-12.75 GHz [7] (Region 1 countries listed in Nos. **5.494** and **5.496**)	Fixed-satellite (space-to-Earth) (geostationary-satellite orbit)	−148	−148 + 0.5(δ − 5)		−138	4 kHz
13.4-13.65 GHz (Region 1)	Fixed-satellite (space-to-Earth) (geostationary-satellite orbit)	**0°-25°**	**25°-80°**	**80°-84°**	**84°-90°**	4 kHz
		−159 + 0.4δ[xxx]	−149[xxx]	−149 − 0.5(δ − 80)[xxx]	−151[xxx]	

[xxx] These values are also based on sharing with the Earth exploration-satellite (active) and space research services.

MOD

[9A] **21.16.3A** Resolution **903 (Rev.WRC-15)** shall apply. (WRC-15)

ARTICLE 22

Space services[1]

Section II − Control of interference to geostationary-satellite systems

MOD

22.5A § 5 In the frequency band 6 700-7 075 MHz, the maximum aggregate power flux-density produced at the geostationary-satellite orbit and within ±5° of inclination around the geostationary-satellite orbit by a non-geostationary-satellite system in the fixed-satellite service shall not exceed −168 dB(W/m²) in any 4 kHz band. The maximum aggregate power flux-density shall be calculated in accordance with Recommendation ITU-R S.1256-0. (WRC-15)

MOD

TABLE **22-1D** (Rev.WRC-15)

Limits to the epfd↓ radiated by non-geostationary-satellite systems in the fixed-satellite service in certain frequency bands into 30 cm, 45 cm, 60 cm, 90 cm, 120 cm, 180 cm, 240 cm and 300 cm broadcasting-satellite service antennas[6, 9, 10, 11]

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[MOD 12]
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	−165.841 −165.541 −164.041 −158.6 −158.6 −158.33 −158.33	0 25 96 98.857 99.429 99.429 100	40	30 cm Recommendation ITU-R BO.1443-3, Annex 1
	−175.441 −172.441 −169.441 −164 −160.75 −160 −160	0 66 97.75 99.357 99.809 99.986 100	40	45 cm Recommendation ITU-R BO.1443-3, Annex 1
	−176.441 −173.191 −167.75 −162 −161 −160.2 −160 −160	0 97.8 99.371 99.886 99.943 99.971 99.997 100	40	60 cm Recommendation ITU-R BO.1443-3, Annex 1
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	−178.94 −178.44 −176.44 −171 −165.5 −163 −161 −160 −160	0 33 98 99.429 99.714 99.857 99.943 99.991 100	40	90 cm Recommendation ITU-R BO.1443-3, Annex 1

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[MOD 12]
	−182.44 −180.69 −179.19 −178.44 −174.94 −173.75 −173 −169.5 −167.8 −164 −161.9 −161 −160.4 −160	0 90 98.9 98.9 99.5 99.68 99.68 99.85 99.915 99.94 99.97 99.99 99.998 100	40	120 cm Recommendation ITU-R BO.1443-3, Annex 1
	−184.941 −184.101 −181.691 −176.25 −163.25 −161.5 −160.35 −160 −160	0 33 98.5 99.571 99.946 99.974 99.993 99.999 100	40	180 cm Recommendation ITU-R BO.1443-3, Annex 1
	−187.441 −186.341 −183.441 −178 −164.4 −161.9 −160.5 −160 −160	0 33 99.25 99.786 99.957 99.983 99.994 99.999 100	40	240 cm Recommendation ITU-R BO.1443-3, Annex 1
	−191.941 −189.441 −185.941 −180.5 −173 −167 −162 −160 −160	0 33 99.5 99.857 99.914 99.951 99.983 99.991 100	40	300 cm Recommendation ITU-R BO.1443-3, Annex 1

MOD

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[12] **22.5C.11** For this Table, reference patterns of Annex 1 to Recommendation ITU-R BO.1443-3 shall be used only for the calculation of interference from non-geostationary satellite systems in the fixed-satellite service into geostationary-satellite systems in the broadcasting-satellite service. (WRC-15)

ADD

Section VII – Limits to the interference into the frequency band 14.5-14.8 GHz by the fixed-satellite service (Earth-to-space) not for feeder links for the broadcasting satellite service (WRC-15)

22.40 Under assumed free-space propagation conditions, the power flux-density emitted by an earth station of a geostationary-satellite network not for feeder links for the broadcasting-satellite service in the frequency bands 14.5-14.75 GHz in countries listed in Resolution **PLEN/1 (WRC-15)** and 14.50-14.8 GHz in countries listed in Resolution **PLEN/2 (WRC-15)** shall not exceed the value of −76 dB(W/(m^2 · 27 MHz)) at any point in the geostationary-satellite orbit. (WRC-15)

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.541-10) in each of the HF maritime mobile bands necessary for their service; (WRC-15)

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

MOD

51.41 2) The characteristics of the narrow-band direct-printing equipment shall be in accordance with Recommendations ITU-R M.476-5 and ITU-R M.625-4. The characteristics should also be in accordance with the most recent version of Recommendation ITU-R M.627. (WRC-15)

ARTICLE 52

Special rules relating to the use of frequencies

Section IV − Use of frequencies for digital selective-calling

52.110 *A − General*

MOD

52.112 § 51 The characteristics of the digital selective-calling equipment shall be in accordance with Recommendation ITU-R M.541-10 and should be in accordance with the most recent version of Recommendation ITU-R M.493. (WRC-15)

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.541-10 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-15)

MOD

52.153 2) The international digital selective-calling frequencies shall be as indicated in Recommendation ITU-R M.541-10 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-15)

Section VI − Use of frequencies for radiotelephony

52.176 *A − General*

MOD

52.181 § 85 Single-sideband apparatus in radiotelephone stations of the maritime mobile service operating in the frequency bands allocated to this service between 1 606.5 kHz and 4 000 kHz and in the frequency bands allocated exclusively to this service between 4 000 kHz and 27 500 kHz shall satisfy the technical and operational conditions specified in Recommendation ITU-R M.1173-1. (WRC-15)

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

B2 − Call and reply

MOD

52.192 *b)* by coast stations to announce the transmission, on another frequency, of traffic lists as specified in Recommendation ITU-R M.1171-0. (WRC-15)

MOD

52.195 § 89 1) Before transmitting on the carrier frequency 2 182 kHz, a station shall, in accordance with Recommendation ITU-R M.1171-0, listen on this frequency for a reasonable period to make sure that no distress traffic is being sent. (WRC-15)

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.1171-0, 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-15)

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

C2 − Call and reply

MOD

52.221 § 97 1) Ship stations may use the following carrier frequencies for calling in radiotelephony:

4 125 kHz[2, 3, 4]
6 215 kHz[3, 4]
8 255 kHz
8 291 kHz[4] (see also No. **52.221A**)
12 290 kHz[4] (see also No. **52.221A**)
16 420 kHz[4] (see also No. **52.221A**)
18 795 kHz
22 060 kHz
25 097 kHz (WRC-15)

MOD

52.221A 2) The carrier frequency 8 291 kHz is authorized on a simplex basis for distress and safety traffic only (see also Appendix **15**). Calling on the carrier frequencies 12 290 kHz and 16 420 kHz shall be permitted only to and from rescue coordination centres (see No. **30.6.1**), subject to the safeguards of Resolution **352 (WRC-03)**. The alternative carrier frequencies 12 359 kHz and 16 537 kHz may be used by ship stations and coast stations for calling on a simplex basis, provided that the peak envelope power does not exceed 1 kW. (WRC-15)

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.1171-0, listen on the frequency for a reasonable period to make sure that no distress traffic is being sent (see No. **52.221A**). (WRC-15)

C3 − Traffic

MOD

52.229 4) Transmitters used for radiotelephony in the frequency bands between 4 000 kHz and 27 500 kHz shall comply with technical characteristics specified in Recommendation ITU-R M.1173-1. (WRC-15)

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.1171-0, and important maritime information. (WRC-15)

MOD

52.240 8) Before transmitting on the frequency 156.8 MHz, a station shall, in accordance with Recommendation ITU-R M.1171-0, listen on this frequency for a reasonable period to make sure that no distress traffic is being sent. (WRC-15)

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

52.263 *B – Bands between 4 000 kHz and 27 500 kHz* (WRC-12)

B1 – Mode of operation of stations (WRC-12)

MOD

52.264 The class of emissions to be used for data transmissions in this section should be in accordance with the most recent version of Recommendation ITU-R M.1798. Coast stations as well as ship stations should use radio systems specified in the most recent version of Recommendation ITU-R M.1798. (WRC-15)

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.541-10, and may be in accordance with the most recent version of Recommendation ITU-R M.493. (WRC-15)

ARTICLE 57

Radiotelephony

MOD

57.1 § 1 The procedure detailed in Recommendation ITU-R M.1171-0 shall be applicable to radiotelephone stations, except in cases of distress, urgency or safety. (WRC-15)

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 and WRC-15, shall be applied, pursuant to Article 54 of the Constitution, on the following basis. (WRC-15)

MOD

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

98 (WRC-12)[******] (WRC-15)

ADD

59.13 The other provisions of these Regulations, as revised by WRC-15, shall enter into force on 1 January 2017, with the following exceptions: (WRC-15)

ADD

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

COM5/1 (WRC-15) and **COM6/25 (WRC-15)** (WRC-15)

APPENDIX 4 (REV.WRC-12)

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

[******] *Note by the Secretariat:* This resolution was abrogated by WRC-15.

[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-15)

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
1.5.10		**For digital broadcasting (except assignments subject to § 5.1.3 of the GE06 Regional Agreement):**								
1.5.10.1	**1EO**	the frequency offset, in kHz Required if the centre frequency of the emission is offset from the assigned frequency	+							**1EO**
7		**CLASS OF EMISSION AND NECESSARY BANDWIDTH** *(in accordance with Article **2** and Appendix **1**)*								
7.1	**7A**	the class of emission In the case of a VHF/UHF broadcasting station, required for digital broadcasting assignments	+	**X**	**X**	**X**	**X**	**X**		**7A**
7.2	**7AB**	the necessary bandwidth In the case of a VHF/UHF broadcasting station, required for analogue sound and digital broadcasting assignments	+	**X**	**X**	**X**	**X**	**X**	**X**	**7AB**

ANNEX 2

Characteristics of satellite networks, earth stations or radio astronomy stations2 (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)

MOD

TABLE A

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

Items in Appendix	*A – GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK, EARTH STATION OR RADIO ASTRONOMY STATION*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network subject to coordination under	Advance publication of a non-geostationary-satellite network not subject to coordination under Section II	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or	Notification or coordination of a non-geostationary-satellite network	Notification or coordination of an earth station (including notification under Appendices 30A or	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4	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.2	**DATE OF BRINGING INTO USE**										**A.2**	
A.2.b	for a space station, the period of validity of the frequency assignments (see Resolution **4 (Rev.WRC-03)**)			**X**	**X**	**X**					A.2.b	
	...											
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** or No. **9.1A**				**X**	**X**	**X**				A.13.a	
	...											

MOD

TABLE A

GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK, EARTH STATION OR RADIO ASTRONOMY STATION

Items in Appendix	*A – GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK, EARTH STATION OR RADIO ASTRONOMY STATION*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network subject to coordination under Section II of Article 9	Advance publication of a non-geostationary-satellite network not subject to coordination under Section II	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A)	Notification or coordination of a non-geostationary-satellite network	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
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.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)**					+					A.17.b.3	

MOD

TABLE A

GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK, EARTH STATION OR RADIO ASTRONOMY STATION

Items in Appendix	*A – GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK, EARTH STATION OR RADIO ASTRONOMY STATION*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network subject to coordination under Section II of Article 9	Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article 9	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A)	Notification or coordination of a non-geostationary-satellite network	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
SUP A.17.c												

MOD

TABLE A

GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK, EARTH STATION OR RADIO ASTRONOMY STATION

Items in Appendix	*A – GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK, EARTH STATION OR RADIO ASTRONOMY STATION*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary satellite network subject to coordination under Section II of Article 9	Advance publication of a non-geostationary satellite network not subject to coordination under Section II of Article 9	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A)	Notification or coordination of a non-geostationary satellite network	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
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 or in Table **21-4** for the frequency band 9 900-10 400 MHz 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 • the Earth exploration-satellite service (active) in the frequency band 9 900-10 400 MHz				+	+					A.17.d	

MOD

TABLE A

GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK, EARTH STATION OR RADIO ASTRONOMY STATION

Items in Appendix	*A – GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK, EARTH STATION OR RADIO ASTRONOMY STATION*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary satellite network subject to coordination under Section II of Article 9	Advance publication of a non-geostationary satellite network not subject to coordination under Section II of Article 9	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A)	Notification or coordination of a non-geostationary satellite network	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
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 **PLEN/1 (WRC-15)** not for feeder links for the broadcasting-satellite service), 14.5-14.8 GHz (in countries listed in Resolution **PLEN/2 (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.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 where the earth stations 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 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.E16** and the power flux-density limits that are specified in No. **5.D16**				+						A.16.c	

MOD

TABLE B

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

Items in Appendix	*B – CHARACTERISTICS TO BE PROVIDED FOR EACH SATELLITE ANTENNA BEAM OR EACH EARTH STATION OR RADIO ASTRONOMY ANTENNA*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network subject to coordination under	Advance publication of a non-geostationary-satellite network not subject to coordination under	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A	Notification or coordination of a non-geostationary-satellite network	Notification or coordination of an earth station (including notification under	Notice for a satellite network in the broadcasting-satellite service under Appendix 30	Notice for a satellite network (feeder-link) under Appendix 30A	Notice for a satellite network in the fixed-satellite service under Appendix 30B	Items in Appendix	Radio astronomy
B.2	**TRANSMISSION / RECEPTION INDICATOR FOR THE BEAM OF THE SPACE STATION OR THE ASSOCIATED SPACE STATION**			X	X	X	+[1]			X	**B.2**	

MOD

TABLE B

CHARACTERISTICS TO BE PROVIDED FOR EACH SATELLITE ANTENNA BEAM OR EACH EARTH STATION OR RADIO ASTRONOMY ANTENNA

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 subject to coordination under Section II of Article 9	Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article 9	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A)	Notification or coordination of a non-geostationary-satellite network	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
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 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 with due regard to their service objectives. In the case of Appendix **30**, **30A** or **30B**, required only for non-elliptical beams				**X**			+	+	+	B.3.b.1	

MOD

TABLE B

CHARACTERISTICS TO BE PROVIDED FOR EACH SATELLITE ANTENNA BEAM OR EACH EARTH STATION OR RADIO ASTRONOMY ANTENNA

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 subject to coordination under	Advance publication of a non-geostationary-satellite network not subject to coordination under	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A	Notification or coordination of a non-geostationary-satellite network	Notification or coordination of an earth station (including notification under	Notice for a satellite network in the broadcasting-satellite service under Appendix 30	Notice for a satellite network (feeder-link) under Appendix 30A	Notice for a satellite network in the fixed-satellite service under Appendix 30B	Items in Appendix	Radio astronomy
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 in the frequency band 12.5-12.7 GHz				+			+	+		B.3.e	

MOD

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 (WRC-15)

Items in Appendix	*C - CHARACTERISTICS TO BE PROVIDED FOR EACH GROUP OF FREQUENCY ASSIGNMENTS FOR A SATELLITE ANTENNA BEAM OR AN EARTH STATION OR RADIO ASTRONOMY ANTENNA*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network subject to	Advance publication of a non-geostationary-satellite network not subject to coordination under Section II	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A	Notification or coordination of a non-geostationary-satellite network	Notification or coordination of an earth station (including notification under	Notice for a satellite network in the broadcasting-satellite service under	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	Items in Appendix	Radio astronomy
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**

MOD

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

Items in Appendix	*C – CHARACTERISTICS TO BE PROVIDED FOR EACH GROUP OF FREQUENCY ASSIGNMENTS FOR A SATELLITE ANTENNA BEAM OR AN EARTH STATION OR RADIO ASTRONOMY ANTENNA*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network subject to coordination under Section II of Article 9	Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article 9	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A)	Notification or coordination of a non-geostationary-satellite network	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
C.8.a.2	the maximum power density, in dB(W/Hz), supplied to the input of the antenna for each carrier type[2] In the case of Appendix **30B**, required only for notification under Article 8 Required if neither C.8.b.2 nor C.8.b.3.b is provided			+	+	+	**O**			+	C.8.a.2	
...												
C.8.b.2	the maximum power density, in dB(W/Hz), supplied to the input of the antenna[2] For coordination or notification of an Appendix **30A** earth station the values shall include the maximum range of power control In the case of Appendix **30B**, required only for submission under Article 6 Required if neither C.8.a.2 nor C.8.b.3.b is provided			+	+	+	+[1]	**X**	**X**	+	C.8.b.2	

MOD

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

Items in Appendix	*C – CHARACTERISTICS TO BE PROVIDED FOR EACH GROUP OF FREQUENCY ASSIGNMENTS FOR A SATELLITE ANTENNA BEAM OR AN EARTH STATION OR RADIO ASTRONOMY ANTENNA*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network subject to coordination under Section II of Article 9	Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article 9	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A)	Notification or coordination of a non-geostationary-satellite network	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
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	

MOD

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

Items in Appendix	*C - CHARACTERISTICS TO BE PROVIDED FOR EACH GROUP OF FREQUENCY ASSIGNMENTS FOR A SATELLITE ANTENNA BEAM OR AN EARTH STATION OR RADIO ASTRONOMY ANTENNA*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network subject to	Advance publication of a non-geostationary-satellite network not subject to coordination under Section II	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A	Notification or coordination of a non-geostationary-satellite network	Notification or coordination of an earth station (including notification under	Notice for a satellite network in the broadcasting-satellite service under	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	Items in Appendix	Radio astronomy
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	

MOD

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

Items in Appendix	*C - CHARACTERISTICS TO BE PROVIDED FOR EACH GROUP OF FREQUENCY ASSIGNMENTS FOR A SATELLITE ANTENNA BEAM OR AN EARTH STATION OR RADIO ASTRONOMY ANTENNA*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary satellite network subject to coordination under Section II of Article 9	Advance publication of a non-geostationary satellite network not subject to coordination under Section II of Article 9	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A)	Notification or coordination of a non-geostationary satellite network	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
C.10.d.7	the antenna diameter, in metres In cases other than Appendix **30A**, required for fixed-satellite service networks operating in the frequency bands 13.75-14 GHz, 14.5-14.75 GHz (in countries listed in Resolution **PLEN/1 (WRC-15)** not for feeder links for the broadcasting-satellite service), 14.5-14.8 GHz (in countries listed in Resolution **PLEN/2 (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) and for maritime mobile-satellite service networks operating in the frequency band 14-14.5 GHz				+	+			**X**		C.10.d.7	

MOD

APPENDIX 5 (REV.WRC-15)

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[MOD 1] of allocation, which might affect or be affected, as appropriate, and which are:

...

e) included in the coordination procedure with effect from the date of receipt[MOD3] 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

---

1 The coordination under Nos. **9.11A** to **9.19** applies only to assignments in frequency bands allocated with equal rights.

...

3 See No. **9.1A** concerning the date to be considered as the date of receipt by the Bureau of the information relating to the coordination of a satellite network or the notification of a frequency assignment.

MOD

TABLE 5-1 (Rev.WRC-15)

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	A station in a satellite network using the geostationary-satellite orbit (GSO), in any space radiocommunication service, in a frequency band and in a Region where this service is not subject to a Plan, in respect of any other satellite network using that orbit, in any space radiocommunication service in a frequency band and in a Region where this service is not subject to a Plan, with the exception of the coordination between earth stations operating in the opposite direction of transmission	1) 3 400-4 200 MHz 5 725-5 850 MHz (Region 1) and 5 850-6 725 MHz 7 025-7 075 MHz 2) 10.95-11.2 GHz 11.45-11.7 GHz 11.7-12.2 GHz (Region 2) 12.2-12.5 GHz (Region 3) 12.5-12.75 GHz (Regions 1 and 3) 12.7-12.75 GHz (Region 2) and 13.75-14.8 GHz	i) Bandwidth overlap, and ii) any network in the fixed-satellite service (FSS) and any associated space operation functions (see No. **1.23**) with a space station within an orbital arc of ±7° of the nominal orbital position of a proposed network in the FSS i) Bandwidth overlap, and ii) any network in the FSS or broadcasting-satellite service (BSS), not subject to a Plan, 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 BSS, not subject to a Plan iii) in the band 14.5-14.8 GHz any network in the space research service (SRS) or FSS not subject to a Plan 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 <u>the SRS</u> or <u>FSS not subject to a Plan</u>		With respect to the space services listed in the threshold/condition column in the frequency bands in 1), 2), 2*bis*), 3), 4), 5), 6), 7) and 8), an administration may request, pursuant to No. **9.41**, to be included in requests for coordination, indicating the networks for which the value of $\Delta T/T$ calculated by the method in § 2.2.1.2 and 3.2 of Appendix **8** exceeds 6%. When the Bureau, on request by an affected administration, studies this information pursuant to No. **9.42**, the calculation method given in § 2.2.1.2 and 3.2 of Appendix **8** shall be used

TABLE 5-1 (*continued*) (Rev.WRC-15)

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		
		9) All frequency bands, other than those in 1), 2), 2)*bis*, 3), 4), 5), 6), 6*bis)*, 7) and 8), allocated to a space service, and the bands in 1), 2), 2)*bis*, 3), 4), 5), 6), 6*bis)*, 7) and 8) where the radio service of the proposed network or affected networks is other than the space services listed in the threshold/ condition column, or in the case of coordination of space stations operating in the opposite direction of transmission	i) Bandwidth overlap, and ii) Value of $\Delta T/T$ exceeds 6%	Appendix **8**	In application of Article 2A of Appendix **30** for the space operation functions using the guardbands defined in § 3.9 of Annex 5 of Appendix **30**, the threshold/condition specified for the FSS in the bands in 2) applies. In application of Article 2A of Appendix **30A** for the space operation functions using the guardbands defined in § 3.1 and 4.1 of Annex 3 of Appendix **30A**, the threshold/condition specified for the FSS in the bands in 7) applies

TABLE 5-1 (*end*) (Rev.WRC-15)

Reference of Article 9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **9.21** Terrestrial, GSO, non-GSO/ terrestrial, GSO, non-GSO	A station of a service for which the requirement to obtain the agreement of other administrations is included in a footnote to the Table of Frequency Allocations referring to No. **9.21**	Band(s) indicated in the relevant footnote except 13.4-13.65 GHz in Region 1 13.4-13.65 GHz in Region 1 indicated in No. **5.A161**	Incompatibility established by the use of Appendices **7**, **8**, technical Annexes of Appendices **30** or **30A**, pfd values specified in some of the footnotes, other technical provisions of the Radio Regulations or ITU-R Recommendations, as appropriate i) Bandwidth overlap, and ii) any network in the space research service (SRS) with a space station within an orbital arc of ±20° of the nominal orbital position of a proposed network in the FSS	Methods specified in, or adapted from, Appendices **7**, **8**, **30**, **30A**, other technical provisions of the Radio Regulations or ITU-R Recommendations	

ANNEX 1

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)

1.2 Between 1 and 3 GHz

MOD

1.2.1 Objectives

Generally, pfd thresholds were used to determine the need for coordination between space stations of the MSS (space-to-Earth) and terrestrial services and for coordination between space stations of the RDSS (space-to-Earth) and terrestrial services. However, to facilitate sharing between digital fixed service stations and non-GSO MSS space stations, the concept of fractional degradation in performance (FDP) was adopted. This concept involves new methods described in this Annex.

As a consequence of this new concept, the need for coordination between space stations of the MSS (space-to-Earth) and terrestrial services is determined using two methods:

– simple method: FDP (simple definition of the MSS system and characteristics of reference FS stations are used in inputs) or power flux-density trigger value;

– more detailed method: system specific methodology (SSM) (specific characteristics of the MSS system and characteristics of reference fixed service stations are used in inputs) as described, for example, in Annex 1 to the most recent version of Recommendation ITU-R M.1143.

If one of the two methods gives a result that does not exceed the criteria relevant to each method, there is no need for coordination.

If only one method is available in an administration, the result of this method must be taken into account. (WRC-15)

1.2.3 Determination of the need for coordination between MSS and RDSS space stations (space-to-Earth) and terrestrial stations (WRC-12)

MOD

1.2.3.2 A system specific methodology (SSM) to be used in determining the need for detailed coordination of non-GSO MSS (space-to-Earth) systems with fixed service systems

The purpose of the SSM is to allow a detailed assessment of the need to coordinate frequency assignments to non-GSO MSS space stations (space-to-Earth) with frequency assignments to receiving stations in a fixed service network of a potentially affected administration. The SSM takes into account specific characteristics of the non-GSO MSS system and reference fixed service characteristics.

Those administrations planning to establish the need for coordination between non-GSO MSS networks and fixed service systems are encouraged to use the most recent version of Recommendation ITU-R M.1143. While urgent additional development work is being undertaken in the ITU-R to facilitate the use of the methodology described in the most recent version of Recommendation ITU-R M.1143, administrations may be able to effect coordination by applying this SSM. (WRC-15)

SUP

1.3

MOD

APPENDIX 7 (REV.WRC-15)

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

ANNEX 4

Antenna gain toward the horizon for an earth station operating with non-geostationary space stations

MOD

1 Determination of the horizon antenna gain

In its simplest implementation, the TIG method depends on the minimum elevation angle of the beam axis of the earth station antenna (ε_{sys}), which is a system parameter that has the same value on all azimuths from the earth station. If the horizon elevation angle at an azimuth under consideration is ε_h (degrees), the minimum separation angle from the horizon at this azimuth to any possible pointing angle for the main beam axis of the antenna (φ_{min}) is equal to the difference between these two angles ($\varepsilon_{sys} - \varepsilon_h$), but it is not less than zero degrees. The maximum separation angle from the horizon at this azimuth to any possible pointing angle for the main beam axis of the antenna (φ_{max}) is equal to the difference between the sum of these two angles and 180° ($180 - \varepsilon_{sys} - \varepsilon_h$). The maximum and minimum values of horizon gain for the azimuth under consideration are obtained from the gain pattern of the earth station antenna at these off-axis angles. Where no pattern is available the pattern of § 3 of Annex 3 may be used.

Additional constraints may be included in the determination of the maximum and minimum values of horizon antenna gain where an earth station operates with a constellation of non-geostationary satellites that are not in near-polar orbit. In this case, depending on the latitude of the earth station, there may be portions of the hemisphere above the horizontal plane at the earth station in which no satellite will appear. To include these visibility limitations within this method, it is first necessary to determine, for a closely spaced set of azimuth angles around the earth station, the minimum elevation angle at which a satellite may be visible. This minimum satellite visibility elevation angle

(ε_v) may be determined from consideration of the visibility of the edge of the shell formed by all possible orbits having the orbital inclination and altitude of the satellites in the constellation.

The lowest elevation angle towards which the main-beam axis of the earth station antenna will point on any azimuth is the minimum composite elevation angle (ε_c), which is equal to the greater of the minimum satellite visibility elevation angle (ε_v) and the minimum elevation angle of the earth station (ε_{sys}). After the minimum composite elevation angle has been determined for all azimuths by the procedure of § 1.1 of this Annex, the resulting profile of the minimum composite elevation angles can be used, in the procedure of § 1.2 of this Annex, to determine the maximum and minimum values of horizon gain at any azimuth.

Further information and an example of this method may be found in the most recent version of Recommendation ITU-R SM.1448.

ANNEX 5

Determination of the coordination area for a transmitting earth station with respect to receiving earth stations operating with geostationary space stations in bidirectionally allocated frequency bands

2 Determination of the bidirectional coordination contour for propagation mode (1)

MOD

2.1 Calculation of horizon gain for unknown receiving earth stations operating with geostationary space stations

The value of G_r, the horizon gain of the receiving earth station, for each azimuth, α, at the transmitting earth station is found by the following steps:

Step 1: The receiving earth station may be operating with any satellite in the geostationary orbit above a minimum elevation angle, ε_{min}, contained in Table 9. The maximum difference in longitude (δ_b (degrees)) between the receiving earth station and its associated space station occurs at this minimum elevation angle, ε_{min}, and is given by:

$$\delta_b = \arccos\left(\frac{\sin\left(\varepsilon_{min} + \arcsin\left(\frac{\cos(\varepsilon_{min})}{K}\right)\right)}{\cos(\zeta)}\right) \quad (103)$$

where:

ζ: latitude of the receiving earth station, which is assumed to be the same as the transmitting earth station

K: ratio of the radius of the satellite orbit to the radius of the Earth, equal to 6.62.

Step 2: For each azimuth, α, at the transmitting earth station:

– determine the azimuth α_r from the receiving earth station to the transmitting earth station:

$$\alpha_r = \alpha + 180° \qquad \text{for } \alpha < 180°$$

$$\alpha_r = \alpha - 180° \qquad \text{for } \alpha \geq 180°$$

– for each azimuth α_r, determine the minimum angular separation, $\varphi(\alpha_r)$, between the receiving earth station main beam axis and the horizon at this azimuth using Case 1 in § 2 of Annex 3. For this evaluation, $\varphi(\alpha_r)$ is the minimum value of $\varphi(\alpha_r, 0, \delta_0)$, where the values of δ_0 are between $-\delta_b$ and $+\delta_b$ in steps of 1° or less, making sure to include the end points.

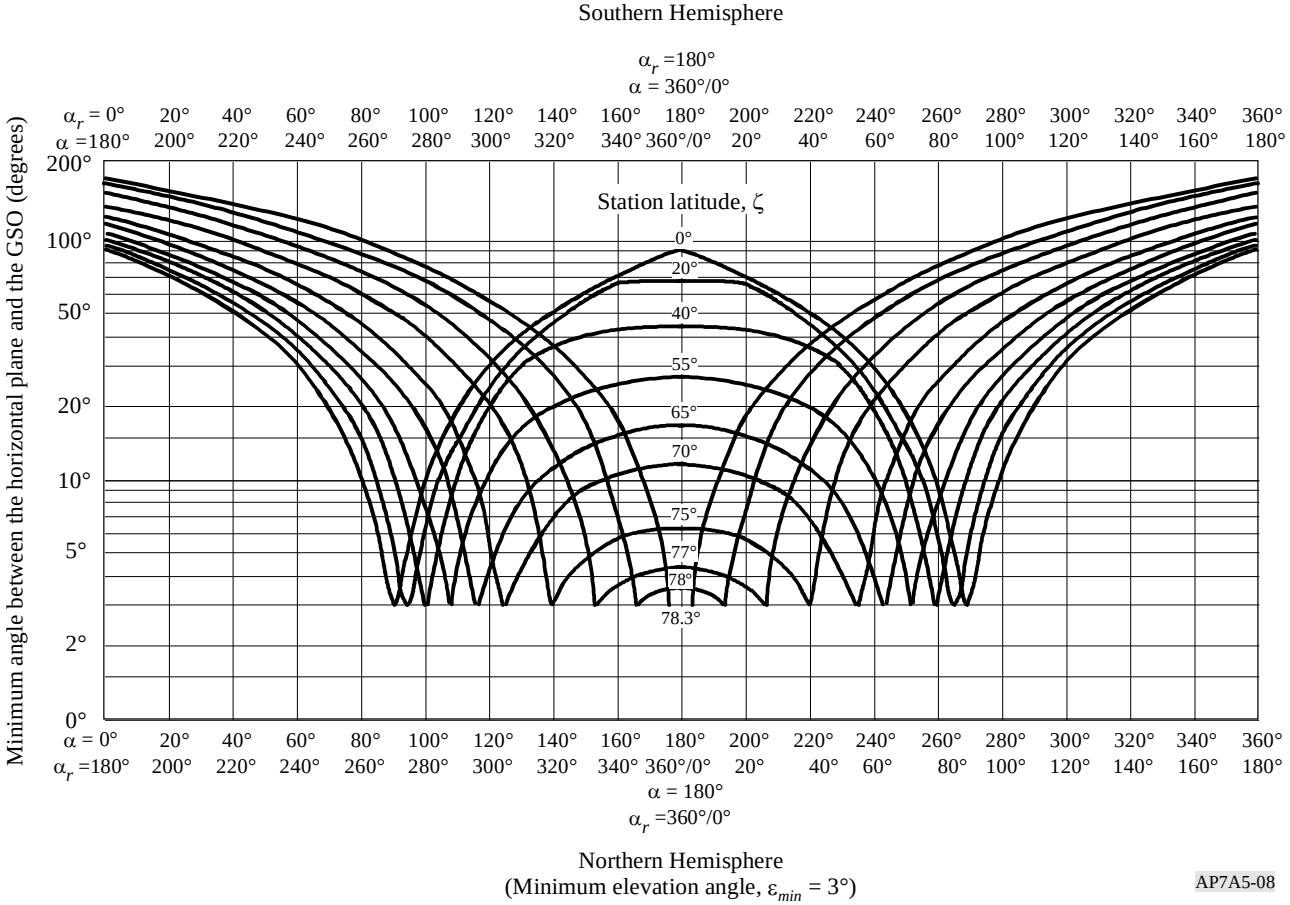
The minimum angular separation, $\varphi(\alpha_r)$, may be used with the gain pattern in § 3 of Annex 3 to determine the horizon gain for this azimuth, α, unless a different gain pattern is referenced in Table 9.

Figure 8 shows plots of the minimum angular separation between the horizon at zero degrees elevation on an azimuth α_r and a satellite on the geostationary orbit at an elevation above 3°. Plots are shown for a set of values of the station latitude, ζ, which is assumed to be the same for both transmitting and receiving earth stations. Figure 8 also provides a scale showing the corresponding azimuth, α, of the transmitting earth station.

Further information and an example may be found in the most recent version of Recommendation ITU-R SM.1448.

FIGURE 8

Illustration of minimum angular distance between points on the geostationary-satellite orbit (GSO) and the horizontal plane



ANNEX 6

Supplementary and auxiliary contours

MOD

4 Determination of a supplementary contour using the time-variant gain (TVG) method

The TVG method requires the cumulative distribution of the time-varying horizon antenna gain of an earth station operating with a non-geostationary space station. In comparison to the TIG method, the TVG method usually produces smaller distances, but requires greater effort in determining the cumulative distribution of the horizon gain of the earth station antenna for each azimuth to be considered.

The TVG method closely approximates the convolution of the distribution of the horizon gain of the earth station antenna and the propagation mode (1) path loss. This method may produce slightly smaller distances than those obtained by an ideal convolution. An ideal convolution cannot be implemented due to the limitations of the current model for propagation mode (1). The propagation mode (1) required distance, at the azimuth under consideration, is taken as the largest distance developed from a set of calculations, each of which is based on equation (4) of the main body of

this Appendix. For convenience, in these calculations, this equation may be rewritten for the *n*-th calculation in the following form:

$$L_b(p_v) - G_e(p_n) = P_t + G_x - P_r(p) \quad \text{dB} \quad (123)$$

with the constraint:

$$p_v = \begin{cases} 100\ p / p_n & \text{for } p_n \geq 2\ p \\ 50 & \text{for } p_n < 2\ p \end{cases} \quad \%$$

where:

P_t, $P_r(p)$: as defined in equations in § 1.3 of the main body of this Appendix where p is the percentage of time associated with permissible interference power $P_r(p)$

G_x: maximum antenna gain assumed for the terrestrial station (dBi). Tables 7 and 8 give values for G_x for the various frequency bands

$G_e(p_n)$: the horizon gain of the coordinating earth station antenna (dBi) that is exceeded for p_n% of the time on the azimuth under consideration

$L_b(p_v)$: the propagation mode (1) minimum required loss (dB) for p_v% of the time; this loss must be exceeded by the propagation mode (1) predicted path loss for all but p_v% of the time.

The values of the percentages of time, p_n, to be used in equation (123) are determined in the context of the cumulative distribution of the horizon antenna gain. This distribution needs to be developed for a predetermined set of values of horizon antenna gain spanning the range from the minimum to the maximum values for the azimuth under consideration. The notation $G_e(p_n)$ denotes the value of horizon antenna gain for which the complement of the cumulative distribution of the horizon antenna gain has the value corresponding to the percentage of time p_n. The p_n value is the percentage of time that the horizon antenna gain exceeds the *n*-th horizon antenna gain value. The procedure in § 4.1 may be used to develop this distribution.

For each value of p_n, the value of horizon antenna gain for this time percentage, $G_e(p_n)$, is used in equation (123) to determine a propagation mode (1) minimum required loss. The propagation mode (1) predicted path loss is to exceed this propagation mode (1) required loss for no more than p_v% of the time, as specified by the constraint associated with equation (123). A series of propagation mode (1) distances are then determined using the procedures described in § 4 of the main body of this Appendix.

The propagation mode (1) required distance is then the maximum distance in the series of propagation mode (1) distances that are obtained for any value of p_n, subject to the constraint associated with equation (123). A detailed description of the method for using equation (123) to determine the propagation mode (1) required distance is provided in § 4.2.

Further information, including examples, may be found in the most recent version of Recommendation ITU-R SM.1448.

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-15)

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

Transmitting space radiocommunication service designation		**Fixed-satellite, mobile-satellite**	**Aero-nautical mobile-satellite (R) service**	**Aero-nautical 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**	**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	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)	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	§ 2.2
Modulation at terrestrial station [1]		A						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		0.005	0.005
	n	2						2	2	2	2	2	2	2	2	2	2	1		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		0.0025	0.0025
	N_L (dB)	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		25	25
	W (dB)	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		48	48
	T_e (K)	500 [2]						750	750	750	750	750	750	1 500	1 100	1 500	1 100	2 636		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		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		−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-15)

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**		**Meteorological-satellite [7, 8]**	**Meteorological-satellite [9]**	**Earth exploration-satellite [7]**	**Earth exploration-satellite [9]**	**Space research [10]**		**Fixed-satellite**		**Broadcasting-satellite**			**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]			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	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			§ 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
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			0.003
	n		3	3		3	3	3	2	2	2	2	1	2	2	2	1	1			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			0.0015
	N_L (dB)		1	1		1	1	1	–	–	1	0	0	0	1	1	1	1			1
	M_S (dB)		7	2		2	7	2	–	–	2	4.7	0.5	1	7	4	7	4			6
	W (dB)		4	0		0	4	0	–	–	0	0	0	0	4	0	4	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			35
		N	42 [4]	42 [4]		42	42	42	42	42	42	42	−18	−18	43	43	42	42		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			−10
		N	0	0		0	0	0	0	0	0	0	−60	−60	−2	−2	−3	−3		−7	−5
	G_X (dBi)		52 [3, 4]	52 [3, 4]		42	42	42	42	42	42	42	42	42	45	45	45	45		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
Permissible interference power	$P_r(p)$ (dBW) in B					−151.2			−125	−125	−154 [11]	−142	−220	−216			−131	−131			

Notes to Table 8c:

[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.

MOD

TABLE 9a (Rev.WRC-15)

Parameters required for the determination of coordination distance for a transmitting earth station in bands shared bidirectionally with receiving earth stations

Space service designation in which the transmitting earth station operates			**Mobile-satellite**		**Earth exploration-satellite, meteorological-satellite**	**Mobile-satellite**		**Fixed-satellite, mobile-satellite**	**Aeronautical mobile-satellite (R) service**		**Fixed-satellite[3]**		**Fixed-satellite**	**Fixed-satellite, meteorological-satellite**	**Fixed-satellite**
Frequency bands (GHz)			0.272-0.273		0.401-0.402	1.670-1.675		2.655-2.690	5.030-5.091		5.150-5.216		6.700-7.075	8.025-8.400	8.025-8.400
Space service designation in which the *receiving* earth station operates			Space operation		Space operation	Meteorological-satellite		Fixed-satellite, broadcasting-satellite	Aeronautical mobile-satellite (R) service		Fixed-satellite	Radiodetermination-satellite	Fixed-satellite	Earth exploration-satellite	Earth exploration-satellite
Orbit[6]			Non-GSO		Non-GSO	Non-GSO	GSO		Non-GSO	GSO	Non-GSO		Non-GSO	Non-GSO	GSO
Modulation at *receiving* earth station[1]			N		N	N	N						N	N	N
Receiving earth station interference parameters and criteria	p_0 (%)		1.0		0.1	0.006	0.011						0.005	0.011	0.083
	n		1		2	3	2						3	2	2
	p (%)		1.0		0.05	0.002	0.0055						0.0017	0.0055	0.0415
	N_L (dB)		0		0	0	0						1	0	1
	M_s (dB)		1		1	2.8	0.9	2			2	2	2	4.7	2
	W (dB)		0		0	0	0						0	0	0
Receiving earth station parameters	G_m (dBi)[2]		20		20	30	45		45	45	48.5		50.7		
	G_r (dBi)[4]		19		19	19 [9]	8		8	8	10		10	10	8
	ε_{min} [5]		10°		10°	5°	3°	3°	10°	10°	3°	3°	3°	5°	3°
	T_e (K)[7]		500		500	370	118	75	340	340	75	75	75		
Reference bandwidth	B (Hz)		10^3		1	10^6	4×10^3		37.5×10^3	37.5×10^3			10^6	10^6	10^6
Permissible interference power	$P_r(p)$ (dBW) in B		−177		−208	−145	−178		−163.5	−163.5			−151	−142	−154

MOD

TABLE 9b (Rev.WRC-15)

Parameters required for the determination of coordination distance for a transmitting earth station in bands shared bidirectionally with receiving earth stations

Space service designation in which the transmitting earth station operates		**Fixed-satellite**			**Fixed-satellite**				**Fixed-satellite**	**Fixed-satellite**	**Fixed-satellite[3]**	**Fixed-satellite[3]**	**Earth exploration-satellite, space research**	
Frequency bands (GHz)		10.7-11.7			12.5-12.75				17.3-17.8	17.7-18.4	19.3-19.6	19.3-19.6	40.0-40.5	
Space service designation in which the *receiving* earth station operates		Fixed-satellite			Fixed-satellite				Broadcasting-satellite	Fixed-satellite, meteorological-satellite	Fixed-satellite[3]	Fixed-satellite[4]	Fixed-satellite, mobile-satellite	
Orbit[7]		GSO		Non-GSO	GSO		Non-GSO			GSO	Non-GSO	GSO	GSO	Non-GSO
Modulation at *receiving* earth station[1]		A	N	N	A	N				N	N			
Receiving earth station interference parameters and criteria	p_0 (%)	0.03	0.003		0.03	0.003				0.003	0.01	0.003	0.003	
	n	2	2		2	2				2	1	2	2	
	p (%)	0.015	0.0015		0.015	0.0015				0.0015	0.01	0.0015	0.0015	
	N_L (dB)	1	1		1	1				1	0	1	1	
	M_S (dB)	7	4		7	4				6	5	6	6	
	W (dB)	4	0		4	0				0	0	0	0	
Receiving earth station parameters	G_m (dBi) [2]			51.9			31.2			58.6	53.2	49.5	50.8	54.4
	G_r [5]	9	9	10	9	9	11[11]			9	10	10	9	7 [12]
	θ_{min} [6]	5°	5°	6°	5°	5°	10°			5°	5°	10°	10°	10°
	T_e (K)[8]	150	150		150	150				300	300	300	300	
Reference bandwidth	B (Hz)	10^6	10^6		10^6	10^6				10^6	10^6			
Permissible interference power	$P_r(p)$ (dBW) in B	−144	−144	−144	−144	−144	−144			−138	−141			

Notes to Table 9b:

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

[2] On-axis gain of the receive earth station antenna.

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

[4] Geostationary-satellite systems.

[5] Horizon antenna gain for the receive earth station (refer to § 3 of the main body of the Appendix).

[6] Minimum elevation angle of operation in degrees (non-GSO or GSO).

[7] Orbit of the space service in which the receiving earth station operates (GSO or non-GSO).

[8] The thermal noise temperature of the receiving system at the terminal of the receiving antenna (under clear-sky conditions). Refer to § 2.1 of this Annex for missing values.

[9] Horizon antenna gain is calculated using the procedure of Annex 5. Where no value of G_m is specified, a value of 42 dBi is to be used.

[10] Horizon antenna gain is calculated using the procedure of Annex 5, except that the following antenna pattern may be used in place of that given in § 3 of Annex 3: $G = 32 - 25 \log \varphi$ for $1° \leq \varphi < 48°$; and $G = -10$ for $48° \leq \varphi < 180°$ (refer to Annex 3 for definition of symbols).

[11] Non-geostationary horizon antenna gain. $G_e = G_{max}$ (see § 2.2 of the main body of this Appendix) for $G = 36 - 25 \log (\varphi) > -6$ (refer to Annex 3 for definition of symbols).

[12] Non-geostationary horizon antenna gain. $G_e = G_{max}$ (see § 2.2 of the main body of this Appendix) for $G = 32 - 25 \log (\varphi) > -10$ (refer to Annex 3 for definition of symbols).

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TABLE 10 (WRC-15)

Predetermined coordination distances

Frequency sharing situation		**Coordination distance (in sharing situations involving services allocated with equal rights) (km)**
Type of earth station	**Type of terrestrial station**	
Ground-based in the bands below 1 GHz to which No. **9.11A** applies. Ground-based mobile in the bands within the range 1-3 GHz to which No. **9.11A** applies	Mobile (aircraft)	500
Aircraft (mobile) (all bands)	Ground-based	500
Aircraft (mobile) (all bands)	Mobile (aircraft)	1 000
Ground-based in the bands: 400.15-401 MHz 1 668.4-1 675 MHz	Station in the meteorological aids service (radiosonde)	580
Aircraft (mobile) in the bands: 400.15-401 MHz 1 668.4-1 675 MHz	Station in the meteorological aids service (radiosonde)	1 080
Ground-based in the radiodetermination-satellite service (RDSS) in the bands: 1 610-1 626.5 MHz 2 483.5-2 500 MHz 2 500-2 516.5 MHz	Ground-based	100
Airborne earth station in the radiodetermination-satellite service (RDSS) in the bands: 1 610-1 626.5 MHz 2 483.5-2 500 MHz 2 500-2 516.5 MHz	Ground-based	400
Receiving earth stations in the meteorological-satellite service	Station in the meteorological aids service	The coordination distance is considered to be the visibility distance as a function of the earth station horizon elevation angle for a radiosonde at an altitude of 20 km above mean sea level, assuming 4/3 Earth radius (see Note 1)
Non-GSO MSS feeder-link earth stations (all bands)	Mobile (aircraft)	500

Non-GSO MSS feeder-link earth stations in the band 5 091-5 150 MHz	Station in the aeronautical radionavigation service	Note 2
Receiving earth stations in the space research service in the band: 2 200-2 290 MHz	Mobile (aircraft)	880
Ground-based in the bands in which the frequency sharing situation is not covered in the rows above	Mobile (aircraft)	500

NOTE 1 – The coordination distance, d (km), for fixed earth stations in the meteorological-satellite service vis-à-vis stations in the meteorological aids service assumes a radiosonde altitude of 20 km and is determined as a function of the physical horizon elevation angle ε_h (degrees) for each azimuth, as follows:

$$d = 100 \quad \text{for} \quad \varepsilon_h \geq 11°$$

$$d = 582\left(\sqrt{1 + (0.254\,\varepsilon_h)^2} - 0.254\,\varepsilon_h\right) \quad \text{for} \quad 0° < \varepsilon_h < 11°$$

$$d = 582 \quad \text{for} \quad \varepsilon_h \leq 0°$$

The minimum and maximum coordination distances are 100 km and 582 km, and correspond to physical horizon angles greater than 11° and less than 0°. (WRC-2000)

NOTE 2 – For the coordination distance in the frequency band 5 091-5 150 MHz vis-à-vis stations in the aeronautical radionavigation service, see No. **5.444A**. (WRC-15)

APPENDIX 8 (REV.WRC-03)

Method of calculation for determining if coordination is required between geostationary-satellite networks sharing the same frequency bands

2 Calculation of the apparent increase in equivalent noise temperature of the satellite link subject to an interfering emission

MOD

2.4 Use of information furnished under Appendix 4

When an administration elects to use information furnished under Appendix **4** with the calculation procedures of § 2.2.1.1 and § 2.2.2.1 in order to formulate comments, the calculations need to be made for both sets of values of γ and T furnished. The greater of the two values of $\Delta T/T$ resulting from these calculations is the one to be used. (WRC-15)

MOD

APPENDIX 15 (REV.WRC-15)

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

(See Article **31**)

TABLE 15-2 (WRC-15)

Frequencies above 30 MHz (VHF/UHF)

Frequency (MHz)	Description of usage	Notes
*121.5	AERO-SAR	The aeronautical emergency frequency 121.5 MHz is used for the purposes of distress and urgency for radiotelephony by stations of the aeronautical mobile service using frequencies in the frequency band between 117.975 MHz and 137 MHz. This frequency may also be used for these purposes by survival craft stations. Use of the frequency 121.5 MHz by emergency position-indicating radio beacons shall be in accordance with Recommendation ITU-R M.690-3. Mobile stations of the maritime mobile service may communicate with stations of the aeronautical mobile service on the aeronautical emergency frequency 121.5 MHz for the purposes of distress and urgency only, and on the aeronautical auxiliary frequency 123.1 MHz for coordinated search and rescue operations, using class A3E emissions for both frequencies (see also Nos. **5.111** and **5.200**). They shall then comply with any special arrangement between governments concerned by which the aeronautical mobile service is regulated.

MOD

APPENDIX 17 (REV.WRC-15)

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

(See Article **52**)

ANNEX 1* (WRC-12)

Frequencies and channelling arrangements in the high-frequency bands for the maritime mobile service, in force until 31 December 2016 (WRC-12)

PART B – Channelling arrangements (WRC-07)

MOD

Section I – Radiotelephony

1 Radiotelephone channelling arrangements for the frequencies to be used by coast and ship stations in the bands allocated to the maritime mobile service are indicated in the following Sub-Sections:

Sub-Section A – Table of single-sideband transmitting frequencies (kHz) for duplex (two-frequency) operation;

Sub-Section B – Table of single-sideband transmitting frequencies (kHz) for simplex (single-frequency) operation and for intership cross-band (two-frequency) operation;

Sub-Section C-1 – Table of recommended single-sideband transmitting frequencies (kHz) for ship stations in the frequency band 4 000-4 063 kHz shared with the fixed service;

Sub-Section C-2 – Table of recommended single-sideband transmitting frequencies (kHz) for ship and coast stations in the frequency band 8 100-8 195 kHz shared with the fixed service.

2 The technical characteristics for single-sideband transmitters specified in Recommendation ITU-R M.1173-1 shall be used. (WRC-15)

3 One or more series of frequencies from Sub-Section A (with the exception of those frequencies mentioned in § 5 below) may be assigned to each coast station, which uses these frequencies associated in pairs (see No. **52.226**); each pair consists of a transmitting and a receiving frequency. The series shall be selected with due regard to the areas served and so as to avoid, as far as possible, harmful interference between the services of different coast stations.

4 The frequencies in Sub-Section B are provided for worldwide common use by ships of all categories, according to traffic requirements, for ship transmissions to coast stations and for intership communication. They are also authorized for worldwide common use for transmissions by coast stations (simplex operation) provided the peak envelope power does not exceed 1 kW.

5 The following frequencies in Sub-Section A are allocated for calling purposes:

– Channel No. 421 in the 4 MHz band;

– Channel No. 606 in the 6 MHz band;

– Channel No. 821 in the 8 MHz band;

– Channel No. 1221 in the 12 MHz band;

– Channel No. 1621 in the 16 MHz band;

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* *Note by the Secretariat*: Annex 1 contains the entire text of Appendix 17 (REV. WRC-07)

– Channel No. 1806 in the 18 MHz band;

– Channel No. 2221 in the 22 MHz band;

– Channel No. 2510 in the 25 MHz band.

Calling on the carrier frequencies 12 290 kHz and 16 420 kHz shall be permitted only to and from rescue coordination centres (see No. **30.6.1**), subject to the safeguards of Resolution **352 (WRC-03)** (see Nos. **52.221A** and **52.222A**).

The remaining frequencies in Sub-Sections A, B, C-1 and C-2 are working frequencies. (WRC-03)

5A For the use of the carrier frequencies:

4 125 kHz (Channel No. 421);
6 215 kHz (Channel No. 606);
8 291 kHz (Channel No. 833);
12 290 kHz (Channel No. 1221);
16 420 kHz (Channel No. 1621);

in Sub-Section A, by coast and ship stations for distress and safety purposes, see Article **31**. (WRC-07)

6 *a)* Maritime radiotelephone stations using single-sideband emissions in the frequency bands between 4 000 kHz and 27 500 kHz exclusively allocated to the maritime mobile service shall operate only on the carrier frequencies shown in the Sub-Sections A and B and, in the case of analogue radiotelephony, shall be in conformity with the technical characteristics specified in Recommendation ITU-R M.1173-1. (WRC-15)

b) Ship stations, when using frequencies for single-sideband emissions in the frequency band 4 000-4 063 kHz, and ship and coast stations, when using frequencies for single-sideband emissions in the frequency band 8 100-8 195 kHz, should operate on the carrier frequencies indicated in Sub-Sections C-1 and C-2 respectively. In the case of analogue radiotelephony technical characteristics of the equipment shall be those specified in Recommendation ITU-R M.1173-1. (WRC-15)

c) Stations, when employing the single-sideband mode for analogue radiotelephony, shall use only class J3E emissions. For digital communications, class J2D emissions shall be used. (WRC-03)

7 The channelling plan established in Sub-Section C-2 does not prejudice the rights of administrations to establish, and to notify assignments to stations in the maritime mobile service other than those using radiotelephony in the frequency band 8 100-8 195 kHz, in conformity with the relevant provisions of these Regulations.

8 (SUP - WRC-03)

ANNEX 2 (WRC-12)

Frequency and channelling arrangements in the high-frequency bands for the maritime mobile service, which enter into force on 1 January 2017 (WRC-12)

MOD

p) These sub-bands, except the frequencies referred to in Notes *i), j), n)* and *o),* 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-15)

MOD

t) The frequency bands 4 065-4 146 kHz, 4 351-4 438 kHz, 6 200-6 224 kHz, 6 501-6 525 kHz, 8 195-8 294 kHz, 8 707-8 815 kHz, 12 230-12 353 kHz, 13 077-13 200 kHz, 16 360-16 528 kHz, 17 242-17 410 kHz, 18 780-18 825 kHz, 19 755-19 800 kHz, 22 000-22 159 kHz, 22 696-22 855 kHz, 25 070-25 100 kHz and 26 145-26 175 kHz may be used, in accordance with the Appendix **25** allotment Plan, for digitally modulated emissions as described in the most recent version of Recommendation ITU-R M.1798 on the condition that it shall not cause harmful interference to, or claim protection from other stations in the maritime mobile service using radiotelephony operations. The digitally modulated emissions may be used provided that their occupied bandwidth does not exceed 2 800 Hz, it is situated wholly within one frequency channel and the peak envelope power of coast stations does not exceed 10 kW and the peak envelope power of ship stations does not exceed 1.5 kW per channel. (WRC-15)

MOD

v) The frequency bands 4 146-4 152 kHz, 6 224-6 233 kHz, 8 294-8 300 kHz, 12 353-12 368 kHz, 16 528-16 549 kHz, 18 825-18 846 kHz, 22 159-22 180 and 25 100-25 121 kHz may be used for simplex digitally modulated emissions as described in the most recent version of Recommendation ITU-R M.1798 on condition that it shall not cause harmful interference to, or claim protection from other stations in the maritime mobile service using radiotelephony operations. The digitally modulated emissions may be used provided that their occupied bandwidth does not exceed 2 800 Hz, it is situated wholly within one frequency channel and the peak envelope power of coast stations does not exceed 10 kW and the peak envelope power of ship stations does not exceed 1.5 kW per channel. (WRC-15)

PART B – Channelling arrangements (WRC-12)

MOD

Section I – Radiotelephony

1 Radiotelephone channelling arrangements for the frequencies to be used by coast and ship stations in the bands allocated to the maritime mobile service are indicated in the following Sub-Sections:

Sub-Section A – Table of single-sideband transmitting frequencies (kHz) for duplex (two-frequency) operation;

Sub-Section B – Table of single-sideband transmitting frequencies (kHz) for simplex (single-frequency) operation and for intership cross-band (two-frequency) operation;

Sub-Section C-1 – Table of recommended single-sideband transmitting frequencies (kHz) for ship stations in the frequency band 4 000-4 063 kHz shared with the fixed service;

Sub-Section C-2 – Table of recommended single-sideband transmitting frequencies (kHz) for ship and coast stations in the frequency band 8 100-8 195 kHz shared with the fixed service.

2 The technical characteristics for single-sideband transmitters specified in Recommendation ITU-R M.1173-1 shall be used. (WRC-15)

3 One or more series of frequencies from Sub-Section A (with the exception of those frequencies mentioned in § 5 below) may be assigned to each coast station, which uses these frequencies associated in pairs (see No. **52.226**); each pair consists of a transmitting and a receiving

frequency. The series shall be selected with due regard to the areas served and so as to avoid, as far as possible, harmful interference between the services of different coast stations.

4 The frequencies in Sub-Section B are provided for worldwide common use by ships of all categories, according to traffic requirements, for ship transmissions to coast stations and for intership communication. They are also authorized for worldwide common use for transmissions by coast stations (simplex operation) provided the peak envelope power does not exceed 1 kW.

5 The following frequencies in Sub-Section A are allocated for calling purposes:

– Channel No. 421 in the 4 MHz band;

– Channel No. 606 in the 6 MHz band;

– Channel No. 821 in the 8 MHz band;

– Channel No. 1221 in the 12 MHz band;

– Channel No. 1621 in the 16 MHz band;

– Channel No. 1806 in the 18 MHz band;

– Channel No. 2221 in the 22 MHz band;

– Channel No. 2510 in the 25 MHz band.

Calling on the carrier frequencies 12 290 kHz and 16 420 kHz shall be permitted only to and from rescue coordination centres (see No. **30.6.1**), subject to the safeguards of Resolution **352 (WRC-03)** (see Nos. **52.221A** and **52.222A**).

The remaining frequencies in Sub-Sections A, B, C-1 and C-2 are working frequencies.

5A For the use of the carrier frequencies:

4 125 kHz (Channel No. 421);
6 215 kHz (Channel No. 606);
8 291 kHz (Channel No. 833);
12 290 kHz (Channel No. 1221);
16 420 kHz (Channel No. 1621);

in Sub-Section A, by coast and ship stations for distress and safety purposes, see Article **31**.

6 *a)* Maritime radiotelephone stations using single-sideband emissions in the frequency bands between 4 000 kHz and 27 500 kHz exclusively allocated to the maritime mobile service shall operate only on the carrier frequencies shown in the Sub-Sections A and B and, in the case of analogue radiotelephony, shall be in conformity with the technical characteristics specified in Recommendation ITU-R M.1173-1. (WRC-15)

b) Ship stations, when using frequencies for single-sideband emissions in the frequency band 4 000-4 063 kHz, and ship and coast stations, when using frequencies for single-sideband emissions in the frequency band 8 100-8 195 kHz, should operate on the carrier frequencies indicated in Sub-Sections C-1 and C-2 respectively. In the case of analogue radiotelephony technical characteristics of the equipment shall be those specified in Recommendation ITU-R M.1173-1. (WRC-15)

c) Stations, when employing the single-sideband mode for analogue radiotelephony, shall use only class J3E emissions. For digital communications, class J2D emissions shall be used.

7 The channelling plan established in Sub-Section C-2 does not prejudice the rights of administrations to establish, and to notify assignments to stations in the maritime mobile service other than those using radiotelephony in the frequency band 8 100-8 195 kHz, in conformity with the relevant provisions of these Regulations.

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APPENDIX 18 (REV.WRC-15)

Table of transmitting frequencies in the VHF maritime mobile band

(See Article **52**)

NOTE A – For assistance in understanding the Table, see Notes *a)* to *zz)* below. (WRC-15)

NOTE B – The Table below defines the channel numbering for maritime VHF communications based on 25 kHz channel spacing and use of several duplex channels. The channel numbering and the conversion of two-frequency channels for single-frequency operation shall be in accordance with Recommendation ITU-R M.1084-5 Annex 4, Tables 1 and 3. The Table below also describes the harmonized channels where the digital technologies defined in the most recent version of Recommendation ITU-R M.1842 could be deployed. (WRC-15)

Channel designator	Notes	Transmitting frequencies (MHz)		Inter-ship	Port operations and ship movement		Public corres-pondence
		From ship stations	From coast stations		Single frequency	Two frequency	
60	*m)*	156.025	160.625		x	x	x
01	*m)*	156.050	160.650		x	x	x
61	*m)*	156.075	160.675		x	x	x
02	*m)*	156.100	160.700		x	x	x
62	*m)*	156.125	160.725		x	x	x
03	*m)*	156.150	160.750		x	x	x
63	*m)*	156.175	160.775		x	x	x
04	*m)*	156.200	160.800		x	x	x
64	*m)*	156.225	160.825		x	x	x
05	*m)*	156.250	160.850		x	x	x
65	*m)*	156.275	160.875		x	x	x
06	*f)*	156.300		x			
2006	*r)*	160.900	160.900				
66	*m)*	156.325	160.925		x	x	x
07	*m)*	156.350	160.950		x	x	x
67	*h)*	156.375	156.375	x	x		
08		156.400		x			
68		156.425	156.425		x		
09	*i)*	156.450	156.450	x	x		
69		156.475	156.475	x	x		
10	*h), q)*	156.500	156.500	x	x		
70	*f), j)*	156.525	156.525	Digital selective calling for distress, safety and calling			
11	*q)*	156.550	156.550		x		
71		156.575	156.575		x		
12		156.600	156.600		x		
72	*i)*	156.625		x			
13	*k)*	156.650	156.650	x	x		
73	*h), i)*	156.675	156.675	x	x		
14		156.700	156.700		x		

74		156.725	156.725		x		
15	*g)*	156.750	156.750	x	x		
75	*n), s)*	156.775	156.775		x		
16	*f)*	156.800	156.800	DISTRESS, SAFETY AND CALLING			
76	*n), s)*	156.825	156.825		x		
17	*g)*	156.850	156.850	x	x		
77		156.875		x			
18	*m)*	156.900	161.500		x	x	x
78	*m)*	156.925	161.525		x	x	x
1078		156.925	156.925		x		
2078	*mm)*		161.525		x		
19	*m)*	156.950	161.550		x	x	x
1019		156.950	156.950		x		
2019	*mm)*		161.550		x		
79	*m)*	156.975	161.575		x	x	x
1079		156.975	156.975		x		
2079	*mm)*		161.575		x		
20	*m)*	157.000	161.600		x	x	x
1020		157.000	157.000		x		
2020	*mm)*		161.600		x		
80	*y), w1)*	157.025	161.625		x	x	x
21	*y), w1)*	157.050	161.650		x	x	x
81	*y), w1)*	157.075	161.675		x	x	x
22	*y), w1)*	157.100	161.700		x	x	x
82	*x), y), w1)*	157.125	161.725		x	x	x
23	*x), y), w1)*	157.150	161.750		x	x	x
83	*x), y), w1)*	157.175	161.775		x	x	x
24	*w), ww), x), AAA)*	157.200	161.800		x	x	x
1024	*w), ww), x), AAA)*	157.200					
2024	*w), ww), x), AAA)*	161.800	161.800	x (digital only)			
84	*w), ww), x), AAA)*	157.225	161.825		x	x	x
1084	*w), ww), x), AAA)*	157.225					
2084	*w), ww), x), AAA)*	161.825	161.825	x (digital only)			
25	*w), ww), x), AAA)*	157.250	161.850		x	x	x
1025	*w), ww), x), AAA)*	157.250					
2025	*w), ww), x), AAA)*	161.850	161.850	x (digital only)			
85	*w), ww), x), AAA)*	157.275	161.875		x	x	x
1085	*w), ww), x), AAA)*	157.275					
2085	*w), ww), x), AAA)*	161.875	161.875	x (digital only)			
26	*w), ww), x)*	157.300	161.900		x	x	x
1026	*w), ww), x)*	157.300					
2026	*w), ww), x)*		161.900				
86	*w), ww), x)*	157.325	161.925		x	x	x
1086	*w), ww), x)*	157.325					
2086	*w), ww), x)*		161.925				

27	*z), zx)*	157.350	161.950			x	x
1027	*z), zz)*	157.350	157.350		x		
2027*	*z)*	161.950	161.950				
87	*z), zz)*	157.375	157.375		x		
28	*z), zx)*	157.400	162.000			x	x
1028	*z), zz)*	157.400	157.400		x		
2028*	*z)*	162.000	162.000				
88	*z), zz)*	157.425	157.425		x		
AIS 1	*f), l), p)*	161.975	161.975				
AIS 2	*f), l), p)*	162.025	162.025				

* From 1 January 2019, channel 2027 will be designated ASM 1 and channel 2028 will be designated ASM 2.

Editorial note: The note numbering below is provisional and will be aligned during final preparations of the new edition of the Radio Regulations.

Notes referring to the Table

General notes

a) Administrations may designate frequencies in the inter-ship, port operations and ship movement services for use by light aircraft and helicopters to communicate with ships or participating coast stations in predominantly maritime support operations under the conditions specified in Nos. **51.69**, **51.73**, **51.74**, **51.75**, **51.76**, **51.77** and **51.78**. However, the use of the channels which are shared with public correspondence shall be subject to prior agreement between interested and affected administrations.

b) The channels of the present Appendix, with the exception of channels 06, 13, 15, 16, 17, 70, 75 and 76, may also be used for high-speed data and facsimile transmissions, subject to special arrangement between interested and affected administrations.

c) The channels of the present Appendix, with the exception of channels 06, 13, 15, 16, 17, 70, 75 and 76, may be used for direct-printing telegraphy and data transmission, subject to special arrangement between interested and affected administrations. (WRC-12)

d) The frequencies in this table may also be used for radiocommunications on inland waterways in accordance with the conditions specified in No. **5.226**.

e) Administrations may apply 12.5 kHz channel interleaving on a non-interference basis to 25 kHz channels, in accordance with the most recent version of Recommendation ITU-R M.1084, provided:

– it shall not affect the 25 kHz channels of the present Appendix maritime mobile distress and safety, automatic identification system (AIS), and data exchange frequencies, especially the channels 06, 13, 15, 16, 17, 70, AIS 1 and AIS 2, nor the technical characteristics set forth in Recommendation ITU-R M.489-2 for those channels;

– implementation of 12.5 kHz channel interleaving and consequential national requirements shall be subject to coordination with affected administrations. (WRC-12)

Specific notes

f) The frequencies 156.300 MHz (channel 06), 156.525 MHz (channel 70), 156.800 MHz (channel 16), 161.975 MHz (AIS 1) and 162.025 MHz (AIS 2) may also be used by aircraft stations for the purpose of search and rescue operations and other safety-related communication. (WRC-07)

g) Channels 15 and 17 may also be used for on-board communications provided the effective radiated power does not exceed 1 W, and subject to the national regulations of the administration concerned when these channels are used in its territorial waters.

h) Within the European Maritime Area and in Canada, these frequencies (channels 10, 67, 73) may also be used, if so required, by the individual administrations concerned, for communication between ship stations, aircraft stations and participating land stations engaged in coordinated search and rescue and anti-pollution operations in local areas, under the conditions specified in Nos. **51.69**, **51.73**, **51.74**, **51.75**, **51.76**, **51.77** and **51.78**.

i) The preferred first three frequencies for the purpose indicated in Note *a)* are 156.450 MHz (channel 09), 156.625 MHz (channel 72) and 156.675 MHz (channel 73).

j) Channel 70 is to be used exclusively for digital selective calling for distress, safety and calling.

k) Channel 13 is designated for use on a worldwide basis as a navigation safety communication channel, primarily for intership navigation safety communications. It may also be used for the ship movement and port operations service subject to the national regulations of the administrations concerned.

l) These channels (AIS 1 and AIS 2) are used for an automatic identification system (AIS) capable of providing worldwide operation, unless other frequencies are designated on a regional basis for this purpose. Such use should be in accordance with the most recent version of Recommendation ITU-R M.1371. (WRC-07)

m) These channels may be operated as single frequency channels, subject to coordination with affected administrations. The following conditions apply for single frequency usage:

– The lower frequency portion of these channels may be operated as single frequency channels by ship and coast stations.

– Transmission using the upper frequency portion of these channels is limited to coast stations.

– If permitted by administrations and specified by national regulations, the upper frequency portion of these channels may be used by ship stations for transmission. All precautions should be taken to avoid harmful interference to channels AIS 1, AIS 2, 2027* and 2028*. (WRC-15)

* From 1 January 2019, channel 2027 will be designated ASM 1 and channel 2028 will be designated ASM 2.

n) With the exception of AIS, the use of these channels (75 and 76) should be restricted to navigation-related communications only and all precautions should be taken to avoid harmful interference to channel 16, by limiting the output power to 1 W. (WRC-12)

o) (SUP - WRC-12)

p) Additionally, AIS 1 and AIS 2 may be used by the mobile-satellite service (Earth-to-space) for the reception of AIS transmissions from ships. (WRC-07)

q) When using these channels (10 and 11), all precautions should be taken to avoid harmful interference to channel 70. (WRC-07)

r) In the maritime mobile service, this frequency is reserved for experimental use for future applications or systems (e.g. new AIS applications, man over board systems, etc.). If authorized by administrations for experimental use, the operation shall not cause harmful interference to, or claim protection from, stations operating in the fixed and mobile services. (WRC-12)

s) Channels 75 and 76 are also allocated to the mobile-satellite service (Earth-to-space) for the reception of long-range AIS broadcast messages from ships (Message 27; see the most recent version of Recommendation ITU-R M.1371). (WRC-12)

w) In Regions 1 and 3:

Until 1 January 2017, the frequency bands 157.200-157.325 MHz and 161.800-161.925 MHz (corresponding to channels: 24, 84, 25, 85, 26 and 86) may be used for digitally modulated emissions, subject to coordination with affected administrations. Stations using these channels or frequency bands for digitally modulated emissions shall not cause harmful interference to, or claim protection from, other stations operating in accordance with Article **5**.

From 1 January 2017, the frequency bands 157.200-157.325 MHz and 161.800-161.925 MHz (corresponding to channels: 24, 84, 25, 85, 26 and 86) are identified for the utilization of the VHF Data Exchange System (VDES) described in the most recent version of Recommendation ITU-R M.2092. These frequency bands may also be used for analogue modulation described in the most recent version of Recommendation ITU-R M.1084 by an administration that wishes to do so, subject to not causing harmful interference to, or claiming protection from other stations in the maritime mobile service using digitally modulated emissions and subject to coordination with affected administrations. (WRC-15)

ww) In Region 2, the frequency bands 157.200-157.325 and 161.800-161.925 MHz (corresponding to channels: 24, 84, 25, 85, 26 and 86) are designated for digitally modulated emissions in accordance with the most recent version of Recommendation ITU-R M.1842.

In Canada and Barbados, from 1 January 2019 the frequency bands 157.200-157.275 and 161.800-161.875 MHz (corresponding to channels: 24, 84, 25 and 85) may be used for digitally modulated emissions, such as those described in the most recent version of Recommendation ITU-R M.2092, subject to coordination with affected administrations. (WRC-15)

x) From 1 January 2017, in Angola, Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Democratic Republic of the Congo, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe, the

frequency bands 157.125-157.325 and 161.725-161.925 MHz (corresponding to channels: 82, 23, 83, 24, 84, 25, 85, 26 and 86) are designated for digitally modulated emissions.

From 1 January 2017, in China, the frequency bands 157.150-157.325 and 161.750-161.925 MHz (corresponding to channels: 23, 83, 24, 84, 25, 85, 26 and 86) are designated for digitally modulated emissions. (WRC-12)

y) These channels may be operated as single or duplex frequency channels, subject to coordination with affected administrations. (WRC-12)

z) Until 1 January 2019, these channels may be used for possible testing of future AIS applications without causing harmful interference to, or claiming protection from, existing applications and stations operating in the fixed and mobile services.

From 1 January 2019, these channels are each split into two simplex channels. The channels 2027 and 2028 designated as ASM 1 and ASM 2 are used for application specific messages (ASM) as described in the most recent version of Recommendation ITU-R M.2092. (WRC-15)

AAA) From 1 January 2019, the channels 24, 84, 25 and 85 may be merged in order to form a unique duplex channel with a bandwidth of 100 kHz in order to operate the VDES terrestrial component described in the most recent version of Recommendation ITU-R M.2092. (WRC-15)

mm) Transmission on these channels is limited to coast stations. If permitted by administrations and specified by national regulations, these channels may be used by ship stations for transmission. All precautions should be taken to avoid harmful interference to channels AIS 1, AIS 2, 2027* and 2028*. (WRC-15)

* From 1 January 2019, channel 2027 will be designated ASM 1 and channel 2028 will be designated ASM 2.

w1) In Regions 1 and 3:

Until 1 January 2017, the frequency bands 157.025-157.175 MHz and 161.625-161.775 MHz (corresponding to channels: 80, 21, 81, 22, 82, 23 and 83) may be used for digitally modulated emissions, subject to coordination with affected administrations. Stations using these channels or frequency bands for digitally modulated emissions shall not cause harmful interference to, or claim protection from, other stations operating in accordance with Article **5**.

From 1 January 2017, the frequency bands 157.025-157.100 MHz and 161.625-161.700 MHz (corresponding to channels: 80, 21, 81 and 22) are identified for utilization of the digital systems described in the most recent version of Recommendation ITU-R M.1842 using multiple 25 kHz contiguous channels.

From 1 January 2017, the frequency bands 157.150-157.175 MHz and 161.750-161.775 MHz (corresponding to channels: 23 and 83) are identified for utilization of the digital systems described in the most recent version of Recommendation ITU-R M.1842 using two 25 kHz contiguous channels. From 1 January 2017, the frequencies 157.125 MHz and 161.725 MHz (corresponding to channel: 82) are identified for the utilization of the digital systems described in the most recent version of Recommendation ITU-R M.1842.

The frequency bands 157.025-157.175 MHz and 161.625-161.775 MHz (corresponding to channels: 80, 21, 81, 22, 82, 23 and 83) can also be used for analogue modulation described in the most recent version of Recommendation ITU-R M.1084 by an administration that wishes to do so, subject to not claiming protection from other stations in the maritime mobile service using digitally modulated emissions and subject to coordination with affected administrations. (WRC-15)

zx) In the United States, these channels are used for communication between ship stations and coast stations for the purpose of public correspondence. (WRC-15)

zz) From 1 January 2019, channels 1027, 1028, 87 and 88 are used as single-frequency analogue channels for port operation and ship movement. (WRC-15)

MOD

APPENDIX 26 (REV.WRC-15)*

Provisions and associated Frequency Allotment Plan for the aeronautical mobile (OR) service in the frequency bands allocated exclusively to that service between 3 025 kHz and 18 030 kHz

(See Article **43**)

APPENDIX 30 (REV.WRC-12)*

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)

ARTICLE 2A (REV.WRC-07)

Use of the guardbands

MOD

2A.2 Any assignment intended to provide these functions in support of a geostationary-satellite network in the BSS shall be notified under Article **11** and brought into use within the following time-limits[n]: (WRC-15)

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[n] The time-limit is established at the time when the request is received under § 2A.1.4. (WRC-15)

MOD

ARTICLE 4 (REV.WRC-03)

Procedures for modifications to the Region 2 Plan or for additional uses in Regions 1 and 3MOD 3 (WRC-15)

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

4.1 Provisions applicable to Regions 1 and 3

MOD

4.1.3*bis* The regulatory time-limit for bringing into use of an assignment in the List may be extended once by not more than three years due to launch failure in the following cases:

– the destruction of the satellite intended to bring the assignment into use;

– the destruction of the satellite launched to replace an already operating satellite which is intended to be relocated to bring another assignment into use; *or*

– the satellite is launched, but fails to reach its assigned orbital location.

For this extension to be granted, the launch failure must have occurred at least five years after the date of receipt of the complete Appendix **4** data. In no case shall the period of the extension of the regulatory time-limit exceed the difference in time between the three-year period and the period remaining from the date of the launch failure to the end of the regulatory time-limit[6]. In order to take advantage of this extension, the administration shall have, within one month of the launch failure or one month after 5 July 2003, whichever comes later, notified the Bureau in writing of such failure, and shall also provide the following information to the Bureau before the end of the regulatory time-limit of § 4.1.3:

– date of launch failure;

– due diligence information as required in Resolutions **49 (Rev.WRC-15)** for the assignment with respect to the satellite that suffered the launch failure, if that information has not already been provided.

If, 11 months after the request for extension, the administration has not provided to the Bureau updated Resolution **49 (Rev.WRC-15)** information, the Bureau shall promptly send a reminder to the notifying administration. If, within one year of the request for extension, the administration has not provided to the Bureau updated Resolution **49 (Rev.WRC-15)** information for the new satellite under procurement, the related frequency assignments shall lapse. (WRC-15)

MOD

4.1.9 Comments from administrations identified in the publication referred to under § 4.1.5 above shall be sent to the Bureau and to the administration proposing the modification. (WRC-15)

MOD

4.1.10 An administration that has not notified its agreement 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 § 4.1.5 shall be deemed to have not agreed to the proposed assignment unless the provisions of § 4.1.10a to 4.1.10d and § 4.1.21 are applied. This time-limit may be extended:

– for an administration that has requested additional information under § 4.1.8, by up to three months; *or*

– for an administration that has requested the assistance of the Bureau under § 4.1.21, by up to three months following the date at which the Bureau communicated the result of its action. (WRC-15)

SUP

4.1.10*ter*

ADD

4.1.10a After the same time period as specified in § 4.1.10, the notifying administration may, pursuant to § 4.1.21, request the Bureau to assist in respect of an administration which has not replied within this time period. (WRC-15)

ADD

4.1.10b The Bureau, acting under § 4.1.10a, shall send a reminder to the administration which has not replied, together with the results of its previously published compatibility analysis, containing the change in the values referred to in paragraph 1b of Annex 1 to Appendix **30**, requesting a decision. (WRC-15)

ADD

4.1.10c Fifteen days before the expiry of the 30-day period referred to in § 4.1.10d, the Bureau shall send a reminder to the above-mentioned administration drawing its attention to the consequence of no reply. (WRC-15)

ADD

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, it shall be deemed that the administration which has not given a decision has agreed to the proposed assignment. (WRC-15)

MOD

4.1.11 If, in seeking agreement, an administration modifies its initial proposal, it shall again apply the provisions of § 4.1 and the subsequent procedure in cases where:

– the assignments of any other administration received by the Bureau in accordance with § 4.1.3 or § 4.2.6, or § 2A.1.4 of Article 2A, or § 7.1 of Article 7, or No. **9.7** before this modified proposal is received under § 4.1.12;

– the assignments of any other administration contained in the Plans or the Lists; *or*

– the terrestrial services of any other administration,

are considered as being affected and receive more interference as a result of the modifications than that produced by the initial proposal. (WRC-15)

MOD

4.1.12 If agreement has been reached with the administrations identified in the publication referred to under § 4.1.5 above, the administration proposing the new or modified assignment may continue with the appropriate procedure in Article 5, and shall so inform the Bureau, indicating the final characteristics of the frequency assignment together with the names of the administrations with which agreement has been reached. (WRC-15)

MOD

4.1.25 Where an administration already having included in the List two assignments (not including those systems notified on behalf of a group of named administrations and included in the List by WRC-2000), in the same channel and covering the same service area, proposes to include in the List a new assignment in the same channel over this same service area, it shall apply the following in respect of another administration which has no assignment in the List in the same channel and which proposes to include in the List a new assignment:

a) if the agreement of the former administration is required following the application of § 4.1 by the latter administration, in order to protect the new assignment proposed by the former administration from interference caused by the assignment proposed by the latter administration, both administrations shall make every possible effort to resolve the difficulties by means of mutually acceptable adjustments to their networks;

b) in case of continuing disagreement, and if the former administration has not communicated to the Bureau the information specified in Annex 2 to Resolution **49 (Rev.WRC-15)**, this administration shall be deemed to have given its agreement to inclusion in the List of the assignment of the latter administration. (WRC-15)

4.2 Provisions applicable to Region 2

MOD

4.2.6*bis* The regulatory time-limit for bringing into use of an assignment in the Region 2 Plan obtained through application of § 4.2 may be extended once by not more than three years due to launch failure in the following cases:

– the destruction of the satellite intended to bring the assignment into use;

– the destruction of the satellite launched to replace an already operating satellite which is intended to be relocated to bring another assignment into use; *or*

– the satellite is launched, but fails to reach its assigned orbital location.

For this extension to be granted, the launch failure must have occurred at least five years after the date of receipt of the complete Appendix **4** data. In no case shall the period of the extension of the regulatory time-limit exceed the difference in time between the three-year period and the period remaining from the date of the launch failure to the end of the regulatory time-limit[15]. In order to take advantage of this extension, the administration shall have, within one month of the launch failure or one month after 5 July 2003, whichever comes later, notified the Bureau in writing of such failure, and shall also provide the following information to the Bureau before the end of the regulatory time-limit of § 4.2.6:

– date of launch failure;

– due diligence information as required in Resolution **49 (Rev.WRC-15)** for the assignment with respect to the satellite that suffered the launch failure, if that information has not already been provided.

If, 11 months after the request for extension, the administration has not provided to the Bureau updated Resolution **49 (Rev.WRC-15)** information, the Bureau shall promptly send a reminder to the notifying administration. If, within one year of the request for extension, the administration has not provided to the Bureau updated Resolution **49 (Rev.WRC-15)** information for the new satellite under procurement, the related frequency assignments shall lapse. (WRC-15)

ARTICLE 5 (REV.WRC-12)

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

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[MOD 20*bis*] 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-15)

MOD

5.2.11 If a recorded frequency assignment stemming from the Regions 1 and 3 List is not brought back into use within the suspension period resulting from the application of § 5.2.10 above, the Bureau shall cancel the assignment from the Master Register and the assignment in the List, unless the assignment is one to which § 4.1.26 or § 4.1.27 is being applied. (WRC-15)

MOD

_____

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 **COM5/4 (WRC-15)** shall apply. (WRC-15)

5.3 Cancellation of entries in the Master Register

MOD

5.3.1 Any notified frequency assignment to which the Article 4 procedures have been applied and which has been provisionally recorded under § 5.2.7 shall be brought into use no later than the end of the period provided under § 4.1.3, 4.1.3*bis*, 4.2.6 or 4.2.6*bis* of Article 4. Any other frequency assignment provisionally recorded under § 5.2.7 shall be brought into use by the date specified in the notice. Unless the Bureau has been informed by the notifying administration of the bringing into use of the assignment under § 5.2.8, it shall, no later than 15 days before the notified date of bringing into use or the end of the regulatory period established under § 4.1.3, 4.1.3*bis*, 4.2.6

or 4.2.6*bis* of Article 4, as appropriate, 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 notified date of bringing into use or the period provided under § 4.1.3, 4.1.3*bis*, 4.2.6 or 4.2.6*bis* of Article 4, as the case may be, it shall cancel the entry in the Master Register. (WRC-15)

MOD

ARTICLE 11 (REV.WRC-12)

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

11.2 TEXT FOR NOTES IN THE REMARKS COLUMN OF THE PLAN (WRC-03)

1 To be dedicated to the Islamic programme envisaged in WARC SAT-77 documents.

2 Not used.

3 Provisional beam. These assignments have been included in the Plan by WRC-97. These assignments are for exclusive use by Palestine, subject to the Israeli-Palestinian Interim Agreement of 28 September 1995, Resolution 741 of the Council notwithstanding and Resolution 99 (Minneapolis, 1998) of the Plenipotentiary Conference.

4 Assignment intended to ensure coverage of Algeria, Libya, Morocco, Mauritania and Tunisia, with the agreement of the countries concerned. If required, it may be used with the characteristics of the beam TUN15000.

5 This assignment shall be brought into use only when the limits referred to in Table 1 are not exceeded or with the agreement of the administrations identified in Table 2, whose networks/beams listed in this Table may be affected, with respect to (see also the Note to § 11.2):

a) assignments in the Region 2 Plan on 12 May 2000; *or*

b) assignments in the terrestrial services which are recorded in the Master Register with a favourable finding or received by the Bureau prior to 12 May 2000 for recording in the Master Register and which subsequently receive a favourable finding based on the Plan as it existed on 12 May 2000; *or*

c) assignments in the fixed-satellite service which:

- are recorded in the Master Register prior to 12 May 2000 with a favourable finding; *or*
- have been coordinated under the provisions of No. **9.7** (or No. **1060**) or § 7.2.1 of Article 7 prior to 12 May 2000; or
- are in process of coordination under the provisions of No. **9.7** (or No. **1060**) or § 7.2.1 of Article 7 prior to 31 July 2000 for which complete Appendix **4** data (or Appendix **3** data, as appropriate) have been received by the Bureau under the relevant provisions of Article **9** (or Article **11**, as appropriate):
  - filings received by the Bureau prior to 12 May 2000 at 1700 h (Istanbul time) shall be taken into account in the pertinent compatibility analysis by applying the pfd criteria referred to in Table 1; *or*
  - filings received by the Bureau after 12 May 2000 at 1700 h (Istanbul time), but before 31 July 2000, shall be taken into account by applying the sharing criteria of

−138 dB(W/(m^2 · 27 MHz)) or the pfd criteria referred to in Table 1, whichever is higher.

6 This assignment shall not claim protection from interference caused by the assignments which pertain to networks/beams identified in Table 3 which are in conformity with the Region 2 Plan on 12 May 2000 (see also the Note to § 11.2).

7 This assignment shall not claim protection from interference caused by assignments in the fixed-satellite service which pertain to networks/beams identified in Table 3 (see also the Note to § 11.2) and:

a) either are recorded in the Master Register with a favourable finding prior to 12 May 2000;

b) or for which complete Appendix **4** data (or Appendix **3** data, as appropriate) under the relevant provisions of Article **9** (or No. **1060**, or § 7.2.1 of Article 7, as appropriate) have been received prior to 12 May 2000, which have been brought into use prior to 12 May 2000 and for which the complete due diligence information, in accordance with Annex 2 to Resolution **49 (Rev.WRC-15)**, has been received prior to 12 May 2000. (WRC-15)

SUP

TABLE 2 (WRC-12)

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

ADD

TABLE 2 (WRC-15)

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
CVA08300	1, 3, 5, 7, 9, 11	c	USA	INTELSAT7 359E, INTELSAT8 359E, INTELSAT10 359E
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
MLI__100	1, 3, 5, 7, 9, 11, 13	c	USA	INTELSAT7 342E, INTELSAT8 342E, INTELSAT8 340E
MNG24800	31, 35	c	CHN, THA	APSTAR-4, THAICOM-A2B, THAICOM-G1K
MOZ30700	2, 6, 10	c	USA	INTELSAT7 359E, INTELSAT8 359E, INTELSAT10 359E

Beam name	Channels	Ref. Table 1	Affected administrations*	Affected networks/beams*
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	G, KOR	AM-SAT A4, KOREASAT-1, KOREASAT-2
RUS-4	31, 35, 39	c	G	AM-SAT A4
SEN22200	23	c	USA	USASAT-26A
SOM31200	26, 28, 30, 32, 34, 36, 38, 40	c	PAK	PAKSAT-1
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
ZWE13500	1, 3, 5, 7, 9, 11, 13	c	USA	INTELSAT7 359E, INTELSAT8 359E

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

SUP

TABLE 3 (WRC-12)

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

ADD

TABLE 3 (WRC-15)

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
CVA08300	1, 3, 5, 7, 9, 11	7	USA	INTELSAT7 359E
CYP08600	1, 3, 5, 7, 9, 11, 13	7	USA	INTELSAT7 359E

Beam name	Channels	Note	Affecting administrations*	Affecting networks/beams*
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
MOZ30700	2, 6, 10, 12	7	USA	INTELSAT7 359E
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
ZWE13500	1, 3, 5, 7, 9, 11, 13	7	USA	INTELSAT7 359E

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

SUP

TABLE 6A (WRC-12)

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

ADD

TABLE 6A (WRC-15)

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						
AFG	AFG__100	50.00	65.88	33.86				CB_TSS_AFGA		42.71		MODRES	35.50	CL		58.4	27M0G7W			P	
AFS	AFS02100	4.80	24.50	−28.00	3.13	1.68	27.00	R13TSS		37.24		MODRES	35.50	CL		59.1	27M0G7W			P	
AGL	AGL29500	−24.80	16.06	−12.45	2.42	1.88	77.88	R13TSS		37.87		MODRES	35.50	CL		59.1	27M0G7W			P	
ALB	ALB29600	62.00	20.04	41.23	0.60	0.60	61.32	R13TSS		48.88		MODRES	35.50	CL		58.9	27M0G7W			P	
ALG	ALG__100	−24.80	1.86	27.60				CB_TSS_ALGA		39.59		MODRES	35.50	CL		54.5	27M0G7W			P	
AND	AND34100	−37.00	1.60	42.50	0.60	0.60	0.00	R13TSS		48.88		MODRES	35.50	CL		56.5	27M0G7W			P	7
ARM	ARM06400	22.80	44.99	39.95	0.73	0.60	148.17	R13TSS		48.02		MODRES	35.50	CR		58.9	27M0G7W			P	
ARS	ARS__100	17.00	44.72	23.76				CB_TSS_ARSA		37.81		MODRES	35.50	CL		57.7	27M0G7W		54	P	
ARS	ARS34000	17.00	52.30	24.80	2.68	0.70	143.00	R13TSS		41.71		MODRES	35.50	CL		59.2	27M0G7W		54	P	5
AUS	AUS00400	152.00	123.00	−24.20	3.06	2.17	102.00	R13TSS		36.22		MODRES	35.50	CR		58.2	27M0G7W		30	P	
AUS	AUS0040A	152.00	96.83	−12.19	0.60	0.60	0.00	R13TSS		48.88		MODRES	35.50	CR		58.9	27M0G7W		30	P	
AUS	AUS0040B	152.00	105.69	−10.45	0.60	0.60	0.00	R13TSS		48.88		MODRES	35.50	CR		58.9	27M0G7W		30	P	
AUS	AUS0040C	152.00	110.52	−66.28	0.60	0.60	0.00	R13TSS		48.88		MODRES	35.50	CR		58.9	27M0G7W		30	P	
AUS	AUS00500	152.00	133.90	−18.40	2.82	1.74	105.00	R13TSS		37.53		MODRES	35.50	CL		59.4	27M0G7W			P	
AUS	AUS00600	152.00	136.60	−30.90	2.41	1.52	161.00	R13TSS		38.80		MODRES	35.50	CL		58.4	27M0G7W			P	
AUS	AUS00700	164.00	145.20	−38.10	2.12	1.02	147.00	R13TSS		41.09		MODRES	35.50	CR		58.5	27M0G7W		31	P	
AUS	AUS0070A	164.00	158.94	−54.50	0.60	0.60	0.00	R13TSS		48.88		MODRES	35.50	CR		58.9	27M0G7W		31	P	
AUS	AUS00800	164.00	145.90	−21.70	3.62	1.63	136.00	R13TSS		36.73		MODRES	35.50	CL		58.8	27M0G7W			P	
AUS	AUS00900	164.00	147.50	−32.10	2.31	1.43	187.00	R13TSS		39.25		MODRES	35.50	CR		59.3	27M0G7W		32	P	
AUS	AUS0090A	164.00	159.06	−31.52	0.60	0.60	0.00	R13TSS		48.88		MODRES	35.50	CR		58.9	27M0G7W		32	P	
AUS	AUS0090B	164.00	167.93	−29.02	0.60	0.60	0.00	R13TSS		48.88		MODRES	35.50	CR		58.9	27M0G7W		32	P	
AUS	AUSA_100	152.00	132.38	−38.37				CB_TSS_AUSA		48.88		MODRES	35.50	CR		58.9	27M0G7W			P	
AUS	AUSB_100	164.00	132.38	−38.37				CB_TSS_AUSB		48.88		MODRES	35.50	CL		58.9	27M0G7W			P	
AUT	AUT01600	−18.80	10.31	49.47	1.82	0.92	151.78	MOD13FRTSS		42.19		MODRES	35.50	CR		59.1	27M0G7W			P	
AZE	AZE06400	23.20	47.47	40.14	0.93	0.60	158.14	R13TSS		46.98		MODRES	35.50	CL		58.9	27M0G7W			P	
BDI	BDI27000	11.00	29.90	−3.10	0.71	0.60	80.00	R13TSS		48.15		MODRES	35.50	CL		58.4	27M0G7W			P	
BEL	BEL01800	38.20	5.12	51.96	1.00	1.00	24.53	MOD13FRTSS		44.45		MODRES	35.50	CL		55.5	27M0G7W			P	5
BEN	BEN23300	−19.20	2.20	9.50	1.44	0.68	97.00	R13TSS		44.54		MODRES	35.50	CL		58.3	27M0G7W			P	
BFA	BFA10700	−30.00	−1.50	12.20	1.45	1.14	29.00	R13TSS		42.26		MODRES	35.50	CL		57.0	27M0G7W			P	5, 7
BGD	BGD22000	74.00	90.30	23.60	1.46	0.84	135.00	R13TSS		43.56		MODRES	35.50	CR		58.7	27M0G7W			P	

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						
BHR	BHR25500	34.00	50.50	26.10	0.60	0.60	0.00	MOD13FRTSS		48.88		MODRES	35.50	CR		54.5	27M0G7W			P	
BIH	BIH14800	56.00	18.22	43.97	0.60	0.60	90.00	R13TSS		48.88		MODRES	35.50	CL		58.9	27M0G7W			P	
BLR	BLR06200	37.80	27.91	53.06	1.21	0.60	11.47	R13TSS		45.83		MODRES	35.50	CL		58.9	27M0G7W			P	
BOT	BOT29700	−0.80	23.30	−22.20	2.13	1.50	36.00	R13TSS		39.40		MODRES	35.50	CL		58.7	27M0G7W			P	
BRM	BRM29800	104.00	96.97	18.67	3.33	1.66	91.58	R13TSS		37.04		MODRES	35.50	CL		58.9	27M0G7W			P	
BRU	BRU33000	74.00	114.70	4.40	0.60	0.60	0.00	R13TSS		48.88		MODRES	35.50	CR		57.5	27M0G7W			P	
BTN	BTN03100	86.00	90.44	27.05	0.72	0.60	175.47	R13TSS		48.11		MODRES	35.50	CR		58.9	27M0G7W			P	
BUL	BUL02000	−1.20	25.00	43.00	1.04	0.60	165.00	R13TSS		46.50		MODRES	35.50	CL		58.6	27M0G7W			P	
CAF	CAF25800	−13.20	21.00	6.30	2.25	1.68	31.00	R13TSS		38.67		MODRES	35.50	CL		59.3	27M0G7W			P	
CBG	CBG29900	86.00	104.82	12.34	1.04	0.86	9.45	R13TSS		44.91		MODRES	35.50	CR		59.3	27M0G7W			P	
CHN	CHN15500	62.00	88.18	31.20	3.03	1.24	163.23	R13TSS		38.69		MODRES	35.50	CL		57.9	27M0G7W			P	
CHN	CHN15800	134.00	113.29	39.70	2.80	1.55	35.44	R13TSS		38.07		MODRES	35.50	CR		57.0	27M0G7W			P	
CHN	CHN19000	122.00	114.17	23.32	0.91	0.60	2.88	MOD13FRTSS		47.08		MODRES	35.50	CR		58.9	27M0G7W			P	
CHN	CHN20000	122.00	113.55	22.20	0.60	0.60	0.00	MOD13FRTSS		48.88		MODRES	35.50	CL		57.0	27M0G7W			P	
CHN	CHNA_100	62.00	90.56	39.22				CB_TSS_CHNA		40.01		MODRES	35.50	CR		58.5	27M0G7W			P	
CHN	CHNC_100	134.00	105.77	27.56				CB_TSS_CHNC		39.51		MODRES	35.50	CL		57.1	27M0G7W			P	
CHN	CHNE_100	92.20	114.96	20.16				CB_TSS_CHNE		44.74		MODRES	35.50	CL		59.4	27M0G7W			P	
CHN	CHNF_100	92.20	123.54	45.78				CB_TSS_CHNF		43.71		MODRES	35.50	CR		60.4	27M0G7W			P	
CLN	CLN21900	50.00	80.60	7.70	1.18	0.60	106.00	R13TSS		45.95		MODRES	35.50	CL		56.7	27M0G7W			P	
CME	CME30000	−13.00	12.70	6.20	2.54	1.68	87.00	R13TSS		38.15		MODRES	35.50	CR		58.5	27M0G7W			P	
COD	COD__100	−19.20	21.85	−3.40				CB_TSS_CODA		38.36		MODRES	35.50	CR		59.7	27M0G7W			P	
COG	COG23500	−13.20	14.60	−0.70	2.02	1.18	59.00	R13TSS		40.67		MODRES	35.50	CL		58.8	27M0G7W			P	
COM	COM20700	29.00	44.10	−12.10	0.76	0.60	149.00	R13TSS		47.86		MODRES	35.50	CR		58.1	27M0G7W			P	
CPV	CPV30100	−33.50	−24.12	16.09	0.77	0.63	94.46	R13TSS		47.56		MODRES	35.50	CL		57.2	27M0G7W			P	
CTI	CTI23700	−24.80	−5.78	7.19	1.50	1.26	111.74	R13TSS		41.67		MODRES	35.50	CL		58.8	27M0G7W			P	
CVA	CVA08300	−1.20	13.02	42.09	0.75	0.66	20.53	R13TSS		47.50		MODRES	35.50	CR		60.2	27M0G7W			P	5, 7
CVA	CVA08500	−1.20	12.59	41.09	1.72	1.31	144.13	MOD13FRTSS		40.92		MODRES	35.50	CR		56.5	27M0G7W			P	
CYP	CYP08600	−1.20	33.45	35.12	0.60	0.60	0.00	MOD13FRTSS		48.88		MODRES	35.50	CR		56.1	27M0G7W			P	5, 7
CZE	CZE14401	−12.80	16.77	46.78	1.71	0.89	149.15	MOD13FRTSS		42.64		MODRES	35.50	CL		58.8	27M0G7W			P	
CZE	CZE14402	−12.80	16.77	46.78	1.71	0.89	149.15	MOD13FRTSS		42.64		MODRES	35.50	CR		58.8	27M0G7W			P	
CZE	CZE14403	−12.80	16.77	46.78	1.71	0.89	149.15	MOD13FRTSS		42.64		MODRES	35.50	CR		58.8	27M0G7W		37	P	
D	D_08700	−18.80	10.31	49.47	1.82	0.92	151.78	MOD13FRTSS		42.19		MODRES	35.50	CR		59.1	27M0G7W			P	
DJI	DJI09900	16.80	42.68	11.68	0.60	0.60	90.00	R13TSS		48.88		MODRES	35.50	CL		57.5	27M0G7W			P	
DNK	DNK__100	−25.20	2.92	59.62				CB_TSS_DNKA		48.88		MODRES	35.50	CL		58.3	27M0G7W			P	
DNK	DNK090XR	−33.50	13.27	60.86	1.99	0.63	151.38	MOD13FRTSS		43.48		MODRES	35.50	CR		54.5	27M0G7W			P	6
DNK	DNK091XR	−33.50	−15.16	63.67	1.56	0.60	170.63	MOD13FRTSS		44.73		MODRES	35.50	CR		58.6	27M0G7W			P	6
E	E____100	−30.00	−9.40	34.15				CB_TSS_E__A		44.79		MODRES	35.50	CL		58.9	27M0G7W		01	P	
E	HISP33D1	−30.00	−4.00	39.00					COP	39.80	5.50	MODRES	35.50	CL		57.6	33M0G7W--	HISPASAT-1	01	PE	
E	HISP33D2	−30.00	−4.00	39.00					COP	39.80	5.50	MODRES	32.50	CL		57.6	33M0G7W--	HISPASAT-1	01	PE	
E	HISPA27D	−30.00	−4.00	39.00					COP	39.80	5.50	MODRES	38.43	CL		57.6	27M0G7W--	HISPASAT-1	01	PE	
E	HISPASA4	−30.00	−4.00	39.00					COP	39.80	5.50	MODRES	38.43	CL		57.6	27M0F8W	HISPASAT-1	01	PE	
EGY	EGY02600	−7.00	29.70	26.80	2.33	1.72	136.00	R13TSS		38.42		MODRES	35.50	CL		58.1	27M0G7W		12	P	8
ERI	ERI09200	22.80	39.41	14.98	1.67	0.95	145.48	R13TSS		42.44		MODRES	35.50	CR		58.9	27M0G7W			P	
EST	EST06100	44.50	25.06	58.60	0.77	0.60	12.27	R13TSS		47.81		MODRES	35.50	CR		58.7	27M0G7W			P	
ETH	ETH09200	36.00	40.29	8.95	2.87	2.16	174.06	R13TSS		36.52		MODRES	35.50	CL		58.7	27M0G7W			P	
F	F_09300	−7.00	3.52	45.41	2.22	1.15	159.34	R13TSS		40.39		MODRES	35.50	CL		58.8	27M0G7W		21	P	8
F	F____100	−7.00	50.00	−15.65				CB_TSS_F__A		48.88		MODRES	35.50	CR		58.9	27M0G7W			P	

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						
F	NCL10000	140.00	166.00	−21.00	1.14	0.72	146.00	R13TSS		45.30		MODRES	35.50	CR		58.7	27M0G7W			P	
F	OCE10100	−160.00	−145.00	−16.30	4.34	3.54	4.00	R13TSS		32.58		MODRES	35.50	CL		58.5	27M0G7W			P	
F	WAL10200	140.00	−176.80	−14.00	0.74	0.60	29.00	R13TSS		47.97		MODRES	35.50	CR		59.4	27M0G7W			P	
FIN	FIN10300	22.80	22.50	64.50	1.38	0.76	171.00	MOD13FRTSS		44.24		MODRES	35.50	CL		54.5	27M0G7W		52	P	
FIN	FIN10400	22.80	15.87	61.15	2.24	0.91	16.70	MOD13FRTSS		41.37		MODRES	35.50	CL		54.5	27M0G7W		52	P	
FJI	FJI19300	−178.00	179.62	−17.87	1.16	0.92	155.22	R13TSS		44.16		MODRES	35.50	CR		58.7	27M0G7W			P	7
FSM	FSM00000	158.00	151.90	5.48	5.15	1.57	167.00	R13TSS		35.38		MODRES	35.50	CR		58.9	27M0G7W			P	5
G	G 02700	−33.50	−3.50	53.80	1.84	0.72	142.00	R13TSS		43.23		MODRES	35.50	CR		58.0	27M0G7W			P	
GAB	GAB26000	−13.20	11.80	−0.60	1.43	1.12	64.00	R13TSS		42.40		MODRES	35.50	CR		58.3	27M0G7W			P	
GEO	GEO06400	23.20	43.35	42.27	1.11	0.60	161.21	R13TSS		46.23		MODRES	35.50	CR		58.9	27M0G7W			P	
GHA	GHA10800	−25.00	−1.20	7.90	1.48	1.06	102.00	R13TSS		42.49		MODRES	35.50	CR		58.6	27M0G7W			P	
GMB	GMB30200	−37.20	−15.10	13.40	0.79	0.60	4.00	R13TSS		47.69		MODRES	35.50	CL		58.3	27M0G7W			P	5, 7
GNB	GNB30400	−30.00	−15.00	12.00	0.90	0.60	172.00	R13TSS		47.12		MODRES	35.50	CL		58.1	27M0G7W			P	5, 7
GNE	GNE30300	−18.80	10.30	1.50	0.68	0.60	10.00	R13TSS		48.34		MODRES	35.50	CL		58.8	27M0G7W			P	
GRC	GRC10500	−1.20	24.51	38.08	1.70	0.95	152.97	MOD13FRTSS		42.40		MODRES	35.50	CL		56.3	27M0G7W			P	5, 7
GUI	GUI19200	−37.00	−11.00	10.20	1.58	1.04	147.00	R13TSS		42.29		MODRES	35.50	CR		58.4	27M0G7W			P	5, 7
HNG	HNG10601	−12.80	16.77	46.78	1.71	0.89	149.15	MOD13FRTSS		42.64		MODRES	35.50	CL		59.3	27M0G7W			P	
HNG	HNG10602	−12.80	16.77	46.78	1.71	0.89	149.15	MOD13FRTSS		42.64		MODRES	35.50	CR		59.3	27M0G7W			P	
HNG	HNG10603	−12.80	16.77	46.78	1.71	0.89	149.15	MOD13FRTSS		42.64		MODRES	35.50	CR		59.3	27M0G7W		37	P	
HOL	HOL21300	38.20	5.12	51.96	1.00	1.00	24.53	MOD13FRTSS		44.45		MODRES	35.50	CL		58.5	27M0G7W			P	
HRV	HRV14801	−12.80	16.77	46.78	1.71	0.89	149.15	MOD13FRTSS		42.64		MODRES	35.50	CL		58.8	27M0G7W			P	
HRV	HRV14802	−12.80	16.77	46.78	1.71	0.89	149.15	MOD13FRTSS		42.64		MODRES	35.50	CR		58.8	27M0G7W			P	
HRV	HRV14803	−12.80	16.77	46.78	1.71	0.89	149.15	MOD13FRTSS		42.64		MODRES	35.50	CR		58.8	27M0G7W		37	P	
I	I 08200	9.00	12.67	40.74	1.99	1.35	144.20	R13TSS		40.14		MODRES	35.50	CR		54.5	27M0G7W			P	8
IND	IND03700	68.00	93.00	25.50	1.46	1.13	40.00	R13TSS		42.27		MODRES	35.50	CL		58.9	27M0G7W			P	
IND	IND04700	68.00	93.30	11.10	1.92	0.60	96.00	R13TSS		43.83		MODRES	35.50	CR		58.4	27M0G7W			P	
IND	INDA_100	55.80	76.16	14.72				CB_TSS_INDA		45.66		MODRES	35.50	CR		58.8	27M0G7W			P	
IND	INDB_100	55.80	83.43	24.22				CB_TSS_INDB		43.15		MODRES	35.50	CL		58.9	27M0G7W			P	
IND	INDD_100	68.00	74.37	29.16				CB_TSS_INDD		41.80		MODRES	35.50	CR		59.3	27M0G7W			P	
INS	INSA_100	80.20	108.82	−0.73				CB_TSS_INSA		38.88		MODRES	35.50	CR		59.2	27M0G7W			P	
INS	INSB_100	104.00	129.75	−3.50				CB_TSS_INSB		37.53		MODRES	35.50	CL		58.8	27M0G7W			P	
IRL	IRL21100	−37.20	−8.25	53.22	0.72	0.60	157.56	R13TSS		48.08		MODRES	35.50	CL		59.2	27M0G7W			P	5, 7
IRN	IRN10900	34.00	54.20	32.40	3.82	1.82	149.00	R13TSS		36.03		MODRES	35.50	CL		57.8	27M0G7W			P	
IRQ	IRQ25600	50.00	43.78	33.28	1.74	1.23	156.76	R13TSS		41.14		MODRES	35.50	CL		58.3	27M0G7W			P	
ISL	ISL04900	−33.50	−19.00	64.90	1.00	0.60	177.00	R13TSS		46.67		MODRES	35.50	CL		60.8	27M0G7W			P	5, 6
ISL	ISL05000	−33.50	−15.35	63.25	1.58	0.60	169.00	R13TSS		44.67		MODRES	35.50	CR		57.3	27M0G7W			P	
ISR	ISR11000	−4.00	34.95	31.32	0.73	0.60	110.02	R13TSS		48.01		MODRES	35.50	CR		58.8	27M0G7W			P	
J	000BS-3N	109.85	134.50	31.50	3.52	3.30	68.00	R13TSS		33.80		MODRES	35.50	CR		*	27M0F8W	BS-3N	02	PE	
J	J 10985	109.85	134.50	31.50	3.52	3.30	68.00	R13TSS		33.80		MODRES	35.50	CR		*	34M5G7W		02	P	
J	J 11100	110.00	134.50	31.50	3.52	3.30	68.00	R13TSS		33.80		MODRES	35.50	CR		*	34M5G7W		02	P	
J	J 1110E	110.00	134.50	31.50	3.52	3.30	68.00	R13TSS		33.80		MODRES	35.50	CR		*	27M0F8W	BS-3M	02	PE	
JOR	JOR22400	11.00	37.55	34.02	1.47	0.91	73.16	MOD13FRTSS		43.19		MODRES	35.50	CL		55.5	27M0G7W			P	8
KAZ	KAZ06600	56.40	65.73	46.40	4.58	1.76	177.45	R13TSS		35.38		MODRES	35.50	CR		58.9	27M0G7W			P	

* Channel 1: 58.2 dBW, channels 3, 5, 7: 59.2 dBW, channels 9, 11, 13: 59.3 dBW, other channels: 59.4 dBW.

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						
KEN	KEN24900	−0.80	37.95	0.92	2.13	1.34	98.35	R13TSS		39.90		MODRES	35.50	CL		58.7	27M0G7W			P	
KGZ	KGZ07000	50.00	73.91	41.32	1.47	0.64	5.05	R13TSS		44.75		MODRES	35.50	CR		59.0	27M0G7W			P	
KIR	KIR__100	176.00	−170.31	−0.56				CB_TSS_KIRA		42.58		MODRES	35.50	CL		58.9	27M0G7W			P	5, 7
KOR	KO11201D	116.00	127.50	36.00	1.24	1.02	168.00	R13TSS		43.40		MODRES	38.43	CL		**	27M0G7W	KOREASAT-1	03	PE	
KOR	KOR11200	116.00	127.50	36.00	1.24	1.02	168.00	R13TSS		43.80		MODRES	35.50	CL		***	27M0G7W		03	P	
KOR	KOR11201	116.00	127.50	36.00	1.24	1.02	168.00	R13TSS		43.40		MODRES	38.43	CL		**	27M0F8W	KOREASAT-1	03	PE	
KRE	KRE28600	140.00	128.45	40.32	1.63	0.68	18.89	R13TSS		44.00		MODRES	35.50	CL		59.0	27M0G7W			P	
KWT	KWT11300	11.00	47.48	29.12	0.60	0.60	90.00	R13TSS		48.88		MODRES	35.50	CR		58.2	27M0G7W			P	
LAO	LAO28400	122.20	103.71	18.17	1.87	1.03	123.99	MOD13FRTSS		41.60		MODRES	35.50	CR		58.8	33M0G7W			P	
LBN	LBN27900	11.00	37.55	34.02	1.47	0.91	73.16	MOD13FRTSS		43.19		MODRES	35.50	CR		55.5	27M0G7W			P	
LBR	LBR24400	−33.50	−9.30	6.60	1.22	0.70	133.00	R13TSS		45.13		MODRES	35.50	CR		58.2	27M0G7W			P	
LBY	LBY__100	−24.80	17.62	26.55				CB_TSS_LBYA		40.30		MODRES	35.50	CL		58.0	27M0G7W			P	
LIE	LIE25300	−18.80	10.31	49.47	1.82	0.92	151.78	MOD13FRTSS		42.19		MODRES	35.50	CL		59.1	27M0G7W			P	
LSO	LSO30500	4.80	27.80	−29.80	0.66	0.60	36.00	R13TSS		48.47		MODRES	35.50	CR		59.2	27M0G7W			P	
LTU	LTU06100	23.20	24.51	56.09				CB_TSS_LTUA		48.21		MODRES	35.50	CL		56.9	27M0G7W			P	
LUX	LUX11400	28.20	5.21	49.20	0.60	0.60	90.00	R13TSS		48.88		MODRES	35.50	CL		57.9	27M0G7W		09	P	
LVA	LVA06100	23.20	24.51	56.09				CB_TSS_LVAA		48.21		MODRES	35.50	CR		56.9	27M0G7W			P	
MAU	MAU__100	29.00	58.61	−15.88				CB_TSS_MAUA		41.42		MODRES	35.50	CL		59.0	27M0G7W			P	
MCO	MCO11600	34.20	7.93	43.59	1.28	0.60	21.73	MOD13FRTSS		45.58		MODRES	35.50	CL		58.6	27M0G7W			P	
MDA	MDA06300	50.00	28.45	46.99	0.60	0.60	90.00	R13TSS		48.88		MODRES	35.50	CR		58.9	27M0G7W			P	
MDG	MDG23600	29.00	46.60	−18.80	2.72	1.14	65.00	R13TSS		39.53		MODRES	35.50	CL		58.3	27M0G7W			P	
MHL	MHL00000	146.00	167.64	9.83	2.07	0.90	157.42	R13TSS		41.75		MODRES	35.50	CR		59.0	27M0G7W			P	
MKD	MKD14800	22.80	21.61	41.56	0.60	0.60	90.00	R13TSS		48.88		MODRES	35.50	CR		58.9	27M0G7W			P	
MLA	MLA__100	91.50	108.05	4.00				CB_TSS_MLAA		43.00		MODRES	35.50	CR		58.4	27M0G7W			P	
MLD	MLD30600	50.00	72.95	5.78	1.19	0.91	104.53	R13TSS		44.09		MODRES	35.50	CR		58.7	27M0G7W			P	
MLI	MLI__100	−19.20	−5.35	17.11				CB_TSS_MLIB		41.21		MODRES	35.50	CR		58.7	27M0G7W			P	5
MLT	MLT14700	22.80	14.40	35.90	0.60	0.60	0.00	R13TSS		48.88		MODRES	35.50	CR		56.0	27M0G7W			P	
MNG	MNG24800	74.00	102.20	46.60	3.60	1.13	169.00	R13TSS		38.35		MODRES	35.50	CR		59.0	27M0G7W			P	5, 7
MOZ	MOZ30700	−1.00	34.00	−18.00	3.57	1.38	55.00	R13TSS		37.52		MODRES	35.50	CL		59.2	27M0G7W			P	5, 7
MRC	MRC20900	−25.20	−8.95	28.98	3.56	1.23	49.23	R13TSS		38.02		MODRES	35.50	CR		54.9	27M0G7W			P	
MTN	MTN__100	−36.80	−10.52	19.66				CB_TSS_MTNA		41.91		MODRES	35.50	CR		55.5	27M0G7W			P	7
MWI	MWI30800	4.80	33.79	−13.25	1.56	0.70	92.69	R13TSS		44.10		MODRES	35.50	CR		59.2	27M0G7W			P	
NGR	NGR11500	−37.20	7.63	17.01	2.20	1.80	102.40	R13TSS		38.48		MODRES	35.50	CL		59.5	27M0G7W			P	5, 7
NIG	NIG11900	−19.20	7.80	9.40	2.16	2.02	45.00	R13TSS		38.05		MODRES	35.50	CR		58.9	27M0G7W			P	
NMB	NMB02500	−18.80	17.50	−21.60	2.66	1.90	48.00	R13TSS		37.41		MODRES	35.50	CL		59.7	27M0G7W			P	
NOR	NOR12000	−0.80	13.42	62.76	1.43	0.60	19.61	MOD13FRTSS		45.10		MODRES	35.50	CL		56.2	27M0G7W		06	P	5, 7
NOR	NOR12100	−0.80	18.00	60.23	1.67	0.83	23.85	R13TSS		43.02		MODRES	35.50	CL		57.8	27M0G7W		06	P	
NPL	NPL12200	50.00	83.70	28.30	1.72	0.60	163.00	R13TSS		44.31		MODRES	35.50	CR		59.6	27M0G7W			P	
NRU	NRU30900	134.00	167.00	−0.50	0.60	0.60	0.00	R13TSS		48.88		MODRES	35.50	CL		57.5	27M0G7W			P	
NZL	NZL__100	158.00	−170.68	−19.72				CB_TSS_NZLA		48.88		MODRES	35.50	CL		59.6	27M0G7W			P	
OMA	OMA12300	17.20	55.60	21.00	1.88	1.02	100.00	R13TSS		41.62		MODRES	35.50	CR		58.3	27M0G7W			P	
PAK	PAK12700	38.20	69.60	29.50	2.30	2.16	14.00	R13TSS		37.49		MODRES	35.50	CR		58.9	27M0G7W			P	

** Channels 2, 4, 6: 63.6 dBW, channels 8, 10, 12: 63.7 dBW.

*** Channels 2, 4, 6: 59.0 dBW, other channels: 59.1 dBW.

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						
PHL	PHL28500	98.00	121.30	11.10	3.46	1.76	99.00	R13TSS		36.60		MODRES	35.50	CL		58.7	27M0G7W			P	
PLW	PLW00000	140.00	132.98	5.51	1.30	0.60	55.41	R13TSS		45.53		MODRES	35.50	CR		58.8	27M0G7W			P	
PNG	PNG13100	134.00	148.07	−6.65	3.13	2.30	168.32	MOD13FRTSS		35.87		MODRES	35.50	CR		54.5	27M0G7W			P	
POL	POL13200	50.00	20.07	51.86	1.20	0.69	17.76	R13TSS		45.26		MODRES	35.50	CL		59.2	27M0G7W			P	
POR	POR__100	−37.00	−15.92	37.65				CB_TSS_PORA		47.17		MODRES	35.50	CR		58.4	27M0G7W			P	5, 7
PSE	YYY00000	−13.20	34.99	31.86	0.60	0.60	90.00	R13TSS		48.88		MODRES	35.50	CL		58.9	27M0G7W			P	3
QAT	QAT24700	20.00	51.38	25.26	0.60	0.60	90.00	R13TSS		48.88		MODRES	35.50	CL		54.5	27M0G7W			P	
ROU	ROU13600	50.00	25.12	45.75	1.17	0.73	9.52	R13TSS		45.15		MODRES	35.50	CR		58.9	27M0G7W			P	
RRW	RRW31000	11.00	30.00	−2.10	0.66	0.60	42.00	R13TSS		48.47		MODRES	35.50	CL		59.8	27M0G7W			P	
RUS	RSTREA11	36.00	38.00	53.00	2.20	2.20	0.00	R13TSS		37.70		MODRES	35.50	CL		53.0	27M0F8W	RST-1	05	PE	
RUS	RSTREA12	36.00	38.00	53.00	2.20	2.20	0.00	R13TSS		37.70		MODRES	35.50	CR		53.0	27M0F8W	RST-1	05	PE	
RUS	RSTRED11	36.00	38.00	53.00	2.20	2.20	0.00	R13TSS		37.70		MODRES	35.50	CL		53.0	27M0G7W	RST-1	05	PE	
RUS	RSTRED12	36.00	38.00	53.00	2.20	2.20	0.00	R13TSS		37.70		MODRES	35.50	CR		53.0	27M0G7W	RST-1	05	PE	
RUS	RSTRSD11	36.00	38.00	53.00	2.20	2.20	0.00	R13TSS		37.70		MODRES	35.50	CL		53.0	27M0G7W	RST-1	05	P	
RUS	RSTRSD12	36.00	38.00	53.00	2.20	2.20	0.00	R13TSS		37.70		MODRES	35.50	CR		53.0	27M0G7W	RST-1	05	P	
RUS	RSTRSD13	36.00	38.00	53.00	2.20	2.20	0.00	R13TSS		37.70		MODRES	39.02	CL		53.0	27M0G7W	RST-1	05	P	
RUS	RSTRSD14	36.00	38.00	53.00	2.20	2.20	0.00	R13TSS		37.70		MODRES	39.02	CR		53.0	27M0G7W	RST-1	05	P	
RUS	RSTRSD21	56.00	65.00	63.00	2.20	2.20	0.00	R123FR		37.70		MODRES	35.50	CL		55.0	27M0G7W	RST-2	14	P	
RUS	RSTRSD22	56.00	65.00	63.00	2.20	2.20	0.00	R123FR		37.70		MODRES	35.50	CR		55.0	27M0G7W	RST-2	14	P	
RUS	RSTRSD31	86.00	97.00	62.00	2.20	2.20	0.00	R13TSS		37.70		MODRES	35.50	CL		55.0	27M0G7W	RST-3	33	P	
RUS	RSTRSD32	86.00	97.00	62.00	2.20	2.20	0.00	R13TSS		37.70		MODRES	35.50	CR		55.0	27M0G7W	RST-3	33	P	
RUS	RSTRSD51	140.00	158.00	56.00	2.20	2.20	0.00	R13TSS		37.70		MODRES	35.50	CL		55.0	27M0G7W	RST-5	35	P	
RUS	RSTRSD52	140.00	158.00	56.00	2.20	2.20	0.00	R13TSS		37.70		MODRES	35.50	CR		55.0	27M0G7W	RST-5	35	P	
RUS	RUS00401	110.00	128.73	54.30	4.25	2.02	156.81	R13TSS		35.11		MODRES	35.50	CL		58.9	27M0G7W	RUS-4	34	P	5, 7, 8
RUS	RUS00402	110.00	128.73	54.30	4.25	2.02	156.81	R13TSS		35.11		MODRES	35.50	CR		58.9	27M0G7W	RUS-4	34	P	5, 7, 8
S	S 13800	5.00	16.20	61.00	1.04	0.98	14.00	R13TSS		44.36		MODRES	35.50	CL		55.6	27M0G7W		04	P	
S	S 13900	5.00	17.00	61.50	2.00	1.00	10.00	R13TSS		41.44		MODRES	35.50	CL		61.1	27M0G7W		04	P	
SDN	SDN__100	−7.00	30.24	13.53				CB_TSS_SDNA		40.26		MODRES	35.50	CR		59.4	27M0G7W			P	
SEN	SEN22200	−37.00	−14.40	13.80	1.46	1.04	139.00	R13TSS		42.63		MODRES	35.50	CL		58.6	27M0G7W			P	5, 7
SEY	SEY00000	42.50	51.86	−7.23	2.43	1.04	27.51	R13TSS		40.44		MODRES	35.50	CR		58.9	27M0G7W			P	
SLM	SLM00000	128.00	159.27	−8.40	1.35	1.08	118.59	R13TSS		42.81		MODRES	35.50	CL		58.9	27M0G7W			P	
SMO	SMO05700	−178.00	−171.70	−13.87	0.60	0.60	90.00	R13TSS		48.88		MODRES	35.50	CR		58.6	27M0G7W			P	7
SMR	SMR31100	−36.80	12.60	43.70	0.60	0.60	0.00	R13TSS		48.88		MODRES	35.50	CR		57.4	27M0G7W			P	7
SNG	SNG15100	88.00	103.86	1.42	0.92	0.72	175.12	R13TSS		46.25		MODRES	35.50	CL		58.5	27M0G7W			P	
SOM	SOM31200	37.80	45.16	7.11	3.31	1.51	65.48	R13TSS		37.46		MODRES	35.50	CR		57.4	27M0G7W			P	5
SRB	SRB14800	−7.00	20.50	43.98	0.91	0.60	145.16	R13TSS		47.07		MODRES	35.50	CR		58.9	27M0G7W			P	
SRL	SRL25900	−33.50	−11.80	8.60	0.78	0.68	114.00	R13TSS		47.20		MODRES	35.50	CR		58.4	27M0G7W			P	6
STP	STP24100	−7.00	6.17	1.45	0.65	0.60	153.51	R13TSS		48.56		MODRES	35.50	CR		56.4	27M0G7W			P	
SUI	SUI14000	−18.80	10.31	49.47	1.82	0.92	151.78	MOD13FRTSS		42.19		MODRES	35.50	CL		59.1	27M0G7W			P	
SVK	SVK14401	−12.80	16.77	46.78	1.71	0.89	149.15	MOD13FRTSS		42.64		MODRES	35.50	CL		59.3	27M0G7W			P	
SVK	SVK14402	−12.80	16.77	46.78	1.71	0.89	149.15	MOD13FRTSS		42.64		MODRES	35.50	CR		59.3	27M0G7W			P	
SVK	SVK14403	−12.80	16.77	46.78	1.71	0.89	149.15	MOD13FRTSS		42.64		MODRES	35.50	CR		59.3	27M0G7W		37	P	
SVN	SVN14800	33.80	15.01	46.18	0.60	0.60	90.00	R13TSS		48.88		MODRES	35.50	CR		58.9	27M0G7W			P	
SWZ	SWZ31300	4.80	31.39	−26.44	0.60	0.60	90.00	R13TSS		48.88		MODRES	35.50	CL		57.9	27M0G7W			P	
SYR	SYR22900	11.00	37.55	34.02	1.47	0.91	73.16	MOD13FRTSS		43.19		MODRES	35.50	CL		55.5	27M0G7W		53	P	
SYR	SYR33900	11.00	37.60	34.20	1.32	0.88	74.00	MOD13FRTSS		43.80		MODRES	35.50	CL		56.4	27M0G7W		53	P	
TCD	TCD14300	17.00	18.36	15.47	3.23	2.05	82.89	R13TSS		36.23		MODRES	35.50	CR		58.9	27M0G7W			P	

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						
TGO	TGO22600	−30.00	0.72	8.61	1.12	0.60	109.54	R13TSS		46.19		MODRES	35.50	CR		58.5	27M0G7W			P	5, 7
THA	THA14200	98.00	100.75	12.88	2.80	1.82	93.77	R13TSS		37.37		MODRES	35.50	CL		58.6	27M0G7W			P	
TJK	TJK06900	38.00	71.14	38.41	1.21	0.73	155.31	R13TSS		45.00		MODRES	35.50	CL		58.8	27M0G7W			P	5
TKM	TKM06800	50.00	59.24	38.83	2.26	1.02	166.64	R13TSS		40.81		MODRES	35.50	CR		58.9	27M0G7W			P	5
TLS	TLS00000	128.00	126.03	−8.72	0.66	0.60	13.92	R13TSS		48.50		MODRES	35.50	CR		58.9	27M0G7W			P	
TON	TON21500	170.75	−175.23	−18.19	1.59	0.60	71.33	R13TSS		44.64		MODRES	35.50	CR		58.3	27M0G7W			P	5
TUN	TUN15000	−25.20	9.50	33.50	1.88	0.72	135.00	MOD13FRTSS		43.13		MODRES	35.50	CR		57.3	27M0G7W		55	P	
TUN	TUN27200	−25.20	2.10	31.75	3.41	1.81	179.18	MOD13FRTSS		36.54		MODRES	35.50	CR		55.5	27M0G7W		55	P	4
TUR	TUR14500	42.00	34.95	39.09	3.18	0.99	0.79	R13TSS		39.47		MODRES	35.50	CL		58.8	27M0G7W		36	P	
TUV	TUV00000	176.00	177.61	−7.11	0.94	0.60	137.58	R13TSS		46.93		MODRES	35.50	CR		58.9	27M0G7W			P	
TZA	TZA22500	11.00	34.60	−6.20	2.41	1.72	129.00	R13TSS		38.27		MODRES	35.50	CR		58.7	27M0G7W			P	
UAE	UAE27400	52.50	53.85	24.34	1.19	0.85	3.72	R13TSS		44.39		MODRES	35.50	CR		58.2	27M0G7W			P	
UGA	UGA05100	17.00	32.20	1.04	1.50	1.02	68.73	R13TSS		42.62		MODRES	35.50	CL		58.2	27M0G7W			P	
UKR	UKR06300	38.20	31.74	48.22	2.29	0.96	177.78	R13TSS		41.01		MODRES	35.50	CR		58.9	27M0G7W			P	
USA	GUM33100	122.00	144.50	13.10	0.60	0.60	0.00	R13TSS		48.88		MODRES	35.50	CL		58.3	27M0G7W			P	
USA	MRA33200	121.80	145.90	16.90	1.20	0.60	76.00	R13TSS		45.87		MODRES	35.50	CR		58.5	27M0G7W			P	
USA	PLM33200	170.00	−161.40	7.00	0.60	0.60	0.00	R13TSS		48.88		MODRES	35.50	CL		57.4	27M0G7W			P	
USA	USAA_100	170.00	−170.51	−12.72				CB_TSS_USAA		48.88		MODRES	35.50	CL		56.1	27M0G7W			P	
USA	WAK33400	140.00	166.50	19.20	0.60	0.60	0.00	R13TSS		48.88		MODRES	35.50	CR		58.6	27M0G7W			P	
UZB	UZB07100	33.80	63.80	41.21	2.56	0.89	159.91	R13TSS		40.84		MODRES	35.50	CR		58.8	27M0G7W			P	
VTN	VTN32500	107.00	106.84	14.21	3.43	1.76	109.43	R13TSS		36.65		MODRES	35.50	CR		58.4	27M0G7W			P	
VUT	VUT12800	140.00	168.00	−16.40	1.52	0.68	87.00	R13TSS		44.30		MODRES	35.50	CL		57.8	27M0G7W			P	
YEM	YEM__100	11.00	48.05	14.64				CB_TSS_YEMA		47.63		MODRES	35.50	CL		54.9	27M0G7W			P	
ZMB	ZMB31400	−0.80	27.50	−13.10	2.38	1.48	39.00	R13TSS		38.98		MODRES	35.50	CR		58.7	27M0G7W			P	
ZWE	ZWE13500	−0.80	29.60	−18.80	1.46	1.36	37.00	R13TSS		41.47		MODRES	35.50	CR		59.2	27M0G7W			P	5, 7

ANNEX 1 (REV.WRC-03)

Limits for determining whether a service of an administration is affected by a proposed modification to the Region 2 Plan or by a proposed new or modified assignment in the Regions 1 and 3 List or when it is necessary under this Appendix to seek the agreement of any other administration[25]

MOD

1 Limits for the interference into frequency assignments in conformity with the Regions 1 and 3 Plan or with the Regions 1 and 3 List or into new or modified assignments in the Regions 1 and 3 List

Under assumed free-space propagation conditions, the power flux-density of a proposed new or modified assignment in the List shall not exceed the value of −103.6 dB(W/(m^2 · 27 MHz)).

With respect to § 4.1.1 *a)* or *b)* of Article 4, an administration in Region 1 or 3 is considered by the Bureau as being affected if the minimum orbital spacing between the wanted and interfering space stations, under worst-case station-keeping conditions, is less than 9°.

However, an administration in Region 1 or 3 is considered as not being affected if either of the following two conditions is met:

a) under assumed free-space propagation conditions, the power flux-density at any test point within the service area associated with any of its frequency assignments in the Plan or in the List or for which the procedure of Article 4 has been initiated, does not exceed the following values: (WRC-15)

MOD

6 Limits to the change in the power flux-density of assignments in the Regions 1 and 3 Plan or List to protect the fixed-satellite service (space-to-Earth) in the frequency band 11.7-12.2 GHz[32] in Region 2 or in the frequency band 12.2-12.5 GHz in Region 3, and of assignments in the Region 2 Plan to protect the fixed-satellite service (space-to-Earth) in the frequency band 12.5-12.7 GHz in Region 1 and in the frequency band 12.2-12.7 GHz in Region 3

The above set of formulas is only applied to networks:

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[25] With respect to this Annex, except for Section 2, the limits relate to the power flux-density which would be obtained assuming free-space propagation conditions.

With respect to Section 2 of this Annex, the limit specified relates to the overall equivalent protection margin calculated in accordance with § 2.2.4 of Annex 5.

– for which Appendix **4** information for coordination had been received by the Bureau prior to 30 March 2002; *and*

– which had been brought into use prior to 30 March 2002 and for which the date of bringing into use had been confirmed to the Bureau; *and*

– for which the complete due diligence information, in accordance with Annex 2 to Resolution **49 (Rev.WRC-15)**, had been received by the Bureau prior to 30 March 2002. (WRC-15)

MOD

ANNEX 4 (REV.WRC-15)

Need for coordination of a transmitting space station in the fixed-satellite service or in the broadcasting-satellite service where this service is not subject to a Plan: in Region 2 (11.7-12.2 GHz) with respect to the Plan, the List or proposed new or modified assignments in the List for Regions 1 and 3; in Region 1 (12.5-12.7 GHz) and in Region 3 (12.2-12.7 GHz) with respect to the Plan or proposed modifications to the Plan in Region 2; in Region 3 (12.2-12.5 GHz) with respect to the Plan, List or proposed new or modified assignments in the List for Region 1

(See Article 7)

– under assumed free-space propagation conditions, the power flux-density at any test point within the service area of the overlapping frequency assignments in the Plan does not exceed the following values: (WRC-15)

APPENDIX 30A (REV.WRC-12)*

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)

ARTICLE 2A (REV.WRC-07)

Use of the guardbands

MOD

2A.2 Any assignment intended to provide these functions in support of a geostationary-satellite network for the BSS feeder link shall be notified under Article **11** and brought into use within the following time-limits[n]: (WRC-15)

_____

[n] The time-limit is established at the time when the request is received under § 2A.1.4. (WRC-15)

ARTICLE 4 (REV.WRC-03)

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

4.1.3*bis* The regulatory time-limit for bringing into use an assignment in the List may be extended once by not more than three years due to launch failure in the following cases:

– the destruction of the satellite intended to bring the assignment into use; *or*

– the destruction of the satellite launched to replace an already operating satellite which is intended to be relocated to bring another assignment into use; *or*

– the satellite is launched, but fails to reach its assigned orbital location.

For this extension to be granted, the launch failure must have occurred at least five years after the date of receipt of the complete Appendix **4** data. In no case shall the period of the extension of the regulatory time-limit exceed the difference in time between the three-year period and the period remaining from the date of the launch failure to the end of the regulatory time-limit[8]. In order to take advantage of this extension, the administration shall have, within one month of the launch failure or one month after 5 July 2003, whichever comes later, notified the Bureau in writing of such failure, and shall also provide the following information to the Bureau before the end of the regulatory time-limit of § 4.1.3:

– date of launch failure;

– due diligence information as required in Resolution **49 (Rev.WRC-15)** for the assignment with respect to the satellite that suffered the launch failure, if that information has not already been provided.

If, 11 months after the request for extension, the administration has not provided to the Bureau updated Resolution **49 (Rev.WRC-15)** information, the Bureau shall promptly send a reminder to the notifying administration. If, within one year of the request for extension, the administration has not provided to the Bureau updated Resolution **49 (Rev.WRC-15)** information for the new satellite under procurement, the related frequency assignments shall lapse. (WRC-15)

MOD

4.1.9 Comments from administrations identified in the publication referred to under § 4.1.5 above shall be sent to the Bureau and to the administration proposing the modification. (WRC-15)

MOD

4.1.10 An administration that has not notified its agreement 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 § 4.1.5 shall be deemed to have not agreed to the proposed assignment unless the provisions of § 4.1.10a to 4.1.10d and § 4.1.21 are applied. This time-limit may be extended:

– for an administration that has requested additional information under § 4.1.8, by up to three months, *or*

– for an administration that has requested the assistance of the Bureau under § 4.1.21, by up to three months following the date at which the Bureau communicated the result of its action. (WRC-15)

SUP

4.1.10*ter*

ADD

4.1.10a After the same time period as specified in § 4.1.10, the notifying administration may, pursuant to § 4.1.21, request the Bureau to assist in respect of an administration which has not replied within this time period. (WRC-15)

ADD

4.1.10b The Bureau, acting under § 4.1.10a, shall send a reminder to the administration which has not replied, together with the results of its previously published compatibility analysis, containing the change in the values referred to in paragraph 4 of Annex 1 to Appendix **30A**, requesting a decision. (WRC-15)

ADD

4.1.10c Fifteen days before the expiry of the 30-day period referred to in § 4.1.10d, the Bureau shall send a reminder to the above-mentioned administration drawing its attention to the consequence of no reply. (WRC-15)

ADD

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, it shall be deemed that the administration which has not given a decision has agreed to the proposed assignment. (WRC-15)

MOD

4.1.11 If, in seeking agreement, an administration modifies its initial proposal, it shall again apply the provisions of § 4.1 and the subsequent procedure in cases where:

– the assignments of any other administration received by the Bureau in accordance with § 4.1.3 or § 4.2.6, or § 2A.1.4 of Article 2A, or § 7.1 of Article 7, or No. **9.7** before this modified proposal is received under § 4.1.12; *or*

– the assignments of any other administration contained in the Plans or the Lists,

are considered as being affected and receive more interference as a result of the modifications than that produced by the initial proposal. (WRC-15)

MOD

4.1.12 If agreement has been reached with the administrations identified in the publication referred to under § 4.1.5 above, the administration proposing the new or modified assignment may continue with the appropriate procedure in Article 5 and shall inform the Bureau, indicating the final characteristics of the frequency assignment together with the names of the administrations with which agreement has been reached. (WRC-15)

MOD

4.1.25 Where an administration already having included in the feeder-link List two assignments (not including those systems notified on behalf of a group of named administrations and included in the feeder-link List by WRC-2000) in the same channel and covering the same service area, proposes to include in the feeder-link List a new assignment in the same channel over this same service area, it shall apply the following in respect of another administration which has no assignment in the feeder-link List in the same channel and which proposes to include in the feeder-link List a new assignment:

a) if the agreement of the former administration is required following the application of § 4.1 by the latter administration, in order to protect the new assignment proposed by the former administration from interference caused by the assignment proposed by the latter administration, both administrations shall make every possible effort to resolve the difficulties by means of mutually acceptable adjustments to their networks;

b) in case of continuing disagreement, and if the former administration has not communicated to the Bureau the information specified in Annex 2 to Resolution **49 (Rev.WRC-15)**, this administration shall be deemed to have given its agreement to inclusion in the feeder-link List of the assignment of the latter administration. (WRC-15)

MOD

ARTICLE 4 (REV.WRC-15)

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

4.1.1 An administration proposing to include a new or modified assignment in the feeder-link List shall seek the agreement of those administrations whose services are considered to be affected, i.e. administrations[4, 5]:

a) of Regions 1 and 3 having a feeder-link frequency assignment in the fixed-satellite service (Earth-to-space) to a space station in the broadcasting-satellite service which is included in the Regions 1 and 3 feeder-link Plan with a necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment; *or*

b) of Regions 1 and 3 having a feeder-link frequency assignment included in the feeder-link List or for which complete Appendix **4** information has been received by the Radiocommunication Bureau in accordance with the provisions of § 4.1.3, and any portion of which falls within the necessary bandwidth of the proposed assignment; *or*

c) of Region 2 having a feeder-link frequency assignment in the fixed-satellite service (Earth-to-space) to a space station in the broadcasting-satellite service which is in conformity with the Region 2 feeder-link Plan, or in respect of which proposed modifications to that Plan have already been received by the Bureau in accordance with the provisions of § 4.2.6 with a necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment; *or*

d) having a feeder-link frequency assignment in the frequency band 17.8-18.1 GHz in Region 2 in the fixed-satellite service (Earth-to-space) to a space station in the broadcasting-satellite service, or a frequency assignment in the frequency band 14.5-14.75 GHz in countries listed in Resolution **PLEN/1 (WRC-15)** and in the frequency band 14.5-14.8 GHz in countries listed in Resolution **PLEN/2 (WRC-15)**, in the fixed-satellite service (Earth-to-space) not subject to a Plan, which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. **9.7**, or under § 7.1 of Article 7, with a necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment. (WRC-15)

4.2 Provisions applicable to Region 2

MOD

4.2.6*bis* The regulatory time-limit for bringing into use of an assignment in the Region 2 Plan obtained through application of § 4.2 may be extended once by no more than three years due to launch failure in the following cases:

– the destruction of the satellite intended to bring the assignment into use; *or*

– the destruction of the satellite launched to replace an already operating satellite which is intended to be relocated to bring another assignment into use; *or*

– the satellite is launched, but fails to reach its assigned orbital location.

For this extension to be granted, the launch failure must have occurred at least five years after the date of receipt of the complete Appendix **4** data. In no case shall the period of the extension of the regulatory time-limit exceed the difference in time between the three-year period and the period remaining from the date of the launch failure to the end of the regulatory time-limit[18]. In order to take advantage of this extension, the administration shall have, within one month of the launch failure or one month after 5 July 2003, whichever comes later, notified the Bureau in writing of such failure, and shall also provide the following information to the Bureau before the end of the regulatory time-limit of § 4.2.6:

– date of launch failure;

– due diligence information as required in Resolution **49 (Rev.WRC-15)** for the assignment with respect to the satellite that suffered the launch failure, if that information has not already been provided.

If, 11 months after the request for extension, the administration has not provided to the Bureau updated Resolution **49 (Rev.WRC-15)** information, the Bureau shall promptly send a reminder to the notifying administration. If, within one year of the request for extension, the administration has not provided to the Bureau updated Resolution **49 (Rev.WRC-15)** information for the new satellite under procurement, the related frequency assignments shall lapse. (WRC-15)

ARTICLE 5 (REV.WRC-12)

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-07)

MOD

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 **COM5/4 (WRC-15)** shall apply. (WRC-15)

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[MOD 24*bis*] 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-15)

MOD

5.2.11 If a recorded frequency assignment stemming from the Regions 1 and 3 List is not brought back into use within the suspension period resulting from the application of § 5.2.10 above, the Bureau shall cancel the assignment from the Master Register and the assignment in the List, unless the assignment is one to which § 4.1.26 or § 4.1.27 is being applied. (WRC-15)

5.3 Cancellation of entries in the Master Register

MOD

5.3.1 Any notified frequency assignment to which the Article 4 procedures have been applied and which has been provisionally recorded under § 5.2.7 shall be brought into use no later than the end of the period provided under § 4.1.3, 4.1.3*bis*, 4.2.6 or 4.2.6*bis* of Article 4. Any other frequency assignment provisionally recorded under § 5.2.7 shall be brought into use by the date specified in the notice. Unless the Bureau has been informed by the notifying administration of the bringing into use of the assignment under § 5.2.8, it shall, no later than 15 days before the notified date of bringing into use or the end of the regulatory period established under § 4.1.3, 4.1.3*bis*, 4.2.6 or 4.2.6*bis* of Article 4, as appropriate, 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 notified date of bringing into use or the period provided under § 4.1.3, 4.1.3*bis*, 4.2.6 or 4.2.6*bis* of Article 4, as the case may be, it shall cancel the entry in the Master Register. (WRC-15)

MOD

ARTICLE 7 (REV.WRC-15)

Coordination, notification and recording in the Master International Frequency Register of frequency assignments to stations in the fixed-satellite service (space-to-Earth) in Region 1 in the frequency band 17.3-18.1 GHz and in Regions 2 and 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 band 17.8-18.1 GHz, to stations in the fixed-satellite service (Earth-to-space) in countries listed in Resolution PLEN/1 (WRC-15) in the frequency band 14.5-14.75 GHz and in countries listed in Resolution PLEN/2 (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 band 17.3-17.8 GHz in Region 2 are involved[28]

MOD

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

7.1 The provisions of No. **9.7**[29] and the associated provisions under Articles **9** and **11** are applicable to transmitting space stations in the fixed-satellite service in Region 1 in the frequency band 17.3-18.1 GHz, to transmitting space stations in the fixed-satellite service in Regions 2 and 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 band 17.8-18.1 GHz, to transmitting earth stations in the fixed-satellite service in countries listed in Resolution **PLEN/1 (WRC-15)** in the frequency band 14.5-14.75 GHz and in countries listed in Resolution **PLEN/2 (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-15)

7.2 In applying the procedures referred to in § 7.1, the provisions of Appendix **5** are replaced by the following:

7.2.1 The frequency assignments to be taken into account are:

a) the assignments in conformity with the appropriate Regional feeder-link Plan in Appendix **30A**;

b) the assignments included in the Regions 1 and 3 feeder-link List;

c) the assignments for which the procedure of Article 4 has been initiated as from the date of receipt of the complete Appendix **4** information under § 4.1.3 or 4.2.6. (WRC-03)

7.2.2 The criteria to be applied are those given in Annex 4.

ADD

7.2*bis* In applying the procedures referred to in § 7.1 for FSS frequency assignments in countries listed in Resolution **PLEN/1 (WRC-15)** in the frequency band 14.5-14.75 GHz and in countries listed in Resolution **PLEN/2 (WRC-15)** in the frequency band 14.5-14.8 GHz not for feeder links for the broadcasting-satellite service, the provision of No. **11.41** is replaced by the following provision. No. **11.41.2** continues to apply. (WRC-15)

ADD

7.2*bis*.1 If, after a notice is returned under No. **11.38**, the notifying administration resubmits the notice and insists upon its reconsideration, and the assignment which was the basis of the unfavourable finding is neither an assignment in the Regions 1 and 3 Plan, nor an assignment of definitive recording in the Regions 1 and 3 feeder-link List or one for which the complete Appendix **4** information has been received under § 4.1.12 for the definitive recording by the date of submission pursuant to No. 9.30 of this notice, the Bureau shall enter the assignment in the Master Register with an indication of those administrations whose assignments were the basis of the unfavourable finding, provided that such resubmission is accompanied with a formal commitment indicating that, if unacceptable interference is caused to the Regions 1 and 3 recorded assignments which were the basis of the unfavourable finding, the notifying administration of the FSS shall immediately eliminate this unacceptable interference (see also No. **11.42**). (WRC-15)

ARTICLE 9A (REV.WRC-12)

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. 1 *Notifying administration symbol*.

Col. 2 *Beam identification* (Column 2, normally, contains the symbol designating the administration or the geographical area taken from Table B1 of the Preface to the International Frequency List, followed by the symbol designating the service area).

Col. 3 *Nominal orbital position*, in degrees and hundredths of a degree from the Greenwich meridian (negative values indicate longitudes which are west of the Greenwich meridian; positive values indicate longitudes which are east of the Greenwich meridian).

Col. 4 *Nominal intersection of the beam axis with the Earth* (boresight or aim point in the case of a non-elliptical beam), longitude and latitude, in degrees and hundredths of a degree.

Col. 5 *Space station receiving antenna characteristics* (elliptical beams). This Column contains three numerical values corresponding to the major axis, the minor axis and the major axis orientation respectively of the elliptical cross-section half-power beam, in degrees and hundredths of a degree. Orientation of the ellipse determined as follows: in

a plane normal to the beam axis, the direction of a major axis of the ellipse is specified as the angle measured anticlockwise from a line parallel to the equatorial plane to the major axis of the ellipse, to the nearest degree.

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

The codes used for the antenna pattern of the receiving space station (feeder link) antenna are defined as follows:

R13RSS	Figure B (Curves A, B and C) and § 3.7.3 in Annex 3
R123FR	Figure C and § 3.7.3 in Annex 3
MODRSS	Figure B (Curves A′, B′ and C) and § 3.7.3 in Annex 3 (Recommendation ITU-R BO.1296)

In cases where the "Space station receiving antenna pattern code" field is blank, the necessary antenna pattern data are provided by shaped beam data submitted by the administration. These data are stored in Column 7. A particular shaped beam is identified by the combination of Column 1, Column 7 and Column 14. In such cases the maximum cross-polar gain is given in Column 8, Cross-polar gain field.

In cases where the "Space station receiving antenna pattern code" field contains a code which starts with "CB_" characters, it is a composite beam. Any composite beam consists of two or more elliptical beams. Each composite beam is described in the special composite beam file having the same name plus a GXT extension (e.g. the description of the CB_COMP_BM1 composite beam is stored in the CB_COMP_BM1.GXT file).

Col. 7 *Space station receiving antenna shaped (non-elliptical, non-composite) beam identification.*

Col. 8 *Maximum space station receiving antenna co-polar and cross-polar (in the case of shaped beam) isotropic gain* (dBi).

Col. 9 *Earth station transmitting antenna pattern code and maximum gain* (dBi).

The codes used for transmitting earth station (feeder-link) antenna patterns are defined as follows:

R13TES	Figure A (Curves A and B) and § 3.5.3 in Annex 3
MODTES	Figure A (Curves A′ and B′) and § 3.5.3 in Annex 3 (Recommendation ITU-R BO.1295)

Col. 10 *Polarization* (CL – circular left, CR – circular right, LE – linear referenced to the equatorial plane) and polarization angle in degrees and hundredths of a degree (in the case of linear polarization only).

Col. 11 *e.i.r.p.* in the direction of maximum radiation (dBW).

Col. 12 *Permitted increase in earth station e.i.r.p.* (dB) for the purpose of power control (see § 3.11 of Annex 3). (WRC-15)

9A.2 TEXT FOR NOTES IN THE REMARKS COLUMN OF THE REGIONS 1 AND 3 FEEDER-LINK PLAN (WRC-03)

SUP

TABLE 1B (WRC-07)

Affecting administrations and corresponding networks/beams identified based on Notes 6 and 7 in § 9A.2 of Article 9A

ADD

TABLE 1B (WRC-15)

Affecting administrations and corresponding networks/beams identified based on Notes 6 and 7 in § 9A.2 of Article 9A

Beam name	Channels	Note	Affecting administrations*	Affecting networks/beams*
CPV30100	2, 4, 8, 10, 12	6	GUY JMC	GUY00302, JMC00005
CPV30100	6	6	JMC	JMC00005
E____100	1, 3, 5, 7, 9, 11, 13	6	G	BERBER02
G 02700	2, 4, 8, 10, 12	6	GUY JMC	GUY00302, JMC00005
G 02700	6	6	JMC	JMC00005
LBR24400	1	6	GUY	GUY00302
LBR24400	3, 9, 13	6	JMC	JMC00005
LBR24400	5, 7, 11	6	GUY JMC	GUY00302, JMC00005

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

SUP

TABLE 3A2 (WRC-12)

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

ADD

TABLE 3A2 (WRC-15)

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							
AFG	AFG24501	50.00	67.00	34.30	1.89	1.19	18.00	MODRSS		40.93		MODTES	57.00	CL		84.0		27M0G7W		7I	P	
AFG	AFG24502	50.00	67.00	34.30	1.89	1.19	18.00	MODRSS		40.93		MODTES	57.00	CR		84.0		27M0G7W		7I	P	
AGL	AGL29500	−24.80	16.43	−12.37	2.66	1.75	77.43	MODRSS		37.77		MODTES	57.00	CR		84.0		27M0G7W			P	
ALB	ALB29600	62.00	19.50	41.37	0.60	0.60	69.35	MODRSS		48.88		MODTES	57.00	CL		82.6		27M0G7W			P	
ALG	ALG25152	−24.80	1.50	27.60	3.65	2.94	135.00	MODRSS		34.14		MODTES	57.00	CL		84.0		27M0G7W			P	
AND	AND34100	−37.00	1.60	42.50	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		83.0		27M0G7W			P	
ARM	ARM06400	22.80	44.99	39.95	0.73	0.60	148.17	MODRSS		48.02		MODTES	57.00	CR		84.0		27M0G7W			P	
ARS	ARS00375	17.00	44.60	23.40	4.21	2.48	145.00	MODRSS		34.26		MODTES	57.00	CL		84.0		27M0G7W		54	P	
ARS	ARS34000	17.00	44.60	23.40	4.21	2.48	145.00	MODRSS		34.28		MODTES	57.00	CL		84.0		27M0G7W		54	P	
AUS	AUS00400	152.00	135.00	−24.20	7.19	5.20	140.00	MODRSS		28.71		MODTES	57.00	CL		87.0		27M0G7W		30	P	
AUS	AUS00401	152.00	96.83	−12.19	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		30	P	
AUS	AUS00402	152.00	105.69	−10.45	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		30	P	
AUS	AUS00403	152.00	110.52	−66.28	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		30	P	
AUS	AUS00404	152.00	158.94	−54.50	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		30	P	
AUS	AUS00405	152.00	159.06	−31.52	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		30	P	
AUS	AUS00406	152.00	167.93	−29.02	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		30	P	
AUS	AUS0040A	152.00	135.36	−23.95	6.89	4.83	141.15	R123FR		29.23		MODTES	57.00	CL		87.0		27M0G7W		30	P	
AUS	AUS00500	152.00	135.00	−24.20	7.19	5.20	140.00	MODRSS		28.71		MODTES	57.00	CR		87.0		27M0G7W		41	P	
AUS	AUS00501	152.00	96.83	−12.19	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		41	P	
AUS	AUS00502	152.00	105.69	−10.45	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		41	P	
AUS	AUS00503	152.00	110.52	−66.28	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		41	P	
AUS	AUS00504	152.00	158.94	−54.50	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		41	P	
AUS	AUS00505	152.00	159.06	−31.52	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		41	P	
AUS	AUS00506	152.00	167.93	−29.02	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		41	P	
AUS	AUS00600	152.00	135.50	−24.20	7.19	5.20	140.00	MODRSS		28.71		MODTES	57.00	CR		87.0		27M0G7W		42	P	
AUS	AUS00601	152.00	96.83	−12.19	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		42	P	
AUS	AUS00602	152.00	105.69	−10.45	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		42	P	
AUS	AUS00603	152.00	110.52	−66.28	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		42	P	
AUS	AUS00604	152.00	158.94	−54.50	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		42	P	
AUS	AUS00605	152.00	159.06	−31.52	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		42	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							
AUS	AUS00606	152.00	167.93	−29.02	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		42	P	
AUS	AUS00700	164.00	136.00	−23.90	7.26	4.48	132.00	MODRSS		29.32		MODTES	57.00	CR		87.0		27M0G7W		31	P	
AUS	AUS00701	164.00	96.83	−12.19	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		31	P	
AUS	AUS00702	164.00	105.69	−10.45	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		31	P	
AUS	AUS00703	164.00	110.52	−66.28	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		31	P	
AUS	AUS00704	164.00	158.94	−54.50	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		31	P	
AUS	AUS00705	164.00	159.06	−31.52	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		31	P	
AUS	AUS00706	164.00	167.93	−29.02	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		31	P	
AUS	AUS0070A	164.00	136.62	−24.16	6.82	4.20	134.19	R123FR		29.87		MODTES	57.00	CR		87.0		27M0G7W		31	P	
AUS	AUS00800	164.00	136.00	−23.90	7.26	4.48	132.00	MODRSS		29.32		MODTES	57.00	CL		87.0		27M0G7W		44	P	
AUS	AUS00801	164.00	96.83	−12.19	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		44	P	
AUS	AUS00802	164.00	105.69	−10.45	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		44	P	
AUS	AUS00803	164.00	110.52	−66.28	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		44	P	
AUS	AUS00804	164.00	158.94	−54.50	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		44	P	
AUS	AUS00805	164.00	159.06	−31.52	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		44	P	
AUS	AUS00806	164.00	167.93	−29.02	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		44	P	
AUS	AUS00900	164.00	136.00	−23.90	7.26	4.48	132.00	MODRSS		29.32		MODTES	57.00	CR		87.0		27M0G7W		32	P	
AUS	AUS00901	164.00	96.83	−12.19	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		32	P	
AUS	AUS00902	164.00	105.69	−10.45	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		32	P	
AUS	AUS00903	164.00	110.52	−66.28	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		32	P	
AUS	AUS00904	164.00	158.94	−54.50	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		32	P	
AUS	AUS00905	164.00	159.06	−31.52	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		32	P	
AUS	AUS00906	164.00	167.93	−29.02	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		87.0		27M0G7W		32	P	
AUS	AUS0090A	164.00	136.62	−24.16	6.82	4.20	134.19	R123FR		29.87		MODTES	57.00	CR		87.0		27M0G7W		32	P	
AUS	AUSA0000	152.00	135.36	−23.95	6.89	4.83	141.15	R123FR		29.23		MODTES	57.00	CL		87.0		27M0G7W		40	P	
AUS	AUSA0001	152.00	96.83	−12.19	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		40	P	
AUS	AUSA0002	152.00	105.69	−10.45	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		40	P	
AUS	AUSA0003	152.00	110.52	−66.28	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		40	P	
AUS	AUSA0004	152.00	158.94	−54.50	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		40	P	
AUS	AUSA0005	152.00	159.06	−31.52	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		40	P	
AUS	AUSA0006	152.00	167.93	−29.02	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		40	P	
AUS	AUSB0000	164.00	136.62	−24.16	6.82	4.20	134.19	R123FR		29.87		MODTES	57.00	CL		87.0		27M0G7W		43	P	
AUS	AUSB0001	164.00	96.83	−12.19	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		43	P	
AUS	AUSB0002	164.00	105.69	−10.45	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		43	P	
AUS	AUSB0003	164.00	110.52	−66.28	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		43	P	
AUS	AUSB0004	164.00	158.94	−54.50	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		43	P	
AUS	AUSB0005	164.00	159.06	−31.52	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		43	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							
AUS	AUSB0006	164.00	167.93	−29.02	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		87.0		27M0G7W		43	P	
AUT	AUT01600	−18.80	10.31	49.47	1.82	0.92	151.78	MODRSS		42.19		MODTES	57.00	CR		84.0		27M0G7W			P	
AZE	AZE06400	23.20	47.47	40.14	0.93	0.60	158.14	MODRSS		46.98		MODTES	57.00	CL		84.0		27M0G7W			P	
BDI	BDI27000	11.00	29.90	−3.10	0.71	0.60	80.00	MODRSS		48.15		MODTES	57.00	CL		81.0		27M0G7W			P	
BEL	BEL01800	38.20	5.12	51.96	1.00	1.00	0.00	MODRSS		44.44		MODTES	57.00	CR		85.5		27M0G7W			P	
BEN	BEN23300	−19.20	2.20	9.50	1.44	0.68	97.00	MODRSS		44.54		MODTES	57.00	CL		84.0		27M0G7W			P	
BFA	BFA10700	−30.00	−1.50	12.20	1.45	1.14	29.00	MODRSS		42.26		MODTES	57.00	CL		84.0		27M0G7W			P	
BGD	BGD22000	74.00	90.30	23.60	1.46	0.84	135.00	MODRSS		43.56		MODTES	57.00	CR		84.0		27M0G7W			P	
BHR	BHR25500	34.00	50.50	26.10	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		83.0		27M0G7W			P	
BIH	BIH14800	56.00	18.22	43.97	0.60	0.60	90.00	MODRSS		48.88		MODTES	57.00	CR		84.0		27M0G7W			P	
BLR	BLR06200	37.80	28.04	53.18	1.17	0.60	9.68	MODRSS		45.96		MODTES	57.00	CL		84.0		27M0G7W			P	
BOT	BOT29700	−0.80	23.30	−22.20	2.13	1.50	36.00	MODRSS		39.40		MODTES	57.00	CL		84.0		27M0G7W			P	
BRM	BRM29800	104.00	96.97	18.68	3.33	1.66	91.63	MODRSS		37.02		MODTES	57.00	CR		84.0		27M0G7W			P	
BRU	BRU3300A	74.00	114.70	4.40	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		84.0		27M0G7W			P	
BTN	BTN03100	86.00	90.44	27.05	0.72	0.60	175.47	MODRSS		48.11		MODTES	57.00	CR		84.0		27M0G7W			P	
BUL	BUL02000	−1.20	25.00	43.00	1.04	0.60	165.00	MODRSS		46.50		MODTES	57.00	CL		83.0		27M0G7W			P	
CAF	CAF25800	−13.20	21.00	6.30	2.25	1.68	31.00	MODRSS		38.67		MODTES	57.00	CR		84.0		27M0G7W			P	
CBG	CBG29900	86.00	104.89	12.79	1.12	0.94	32.89	MODRSS		44.22		MODTES	57.00	CR		84.0		27M0G7W			P	
CHN	CHN15400	62.00	101.90	33.50	5.10	2.80	143.00	MODRSS		32.90		MODTES	57.00	CR		84.0		27M0G7W		45	P	
CHN	CHN15500	62.00	101.90	33.50	5.10	2.80	143.00	MODRSS		32.90		MODTES	57.00	CL		84.0		27M0G7W		45	P	
CHN	CHN15800	134.00	113.21	34.27	6.40	3.16	10.74	MODRSS		31.39		MODTES	57.00	CL		84.0		27M0G7W		46	P	
CHN	CHN15900	134.00	113.21	34.27	6.40	3.16	10.74	MODRSS		31.39		MODTES	57.00	CR		84.0		27M0G7W		46	P	
CHN	CHN16000	92.20	108.10	33.70	5.00	4.00	148.00	MODRSS		31.44		MODTES	57.00	CR		84.0		27M0G7W		47	P	
CHN	CHN16100	92.20	108.10	33.70	5.00	4.00	148.00	MODRSS		31.44		MODTES	57.00	CL		84.0		27M0G7W		47	P	
CHN	CHN20000	122.00	113.55	22.20	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		84.0		27M0G7W			P	
CLN	CLN21900	50.00	80.60	7.70	1.18	0.60	106.00	MODRSS		45.95		MODTES	57.00	CL		84.0		27M0G7W			P	
COD	COD__100	−19.20	21.85	−3.40				CB_RSS_CODA		38.36		MODTES	57.00	CL		84.0		27M0G7W			P	
COG	COG23500	−13.20	14.60	−0.70	2.02	1.18	59.00	MODRSS		40.67		MODTES	57.00	CR		84.0		27M0G7W			P	
COM	COM20700	29.00	44.10	−12.10	0.76	0.60	149.00	MODRSS		47.86		MODTES	57.00	CR		84.0		27M0G7W			P	
CPV	CPV30100	−33.50	−24.12	16.09	0.77	0.63	94.46	MODRSS		47.56		MODTES	57.00	CL		84.0		27M0G7W			P	5, 6
CTI	CTI23700	−24.80	−5.66	7.39	1.45	1.29	126.59	MODRSS		41.73		MODTES	57.00	CR		84.0		27M0G7W			P	
CVA	CVA08300	−1.20	13.02	42.09	0.75	0.66	20.53	MODRSS		47.48		MODTES	57.00	CR		84.0		27M0G7W			P	
CVA	CVA08500	−1.20	13.02	42.09	0.75	0.66	20.53	MODRSS		47.48		MODTES	57.00	CR		84.0		27M0G7W			P	
CYP	CYP08600	−1.20	33.45	35.12	0.60	0.60	90.00	MODRSS		48.88		MODTES	57.00	CL		84.0		27M0G7W			P	
CZE	CZE14401	−12.80	16.77	46.78	1.71	0.89	149.15	MODRSS		42.64		MODTES	57.00	CR		84.0		27M0G7W			P	
CZE	CZE14402	−12.80	16.77	46.78	1.71	0.89	149.15	MODRSS		42.64		MODTES	57.00	CL		84.0		27M0G7W			P	
CZE	CZE14403	−12.80	16.77	46.78	1.71	0.89	149.15	MODRSS		42.64		MODTES	57.00	CL		84.0		27M0G7W		37	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							
D	D 08700	−18.80	10.31	49.47	1.82	0.92	151.78	MODRSS		42.19		MODTES	57.00	CR		84.0		27M0G7W			P	
DJI	DJI09900	16.80	42.68	11.68	0.60	0.60	90.00	MODRSS		48.88		MODTES	57.00	CL		84.0		27M0G7W			P	
DNK	DNK__100	−25.20	5.28	61.83				CB_RSS_DNKA		48.88		MODTES	57.00	CL		79.5		27M0G7W			P	
DNK	DNK09000	−33.50	14.34	61.72	1.83	0.60	151.50	MODRSS		44.05		MODTES	57.00	CR		84.0		27M0G7W			P	
DNK	DNK09100	−33.50	−14.94	63.79	1.52	0.60	168.57	MODRSS		44.86		MODTES	57.00	CR		84.0		27M0G7W			P	
E	E____100	−30.00	−9.40	34.15				CB_RSS_E__A		44.79		MODTES	57.00	CR		84.0		27M0G7W		01	P	6
E	HISP27D4	−30.00	−3.10	39.90					ECO	43.00	18.70	R13TES	55.00	CR		82.5		27M0G7W--	HISPASAT-1	01	PE	
E	HISP27D6	−30.00	−3.10	39.90					ECO	43.00	18.70	R13TES	58.50	CR		83.5		27M0G7W--	HISPASAT-1	01	PE	
E	HISP33D4	−30.00	−3.10	39.90					ECO	43.00	18.70	MODTES	55.00	CR		82.5		33M0G7W--	HISPASAT-1	01	PE	
E	HISP33D6	−30.00	−3.10	39.90					ECO	43.00	18.70	MODTES	58.50	CR		83.5		33M0G7W--	HISPASAT-1	01	PE	
E	HISPASA4	−30.00	−3.10	39.90					ECO	43.00	18.70	R13TES	55.00	CR		82.5		27M0F8W	HISPASAT-1	01	PE	
E	HISPASA6	−30.00	−3.10	39.90					ECO	43.00	18.70	R13TES	58.50	CR		83.5		27M0F8W	HISPASAT-1	01	PE	
EGY	EGY02600	−7.00	29.70	26.80	2.33	1.72	136.00	MODRSS		38.42		MODTES	57.00	CR		84.0		27M0G7W		12	P	
ERI	ERI09200	22.80	39.41	14.98	1.67	0.95	145.49	MODRSS		42.44		MODTES	57.00	CL		84.0		27M0G7W			P	
EST	EST06100	44.50	25.40	59.18	0.67	0.60	5.99	MODRSS		48.42		MODTES	57.00	CR		84.0		27M0G7W			P	
F	F 09300	−7.00	3.30	45.37	2.18	1.20	156.36	MODRSS		40.27		MODTES	57.00	CR		84.0		27M0G7W		21	P	
F	F____100	−7.00	29.16	13.43				CB_RSS_F__A		48.88		MODTES	57.00	CL		84.0		27M0G7W		12	P	
F	F____200	140.00	174.50	−17.30				CB_RSS_F__B		45.80		MODTES	57.00	CL		84.0		27M0G7W		7F	P	
F	F____300	140.00	174.65	−17.65				CB_RSS_F__C		47.97		MODTES	57.00	CR		84.0		27M0G7W		7F	P	
F	OCE10100	−160.00	−145.00	−16.30	4.34	3.54	4.00	MODRSS		32.58		MODTES	57.00	CL		84.0		27M0G7W			P	
FIN	FIN10300	22.80	17.61	61.54	2.18	0.90	11.59	MODRSS		41.53		MODTES	57.00	CL		84.0		27M0G7W		52	P	
FIN	FIN10400	22.80	17.61	61.54	2.18	0.90	11.59	MODRSS		41.53		MODTES	57.00	CL		84.0		27M0G7W		52	P	
FJI	FJI19300	−178.00	179.62	−17.87	1.16	0.92	155.22	MODRSS		44.16		MODTES	57.00	CR		84.0		27M0G7W			P	
FSM	FSM00000	158.00	151.90	5.48	5.15	1.57	167.00	MODRSS		35.38		MODTES	57.00	CR		84.0		27M0G7W			P	
G	G 02700	−33.50	−3.50	53.80	1.84	0.72	142.00	MODRSS		43.23		MODTES	57.00	CR		84.0		27M0G7W			P	5, 6
GAB	GAB26000	−13.20	11.80	−0.60	1.43	1.12	64.00	MODRSS		42.40		MODTES	57.00	CL		84.0		27M0G7W			P	
GEO	GEO06400	23.20	43.35	42.27	1.11	0.60	161.21	MODRSS		46.23		MODTES	57.00	CL		84.0		27M0G7W			P	
GMB	GMB30200	−37.20	−15.10	13.40	0.79	0.60	4.00	MODRSS		47.69		MODTES	57.00	CL		83.0		27M0G7W			P	
GNB	GNB30400	−30.00	−15.00	12.00	0.90	0.60	172.00	MODRSS		47.12		MODTES	57.00	CL		84.0		27M0G7W			P	
GNE	GNE30300	−18.80	10.30	1.50	0.68	0.60	10.00	MODRSS		48.34		MODTES	57.00	CR		84.0		27M0G7W			P	
GRC	GRC10500	−1.20	24.52	38.11	1.70	0.95	152.55	MODRSS		42.37		MODTES	57.00	CR		84.0		27M0G7W			P	
GUI	GUI19200	−37.00	−11.00	10.20	1.58	1.04	147.00	MODRSS		42.29		MODTES	57.00	CR		85.0		27M0G7W			P	
HNG	HNG10601	−12.80	16.77	46.78	1.71	0.89	149.15	MODRSS		42.64		MODTES	57.00	CR		84.0		27M0G7W			P	
HNG	HNG10602	−12.80	16.77	46.78	1.71	0.89	149.15	MODRSS		42.64		MODTES	57.00	CL		84.0		27M0G7W			P	
HNG	HNG10603	−12.80	16.77	46.78	1.71	0.89	149.15	MODRSS		42.64		MODTES	57.00	CL		84.0		27M0G7W		37	P	
HOL	HOL21300	38.20	5.12	51.96	1.00	1.00	0.00	MODRSS		44.44		MODTES	57.00	CL		85.5		27M0G7W			P	
HRV	HRV14801	−12.80	16.77	46.78	1.71	0.89	149.15	MODRSS		42.64		MODTES	57.00	CR		84.0		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							
HRV	HRV14802	−12.80	16.77	46.78	1.71	0.89	149.15	MODRSS		42.64		MODTES	57.00	CL		84.0		27M0G7W			P	
HRV	HRV14803	−12.80	16.77	46.78	1.71	0.89	149.15	MODRSS		42.64		MODTES	57.00	CL		84.0		27M0G7W		37	P	
I	I 08200	9.00	12.67	40.74	1.99	1.35	144.20	MODRSS		40.14		MODTES	57.00	CR		84.0		27M0G7W			P	
IND	IND03700	68.00	93.00	25.50	1.46	1.13	40.00	MODRSS		42.27		MODTES	57.00	CL		84.0		27M0G7W			P	
IND	IND04701	68.00	93.30	11.10	1.92	0.60	96.00	MODRSS		43.83		MODTES	57.00	CR		84.0		27M0G7W		7E	P	
IND	IND04702	68.00	93.30	11.10	1.92	0.60	96.00	MODRSS		43.83		MODTES	57.00	CL		84.0		27M0G7W		7E	P	
IND	INDA_101	55.80	76.16	14.72				CB_RSS_INDA		45.66		MODTES	57.00	CR		84.0		27M0G7W		7G	P	
IND	INDA_102	55.80	76.16	14.72				CB_RSS_INDA		45.66		MODTES	57.00	CL		84.0		27M0G7W		7G	P	
IND	INDB_101	55.80	83.67	23.73				CB_RSS_INDB		43.13		MODTES	57.00	CR		84.0		27M0G7W		7H	P	
IND	INDB_102	55.80	83.67	23.73				CB_RSS_INDB		43.13		MODTES	57.00	CL		84.0		27M0G7W		7H	P	
IND	INDD_100	68.00	74.37	29.16				CB_RSS_INDD		41.79		MODTES	57.00	CR		84.0		27M0G7W			P	
INS	INS02800	80.20	113.60	−1.40	6.73	3.33	160.00	MODRSS		30.94		MODTES	57.00	CR		84.0		27M0G7W			P	
INS	INS03501	104.00	115.20	−1.70	9.14	3.43	170.00	MODRSS		29.48		MODTES	57.00	CL		84.0		27M0G7W		7D	P	
INS	INS03502	104.00	115.20	−1.70	9.14	3.43	170.00	MODRSS		29.48		MODTES	57.00	CR		84.0		27M0G7W		7D	P	
IRL	IRL21100	−37.20	−8.25	53.22	0.72	0.60	157.56	MODRSS		48.08		MODTES	57.00	CR		84.0		27M0G7W			P	
IRN	IRN10900	34.00	54.20	32.40	3.82	1.82	149.00	MODRSS		36.03		MODTES	57.00	CL		83.0		27M0G7W			P	
ISL	ISL04900	−33.50	−19.00	64.90	1.00	0.60	177.00	MODRSS		46.67		MODTES	57.00	CL		83.0		27M0G7W			P	
ISL	ISL05000	−33.50	−14.94	63.79	1.52	0.60	168.57	MODRSS		44.86		MODTES	57.00	CR		84.0		27M0G7W			P	
ISR	ISR11000	−4.00	34.95	31.32	0.73	0.60	110.02	MODRSS		48.03		MODTES	57.00	CR		84.0		27M0G7W			P	
J	000BS−3N	109.85	134.50	31.50	3.52	3.30	68.00	MODRSS		33.80		MODTES	57.00	CR		87.0		27M0F8W	BS-3N	02	PE	
J	J 10985	109.85	134.50	31.50	3.52	3.30	68.00	MODRSS		33.80		MODTES	57.00	CR		87.0		34M5G7W		02	P	
J	J 11100	110.00	134.50	31.50	3.52	3.30	68.00	MODRSS		33.80		MODTES	57.00	CR		87.0		34M5G7W		02	P	
J	J 1110E	110.00	134.50	31.50	3.52	3.30	68.00	MODRSS		33.80		MODTES	57.00	CR		87.0		27M0F8W	BS-3M	02	PE	
JOR	JOR22400	11.00	37.55	34.02	1.47	0.91	73.16	MODRSS		43.19		MODTES	57.00	CL		85.0		27M0G7W			P	
KAZ	KAZ06600	56.40	65.73	46.40	4.58	1.76	177.45	MODRSS		35.38		MODTES	57.00	CL		84.0		27M0G7W			P	
KEN	KEN24900	−0.80	37.99	0.88	2.06	1.30	99.68	MODRSS		40.17		MODTES	57.00	CR		84.0		27M0G7W			P	
KGZ	KGZ07000	50.00	73.91	41.32	1.47	0.64	5.05	MODRSS		44.75		MODTES	57.00	CR		84.0		27M0G7W			P	
KIR	KIR__100	176.00	−170.31	−0.56				CB_RSS_KIRA		42.60		MODTES	57.00	CL		84.0		27M0G7W			P	
KOR	KOR11201	116.00	127.50	36.00	1.24	1.02	168.00	MODRSS		43.43		MODTES	57.00	CL		89.0		27M0G7W		03	P	
KOR	KOR11202	116.00	127.50	36.00	1.24	1.02	168.00	MODRSS		43.43		MODTES	57.00	CR		89.0		27M0G7W		03	P	
KRE	KRE28600	140.00	128.45	40.32	1.63	0.68	18.89	MODRSS		44.00		MODTES	57.00	CL		87.0		27M0G7W			P	
KWT	KWT11300	11.00	47.48	29.12	0.60	0.60	90.00	MODRSS		48.88		MODTES	57.00	CR		83.0		27M0G7W			P	
LAO	LAO28400	122.20	103.71	18.17	1.87	1.03	123.99	MODRSS		42.18		MODTES	57.00	CR		84.0		33M0G7W			P	
LBN	LBN27900	11.00	37.55	34.02	1.47	0.91	73.16	MODRSS		43.19		MODTES	57.00	CR		84.0		27M0G7W			P	
LBR	LBR24400	−33.50	−9.30	6.60	1.22	0.70	133.00	MODRSS		45.13		MODTES	57.00	CR		84.0		27M0G7W			P	5, 6
LBY	LBY28021	−24.80	17.50	26.30	3.68	1.84	130.00	MODRSS		36.14		MODTES	57.00	CL		84.0		27M0G7W			P	
LIE	LIE25300	−18.80	10.31	49.47	1.82	0.92	151.78	MODRSS		42.19		MODTES	57.00	CL		84.0		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							
LSO	LSO30500	4.80	27.80	−29.80	0.66	0.60	36.00	MODRSS		48.47		MODTES	57.00	CL		84.0		27M0G7W			P	
LTU	LTU06100	23.20	24.52	56.11				CB_RSS_LTUA		47.92		MODTES	57.00	CR		84.0		27M0G7W			P	
LUX	LUX11400	28.20	5.21	49.20	0.60	0.60	90.00	MODRSS		48.88		MODTES	57.00	CL		84.0		27M0G7W		09	P	
LVA	LVA06100	23.20	24.52	56.11				CB_RSS_LVAA		47.92		MODTES	57.00	CR		84.0		27M0G7W			P	
MAU	MAU__100	29.00	58.61	−15.88				CB_RSS_MAUA		41.42		MODTES	57.00	CL		84.0		27M0G7W			P	
MCO	MCO11600	34.20	7.40	43.70	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		81.0		27M0G7W			P	
MDA	MDA06300	50.00	28.45	46.99	0.60	0.60	90.00	MODRSS		48.88		MODTES	57.00	CR		84.0		27M0G7W			P	
MDG	MDG23600	29.00	46.20	−18.60	2.57	0.80	67.00	MODRSS		41.32		MODTES	57.00	CL		84.0		27M0G7W			P	
MHL	MHL00000	146.00	167.64	9.83	2.07	0.90	157.42	MODRSS		41.75		MODTES	57.00	CR		84.0		27M0G7W			P	
MKD	MKD14800	22.80	21.53	41.50	0.60	0.60	90.00	MODRSS		48.88		MODTES	57.00	CL		84.0		27M0G7W			P	
MLA	MLA__100	91.50	108.07	3.92				CB_RSS_MLAA		41.75		MODTES	57.00	CR		84.0		27M0G7W			P	
MLD	MLD30600	50.00	73.10	6.00	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		84.0		27M0G7W			P	
MLI	MLI__100	−19.20	−4.80	16.10				CB_RSS_MLIA		41.11		MODTES	57.00	CR		87.0		27M0G7W			P	
MLT	MLT14700	22.80	14.40	35.90	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CR		84.0		27M0G7W			P	
MNG	MNG24800	74.00	101.95	46.79	3.32	1.04	169.27	MODRSS		39.07		MODTES	59.92	CL		86.9		27M0G7W			P	
MRC	MRC20900	−25.20	−8.90	28.90	3.96	1.55	50.00	MODRSS		36.57		MODTES	57.00	CR		80.0		27M0G7W			P	
MTN	MTN__100	−36.80	−11.24	20.91				CB_RSS_MTNA		37.55		MODTES	57.00	CR		86.0		27M0G7W			P	
MWI	MWI30800	4.80	33.79	−13.25	1.56	0.70	92.69	MODRSS		44.10		MODTES	57.00	CR		84.0		27M0G7W			P	
NGR	NGR11500	−37.20	7.63	16.97	2.20	1.80	100.58	MODRSS		38.47		MODTES	57.00	CL		84.0		27M0G7W			P	
NOR	NOR12000	−0.80	16.70	61.58	1.84	0.95	177.31	MODRSS		42.02		MODTES	57.00	CR		84.0		27M0G7W		06	P	
NOR	NOR12100	−0.80	16.70	61.58	1.84	0.95	177.31	MODRSS		42.02		MODTES	57.00	CL		84.0		27M0G7W		06	P	
NRU	NRU30900	134.00	167.00	−0.50	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		84.0		27M0G7W			P	
NZL	NZL__100	158.00	−174.35	−24.30				CB_RSS_NZLA		48.88		MODTES	57.00	CL		84.0		27M0G7W			P	
OMA	OMA12300	17.20	55.60	21.00	1.88	1.02	100.00	MODRSS		41.62		MODTES	57.00	CL		85.0		27M0G7W			P	
PHL	PHL28500	98.00	121.30	11.10	3.46	1.76	99.00	MODRSS		36.60		MODTES	57.00	CL		84.0		27M0G7W			P	
PLW	PLW00000	140.00	132.98	5.51	1.30	0.60	55.41	MODRSS		45.53		MODTES	57.00	CR		84.0		27M0G7W			P	
POL	POL13200	50.00	19.71	52.18	1.22	0.63	16.12	MODRSS		45.59		MODTES	57.00	CR		84.0		27M0G7W			P	
POR	POR__100	−37.00	−15.92	37.65				CB_RSS_PORA		47.17		MODTES	57.00	CR		84.0		27M0G7W			P	
PSE	YYY00001	−13.20	34.99	31.86	0.60	0.60	90.00	MODRSS		48.88		MODTES	57.00	CL		80.5		27M0G7W			P	8
QAT	QAT24700	20.00	51.59	25.35	0.60	0.60	90.00	MODRSS		48.88		MODTES	57.00	CL		84.0		27M0G7W			P	
ROU	ROU13600	50.00	25.12	45.75	1.17	0.73	9.52	MODRSS		45.15		MODTES	57.00	CL		84.0		27M0G7W			P	
RRW	RRW31000	11.00	30.00	−2.10	0.66	0.60	42.00	MODRSS		48.47		MODTES	57.00	CR		81.0		27M0G7W			P	
RUS	RSTREA11	36.00	38.00	53.00					COP	38.40	8.40	MODTES	57.00	CR		84.0		27M0F8W	RST-1	05	PE	
RUS	RSTREA12	36.00	38.00	53.00					COP	38.40	8.40	MODTES	57.00	CL		84.0		27M0F8W	RST-1	05	PE	
RUS	RSTRED11	36.00	38.00	53.00					COP	38.40	8.40	MODTES	57.00	CR		84.0		27M0G7W	RST-1	05	PE	
RUS	RSTRED12	36.00	38.00	53.00					COP	38.40	8.40	MODTES	57.00	CL		84.0		27M0G7W	RST-1	05	PE	
RUS	RSTRSD11	36.00	38.00	53.00					COP	38.40	8.40	MODTES	57.00	CR		84.0		27M0G7W	RST-1	05	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							
RUS	RSTRSD12	36.00	38.00	53.00					COP	38.40	8.40	MODTES	57.00	CL		84.0		27M0G7W	RST-1	05	P	
RUS	RSTRSD21	56.00	65.00	63.00					COP	38.40	8.40	MODTES	57.00	CR		84.0		27M0G7W	RST-2	14	P	
RUS	RSTRSD22	56.00	65.00	63.00					COP	38.40	8.40	MODTES	57.00	CL		84.0		27M0G7W	RST-2	14	P	
RUS	RSTRSD31	86.00	97.00	62.00					COP	38.40	8.40	MODTES	57.00	CR		84.0		27M0G7W	RST-3	33	P	
RUS	RSTRSD32	86.00	97.00	62.00					COP	38.40	8.40	MODTES	57.00	CL		84.0		27M0G7W	RST-3	33	P	
RUS	RSTRSD51	140.00	158.00	56.00					COP	38.40	8.40	MODTES	57.00	CR		84.0		27M0G7W	RST-5	35	P	
RUS	RSTRSD52	140.00	158.00	56.00					COP	38.40	8.40	MODTES	57.00	CL		84.0		27M0G7W	RST-5	35	P	
RUS	RUS00401	110.00	118.22	51.52					COP	38.40	8.40	MODTES	57.00	CR		84.0		27M0G7W	RUS-4	34	P	
RUS	RUS00402	110.00	118.22	51.52					COP	38.40	8.40	MODTES	57.00	CL		84.0		27M0G7W	RUS-4	34	P	
S	S 13800	5.00	17.00	61.50	2.00	1.00	10.00	MODRSS		41.44		MODTES	57.00	CL		84.0		27M0G7W		04	P	
S	S 13900	5.00	17.00	61.50	2.00	1.00	10.00	MODRSS		41.44		MODTES	57.00	CL		84.0		27M0G7W		04	P	
SEY	SEY00000	42.50	51.86	−7.23	2.43	1.04	27.51	MODRSS		40.44		MODTES	57.00	CR		84.0		27M0G7W			P	
SLM	SLM00000	128.00	159.27	−8.40	1.35	1.08	118.59	MODRSS		42.81		MODTES	57.00	CL		84.0		27M0G7W			P	
SMO	SMO05700	−178.00	−171.70	−13.87	0.60	0.60	90.00	MODRSS		48.88		MODTES	57.00	CL		84.0		27M0G7W			P	
SMR	SMR31100	−36.80	12.50	43.90	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		83.0		27M0G7W			P	
SNG	SNG15100	88.00	103.86	1.42	0.92	0.72	175.12	MODRSS		46.25		MODTES	57.00	CL		84.0		27M0G7W			P	
SRB	SRB14800	−7.00	20.50	43.98	0.91	0.60	145.16	MODRSS		47.07		MODTES	57.00	CL		84.0		27M0G7W			P	
SRL	SRL25900	−33.50	−11.80	8.60	0.78	0.68	114.00	MODRSS		47.20		MODTES	57.00	CR		84.0		27M0G7W			P	
STP	STP24100	−7.00	7.00	0.80	0.60	0.60	0.00	MODRSS		48.88		MODTES	57.00	CL		84.0		27M0G7W			P	
SUI	SUI14000	−18.80	10.31	49.47	1.82	0.92	151.78	MODRSS		42.19		MODTES	57.00	CL		84.0		27M0G7W			P	
SVK	SVK14401	−12.80	16.77	46.78	1.71	0.89	149.15	MODRSS		42.64		MODTES	57.00	CR		84.0		27M0G7W			P	
SVK	SVK14402	−12.80	16.77	46.78	1.71	0.89	149.15	MODRSS		42.64		MODTES	57.00	CL		84.0		27M0G7W			P	
SVK	SVK14403	−12.80	16.77	46.78	1.71	0.89	149.15	MODRSS		42.64		MODTES	57.00	CL		84.0		27M0G7W		37	P	
SVN	SVN14800	33.80	15.01	46.18	0.60	0.60	90.00	MODRSS		48.88		MODTES	57.00	CR		82.0		27M0G7W			P	
SWZ	SWZ31300	4.80	31.39	−26.44	0.60	0.60	90.00	MODRSS		48.88		MODTES	57.00	CR		82.0		27M0G7W			P	
SYR	SYR22900	11.00	37.55	34.02	1.47	0.91	73.16	MODRSS		43.19		MODTES	57.00	CL		84.0		27M0G7W		53	P	
SYR	SYR33900	11.00	37.60	34.20	1.32	0.88	74.00	MODRSS		43.80		MODTES	57.00	CL		84.0		27M0G7W		53	P	
TCD	TCD14300	17.00	18.39	15.52	3.21	2.05	83.26	MODRSS		36.26		MODTES	57.00	CR		84.0		27M0G7W			P	
THA	THA14200	98.00	100.75	12.88	2.80	1.82	93.77	MODRSS		37.38		MODTES	57.00	CR		84.0		27M0G7W			P	
TJK	TJK06900	38.00	71.14	38.41	1.21	0.73	155.31	MODRSS		45.00		MODTES	57.00	CL		82.0		27M0G7W			P	
TKM	TKM06800	50.00	59.24	38.83	2.26	1.02	166.64	MODRSS		40.81		MODTES	57.00	CL		85.7		27M0G7W			P	
TLS	TLS00000	128.00	126.03	−8.72	0.66	0.60	13.92	MODRSS		48.50		MODTES	57.00	CR		84.0		27M0G7W			P	
TON	TON21500	170.75	−175.23	−18.19	1.59	0.60	71.33	MODRSS		44.64		MODTES	57.00	CR		84.0		27M0G7W			P	
TUN	TUN15000	−25.20	9.50	33.50	1.88	0.72	135.00	MODRSS		43.13		MODTES	57.00	CR		84.0		27M0G7W		55	P	
TUN	TUN27200	−25.20	2.50	32.00	3.59	1.75	175.00	MODRSS		36.47		MODTES	57.00	CR		84.0		27M0G7W		55	P	
TUR	TUR14500	42.00	35.14	38.99	3.19	1.10	0.03	MODRSS		39.00		MODTES	57.00	CL		84.0		27M0G7W		36	P	
TUV	TUV00000	176.00	177.61	−7.11	0.94	0.60	137.58	MODRSS		46.93		MODTES	57.00	CR		84.0		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							
TZA	TZA22500	11.00	34.60	−6.20	2.41	1.72	129.00	MODRSS		38.27		MODTES	57.00	CR		84.0		27M0G7W			P	
UAE	UAE27400	52.50	53.98	24.37	1.23	0.84	6.62	MODRSS		44.31		MODTES	57.00	CR		84.0		27M0G7W			P	
UGA	UGA05100	17.00	32.20	1.04	1.50	1.02	68.73	MODRSS		42.62		MODTES	57.00	CR		84.0		27M0G7W			P	
UKR	UKR06300	38.20	31.82	48.19	2.32	0.95	177.32	MODRSS		41.01		MODTES	57.00	CR		84.0		27M0G7W			P	
USA	GUM33101	122.00	155.56	13.21				CB_RSS_GUMA		43.61		MODTES	57.00	CR		87.0		27M0G7W		7C	P	
USA	GUM33102	122.00	155.56	13.21				CB_RSS_GUMA		43.61		MODTES	57.00	CL		87.0		27M0G7W		7C	P	
USA	MRA33200	121.80	155.56	13.21				CB_RSS_MRAA		43.61		MODTES	57.00	CR		91.0		27M0G7W			P	
USA	PLM33200	170.00	−145.55	19.50				CB_RSS_PLMA		39.35		MODTES	57.00	CL		87.0		27M0G7W			P	
USA	USAA_101	170.00	−145.55	19.50				CB_RSS_USAA		39.35		MODTES	57.00	CR		87.0		27M0G7W		7A	P	
USA	USAA_102	170.00	−145.55	19.50				CB_RSS_USAA		39.35		MODTES	57.00	CL		87.0		27M0G7W		7A	P	
UZB	UZB07100	33.80	63.80	41.21	2.56	0.89	159.91	MODRSS		40.84		MODTES	57.00	CR		82.0		27M0G7W			P	
VTN	VTN32500	107.00	106.84	14.21	3.43	1.76	109.43	MODRSS		36.64		MODTES	57.00	CR		84.0		27M0G7W			P	
VUT	VUT12801	140.00	168.00	−16.40	1.52	0.68	87.00	MODRSS		44.30		MODTES	57.00	CL		84.0		27M0G7W		7B	P	
VUT	VUT12802	140.00	168.00	−16.40	1.52	0.68	87.00	MODRSS		44.30		MODTES	57.00	CR		84.0		27M0G7W		7B	P	
ZMB	ZMB31400	−0.80	27.50	−13.10	2.38	1.48	39.00	MODRSS		38.98		MODTES	57.00	CR		84.0		27M0G7W			P	
ZWE	ZWE13500	−0.80	29.60	−18.80	1.46	1.36	37.00	MODRSS		41.47		MODTES	57.00	CL		85.0		27M0G7W			P	

ANNEX 1

Limits for determining whether a service of an administration is considered to be affected by a proposed modification to the Region 2 feeder-link Plan or by a proposed new or modified assignment in the Regions 1 and 3 feeder-link List or when it is necessary under this Appendix to seek the agreement of any other administration (Rev.WRC-03)

MOD

6 Limits applicable to protect a frequency assignment in the band 17.8-18.1 GHz (Region 2) to a receiving feeder-link space station in the fixed-satellite service (Earth-to-space) or a frequency assignment in the frequency bands 14.5-14.75 GHz (in countries listed in Resolution PLEN/1 (WRC-15)) and 14.5-14.8 GHz (in countries listed in Resolution PLEN/2 (WRC-15)) to a receiving space station in the fixed-satellite service (Earth-to-space) not subject to a Plan (WRC-15)

With respect to § 4.1.1 *d)* of Article 4, an administration is considered affected by a proposed new or modified assignment in the Regions 1 and 3 feeder-link List when the power flux-density arriving at the receiving space station of a broadcasting-satellite feeder link in Region 2 or the receiving space station of the fixed-satellite service uplinks not subject to a Plan in all Regions of that administration would cause an increase in the noise temperature of the receiving uplink space station which exceeds the threshold value of $\Delta T/T$ corresponding to 6%, where $\Delta T/T$ is calculated in accordance with the method given in Appendix **8**, except that the maximum power densities per hertz averaged over the worst 1 MHz are replaced by power densities per hertz averaged over the necessary bandwidth of the feeder-link carriers. (WRC-15)

ANNEX 4 (REV.WRC-03)

Criteria for sharing between services

ADD

3 Threshold values for determining when coordination is required between transmitting earth stations in the fixed-satellite service in the frequency band 14.5-14.75 GHz (in countries listed in Resolution PLEN/1 (WRC-15)) and 14.5-14.8 GHz (in countries listed in Resolution PLEN/2 (WRC-15)) not for feeder links for the broadcasting-satellite service and a receiving space station subject to a Plan in the frequency band 14.5-14.8 GHz (WRC-15)

With respect to § 7.1, Article 7, coordination of a transmitting earth station in the fixed-satellite service with a receiving space station in a broadcasting-satellite feeder link in the Regions 1 and 3 feeder-link Plan or List, or a proposed new or modified receiving space station in the List, is required when the power flux-density arriving at the receiving space station of a broadcasting-satellite service feeder link of another administration exceeds the value of:

-197.0 – GRx dB(W/(m^2 · Hz)) with regard to the assignment in the Regions 1 and 3 feeder-link Plan or

-193.9 – GRx dB(W/(m^2 · Hz)), with regard to the assignment included in the feeder-link List or for which complete Appendix **4** information has been received by the Radiocommunication Bureau in accordance with the provisions of § 4.1.3,

where GRx is the relative receive antenna gain of the space station subject to a Plan at the location of the transmitting earth station in the fixed-satellite service not for feeder links for the broadcasting-satellite service. (WRC-15)

APPENDIX 30B (REV.WRC-12)

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, 11.2-11.45 GHz and 12.75-13.25 GHz

MOD

ARTICLE 6 (REV.WRC-12)

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], MOD [2] (WRC-15)

---

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

MOD

6.14 The Bureau, acting on a request for assistance under § 6.13, shall send a reminder to the administration which has not replied, together with the results of its previously published compatibility analysis, containing the change in the values referred to in paragraph 2.3 of Annex 4 to Appendix **30B**, requesting a decision. (WRC-15)

MOD

6.17 If agreements have been reached with administrations published in accordance with § 6.7, the administration proposing the new or modified assignment may request the Bureau to have the assignment entered into the List, indicating the final characteristics of the assignment together with the names of the administrations with which agreement has been reached. For this purpose, it shall send to the Bureau the information specified in Appendix **4**. In submitting the notice, the administration may request the Bureau to examine the notice under § 6.19, 6.21 and 6.22 (entry into the List) and then the notice submitted separately under Article 8 of this Appendix (notification). (WRC-15)

MOD

6.31 The regulatory time-limit for bringing into use an assignment to a space station of a satellite network is no more than eight years from the date of receipt by the Bureau of the complete notice under § 6.1. (WRC-15)

MOD

6.31*bis* The regulatory time-limit in § 6.31 for bringing into use of an assignment to a space station of a satellite network may be extended once by not more than three years due to launch failure in the following cases:

– the destruction of the satellite intended to bring the assignment into use;

– the destruction of the satellite launched to replace an already operating satellite which is intended to be relocated to bring another assignment into use; *or*

– the satellite is launched, but fails to reach its assigned orbital location.

For this extension to be granted, the launch failure must have occurred at least five years after the date of receipt of the complete Appendix **4** data. In no case shall the period of the extension of the regulatory time-limit exceed the difference in time between the three-year period and the period remaining from the date of the launch failure to the end of the regulatory time-limit. In order to take advantage of this extension, the administration shall have, within one month of the launch failure or one month after 17 February 2012, whichever comes later, notified the Bureau in writing of such failure, and shall also provide the following information to the Bureau before the end of the regulatory time-limit of § 6.31:

– date of launch failure;

– due diligence information as required in Resolution **49 (Rev.WRC-15)**, if this resolution applies to the satellite network in which the space station is to operate, for the assignments with respect to the satellite that suffered the launch failure, if that information has not already been provided.

If, 11 months after the request for extension, the administration has not provided to the Bureau updated Resolution **49 (Rev.WRC-15)** information, the Bureau shall promptly send a reminder to the notifying administration. If, for a satellite network or satellite system to which Resolution **49 (Rev.WRC-15)** applies, the administration has not provided to the Bureau updated Resolution **49 (Rev.WRC-15)** information for the new satellite under procurement within one year of the request for extension, the related frequency assignments shall lapse. (WRC-15)

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*

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*), 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-15)

MOD

7.1 The administration of a country** which has joined the Union as a Member State and does not have a national allotment in the Plan or an assignment stemming from the conversion of an allotment shall obtain a national allotment by the following procedure. (WRC-15)

MOD

ARTICLE 8 (REV.WRC-12)

Procedure for notification and recording in the Master Register of assignments in the planned bands for the fixed-satellite service[11, MOD 12] (WRC-15)

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

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*bis*] 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-15)

ADD

14*bis* 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 **COM5/4 (WRC-15)** shall apply. (WRC-15)

MOD

ARTICLE 10 (REV.WRC-15)

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

A.1 COLUMN HEADINGS OF THE PLAN

Col. 2 *Nominal orbital position*, in degrees

Col. 3 *Longitude of the boresight*, in degrees

Col. 4 *Latitude of the boresight*, in degrees

Col. 5 *Major axis of the elliptical cross-section half-power beam*, in degrees

Col. 6 *Minor axis of the elliptical cross-section half-power beam*, in degrees

Col. 7 *Orientation of the ellipse determined as follows*: in a plane normal to the beam axis, the direction of the major axis of the ellipse is defined by the angle measured anticlockwise from a line parallel to the equatorial plane to the major axis of the ellipse, to the nearest degree

Col. 8 Earth station *e.i.r.p.* density (dB(W/Hz))

Col. 9 Satellite *e.i.r.p.* density (dB(W/Hz))

Col. 10 *Remarks*

1 Assignment converted from allotment.

2 The Administration of Luxembourg (LUX) agreed to operate the LUX-30B-6 satellite network within the characteristics included in the Appendix **30B** List, as modified during WRC-07, and to immediately eliminate interference that could be caused by LUX-30B-6 to the national allotment of the Islamic Republic of Iran (IRN00000) (IRN).

3 Allotment converted into assignment with a shaped beam and then reinstated back into the Plan.

4-5 (SUP – WRC-07)

6 Allotment reinstated from assignments which were provisionally entered in the List in accordance with § 6.25. §§ 6.26 to 6.29 apply.

Note by the Secretariat (applicable when an asterisk (*) appears in column 10): It is to be noted that this beam is intended to be implemented as part of a multi-beam network, operating from a single orbital location. Within any multi-beam network, the beams are the responsibility of a single administration, hence interference between them has not been taken into account during the Conference. The number which appears in the alphanumeric code that follows the asterisk serves to identify the multi-beam network concerned.

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

1	2	3	4	5	6	7	8	9	10
...									
XAN00000	−5.00	−65.60	15.10	1.60	1.60	90.00	−9.6	−38.9	*/MB5
...									
AZE00000	95.90	47.20	40.34	1.60	1.60	0.00	−9.6	−42.2	
...									
BLR00000	64.40	27.01	53.60	1.60	1.60	0.00	−9.4	−41.3	
...									
CZE00000	−31.90	15.68	49.81	1.60	1.60	0.00	−9.6	−41.3	
...									
KAZ00000	58.50	66.36	46.72	4.60	1.69	176.88	−9.6	−41.0	
...									
LBY00000	28.90	19.00	25.90	3.00	2.70	165.00	−6.8	−39.2	
...									
LTU00000	−9.30	23.67	55.23	1.60	1.60	0.00	−9.6	−42.8	
...									
MCO00000	52.00						−15.6	−28.7	3, 6
...									
RUS00002	88.10	94.80	48.60	7.50	3.50	175.00	−1.4	−38.3	
...									
SDN00001	23.55								1
SDN00002	23.55								1
...									
SEY00000	42.25	51.50	−3.20	13.80	3.80	48.50	−3.0	−43.8	
...									
UKR00001	38.20	31.73	48.22	1.98	1.60	178.15	−15.1	−40.7	
...									
UZB00000	110.50	65.45	41.09	1.60	1.60	0.00	−9.6	−40.3	
...									
VTN00000	107.00	16					−7.1	−35.8	3
...									
SVK00000	−19.82	17.30	49.60	1.60	1.60	90.00	−9.6	−40.0	
...									

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
...									
XAN00000	−5.00	−65.60	15.10	1.30	1.00	58.00	−1.1	−22.3	*/MB5
...									
AZE00000	95.90	47.20	40.34	0.80	0.80	0.00	−10.2	−31.0	
...									
BLR00000	64.40	27.01	53.60	1.14	0.80	25.74	−3.0	−30.0	
...									

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
CZE00000	−31.90	15.68	49.81	0.80	0.80	0.00	−8.4	−30.5	
...									
KAZ00000	58.50	66.36	46.72	4.60	1.69	176.88	−0.6	−28.0	
...									
LBY00000	28.90	19.00	25.90	3.00	2.70	165.00	3.1	−27.8	
...									
LTU00000	−9.30	23.67	55.23	0.80	0.80	0.00	−10.2	−32.5	
...									
MCO00000	52.0								1
...									
MEX00000	−113.00								1
...									
RUS00002	88.10						5.4	−26.32	3
...									
SDN00001	23.55								1
SDN00002	23.55								1
...									
SEY00000	42.25	51.50	−3.20	13.80	3.80	48.50	−1.3	−33.8	
...									
UKR00001	38.20	31.73	48.22	2.21	0.97	178.15	−9.1	−31.0	
...									
UZB00000	110.50	65.45	41.09	1.49	1.05	10.98	−10.2	−31.0	
...									
VTN00000	107.00						2.9	−18.6	3
...									
SVK00000	−19.82	17.30	49.60	1.30	1.00	166.00	−5.1	−27.4	
...									

MOD

APPENDIX 42 (REV.WRC-15)

Table of allocation of international call sign series

(See Article **19**)

Call sign series	Allocated to
...	...
ZQA-ZQZ	United Kingdom of Great Britain and Northern Ireland
ZRA-ZUZ	South Africa (Republic of)
ZVA-ZZZ	Brazil (Federative Republic of)
Z2A-Z2Z	Zimbabwe (Republic of)
Z3A-Z3Z	The Former Yugoslav Republic of Macedonia
Z8A-Z8Z	South Sudan (Republic of)
...	...

MOD

RESOLUTION 5 (REV.WRC-15)

Technical cooperation with the developing countries in the study of propagation in tropical and similar areas

The World Radiocommunication Conference (Geneva, 2015),

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 Union of National Radio and Television Organizations of Africa (URTNA)* 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.

* *Note by the Secretariat*: In 2006, this Union was transformed into a new Union, under the name "The African Union of Broadcasting (AUB)".

MOD

RESOLUTION 12 (WRC-15)

Assistance and support to Palestine

The World Radiocommunication Conference (Geneva, 2015),

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) Resolution 68/235 of the United Nations General Assembly, 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. 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 rebuilding its telecommunication networks;

f) 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. Dubai, 2014), Resolution 18 (Rev. Hyderabad, 2010) of the World Telecommunication Development Conference, on Special Technical Assistance to Palestine;

h) Resolution 9 (Rev. Dubai, 2014) of the World Telecommunication Development Conference, which recognizes 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 ITU Constitution and 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. Busan, 2014) of the Plenipotentiary Conference, which recognizes that ITU's policy of assistance to Palestine for the development of its telecommunication and ICT sector has been efficient;

c) the statement by the Chairman of WRC-07 relating to the procedure to be applied by Palestine to obtain for its exclusive use assignments/an allotment in the Appendix **30B** Plan, in accordance with the Interim Agreement and Resolution 99 (Rev. Busan, 2014) of the Plenipotentiary Conference,

mindful

of the fundamental principles contained in the ITU Constitution,

reaffirming

a) the acceptance of the requirements of Palestine under the digital broadcasting and television plan at the Regional Radiocommunication Conference (Geneva, 2006);

b) Palestine's right, pursuant to the Appendix **30B** Plan, to submit a request for assignments/an allotment intended for exclusive use by Palestine, in accordance with the Interim Agreement and Resolution 99 (Rev. Busan, 2014), without prejudging future agreements between the concerned parties,

welcomes

the bilateral agreement on principles for assignment of frequencies in the 2 100 MHz band for Palestinian cellular operators elaborated through the Joint Technical Committee and signed by concerned parties on 19 November 2015,

invites Member States

to support the timely implementation in 2016 in Palestine of new technologies in accordance with the bilateral agreement signed on 19 November 2015 and of 2G in accordance with previously agreed upon bilateral arrangements,

resolves

that assistance to Palestine, pursuant to the relevant ITU resolutions and decisions shall be continued, in particular through capacity building, with the view to enabling Palestine to obtain and manage the required radio spectrum in order to operate its telecommunication networks and wireless services,

instructs the Director of the Radiocommunication Bureau and the Director of the Telecommunication Development Bureau

to encourage all concerned parties in continuing bilateral negotiations and facilitate implementing the agreements and relevant resolutions, in order to undertake additional measures required for enhancing and developing the wireless telecommunication infrastructures, new technologies and services for Palestine,

further instructs the Director of the Radiocommunication Bureau

1 to continue providing specialized assistance and support, in particular in the field of spectrum management and frequency assignment, to Palestine in collaboration with ITU-D, pursuant to the relevant ITU resolutions;

2 to report to the next WRC-19 on the progress achieved in the implementation of this Resolution.

MOD

RESOLUTION 18 (REV.WRC-15)

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 (Geneva, 2015),

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 and, if available on board ships and aircraft, by the addition of the single group “NNN” in radiotelegraphy; 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.

MOD

RESOLUTION 28 (REV.WRC-15)

Revision of references to the text of ITU-R Recommendations incorporated by reference in the Radio Regulations

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the Voluntary Group of Experts (VGE) on simplification of the Radio Regulations proposed the transfer of certain texts of the Radio Regulations to other documents, especially to ITU-R Recommendations, using the incorporation by reference procedure;

b) that, in some cases, the provisions of the Radio Regulations imply an obligation on Member States to conform to the criteria or specifications incorporated by reference;

c) that references to incorporated texts shall be explicit and shall refer to a precisely identified provision (see Resolution **27 (Rev.WRC-12)**);

d) that all texts of ITU-R Recommendations incorporated by reference are published in a volume of the Radio Regulations;

e) that, taking into account the rapid evolution of technology, ITU-R may revise the ITU-R Recommendations containing text incorporated by reference at short intervals;

f) that, following revision of an ITU-R Recommendation containing text incorporated by reference, the reference in the Radio Regulations shall continue to apply to the earlier version until such time as a competent world radiocommunication conference (WRC) agrees to incorporate the new version;

g) that it would be desirable that texts incorporated by reference reflect the most recent technical developments,

noting

that administrations need sufficient time to examine the potential consequences of changes to ITU-R Recommendations containing text incorporated by reference and would therefore benefit greatly from being advised, as early as possible, of which ITU-R Recommendations have been revised and approved during the elapsed study period or at the Radiocommunication Assembly preceding the WRC,

resolves

1 that each radiocommunication assembly shall communicate to the following WRC a list of the ITU-R Recommendations containing text incorporated by reference in the Radio Regulations which have been revised and approved during the elapsed study period;

2 that, on this basis, WRC should examine those revised ITU-R Recommendations, and decide whether or not to update the corresponding references in the Radio Regulations;

3 that, if the WRC decides not to update the corresponding references, the currently referenced version shall be maintained in the Radio Regulations;

4 that WRCs shall place the examination of ITU-R Recommendations in conformity with *resolves* 1 and *resolves* 2 of this Resolution on the agenda of future WRCs,

instructs the Director of the Radiocommunication Bureau

to provide the CPM immediately preceding each WRC with a list, for inclusion in the CPM Report, of those ITU-R Recommendations containing texts incorporated by reference that have been revised or approved since the previous WRC, or that may be revised in time for the following WRC,

urges administrations

1 to participate actively in the work of the radiocommunication study groups and the radiocommunication assembly on revision of those Recommendations to which mandatory references are made in the Radio Regulations;

2 to examine any indicated revisions of ITU-R Recommendations containing text incorporated by reference and to prepare proposals on possible updating of relevant references in the Radio Regulations.

MOD

RESOLUTION 33 (REV.WRC-15)

Bringing into use of space stations in the broadcasting-satellite service, prior to the entry into force of agreements and associated plans for the broadcasting-satellite service

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that while Resolution **507 (Rev.WRC-15)** envisages plans for the broadcasting-satellite service (BSS), some administrations might nevertheless feel the need to bring stations in that service into use prior to such plans being established;

b) that administrations should, as far as possible, avoid proliferation of space stations in the BSS before such plans have been established;

c) that a space station in the BSS may cause harmful interference to terrestrial stations operating in the same frequency band, even if the latter are outside the service area of the space station;

d) that the procedures specified in Articles **9** to **14** and Appendix **5** contain provisions for coordination between stations in the BSS and terrestrial stations, between space systems in that service and space systems of other administrations;

e) that there are many existing and planned stations in the BSS not subject to agreements and associated plans that have submitted advance publication information (API) or a request for coordination under the existing Resolution **33** procedures and that some administrations are currently in coordination under these procedures,

resolves

1 that, except in those cases where agreements and associated plans for the BSS have been established and have entered into force, for satellite networks for which the API has been received following 1 January 1999, only the procedures of Articles **9** to **14**[*] shall be applied for the coordination and notification of stations in the BSS and coordination and notification of other services in respect of that service;

2 that, except in those cases where agreements and associated plans for the BSS have been established and have entered into force, for satellite networks for which the API has been received by the Radiocommunication Bureau prior to 1 January 1999, only the procedure in Sections A to C in this Resolution shall be applied;

3 that a future conference review the requirement for the procedures in this Resolution.

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[*] Or procedures contained in other provisions of these Regulations when they replace any of those in Articles **9** to **14** for the broadcasting-satellite service.

Section A − Coordination procedure between space stations in the broadcasting-satellite service and terrestrial stations

2.1 Before an administration notifies to the Bureau or brings into use any frequency assignment to a space station in the BSS in a frequency band where this frequency band is allocated, with equal rights, to the BSS and to a terrestrial radiocommunication service, either in the same Region or sub-Region or in different Regions or sub-Regions, it shall coordinate the use of this assignment with any other administration whose terrestrial radiocommunication services may be affected. For this purpose, it shall inform the Bureau of all the technical characteristics of the station, as listed in the relevant sections of Appendix 4, which are necessary to assess the risk of interference to a terrestrial radiocommunication service[1].

2.2 The Bureau shall publish this information in a Special Section of its International Frequency Information Circular (BR IFIC) and shall also, when the BR IFIC contains such information, so advise all administrations by circular telegram.

2.3 Any administration which considers that its terrestrial radiocommunication services may be affected shall forward its comments to the administration seeking coordination and, in any case, to the Bureau. These comments must be forwarded within four months from the date of the relevant BR IFIC. It shall be deemed that any administration which has not forwarded comments within that period considers that its terrestrial radiocommunication services are unlikely to be affected.

2.4 Any administration which has forwarded comments on the projected station shall either give its agreement, with a copy to the Bureau, or, if this is not possible, send to the administration seeking coordination all the data on which its comments are based as well as any suggestions it may be able to offer with a view to a satisfactory solution of the problem.

2.5 The administration which plans to bring into use a space station in the BSS as well as any other administration which believes that its terrestrial radiocommunication services are likely to be affected by the station in question may request the assistance of the Bureau at any time during the coordination procedure.

2.6 In the event of continuing disagreement between an administration seeking to effect coordination and one with which coordination has been sought, the administration seeking coordination shall, except in the cases where the assistance of the Bureau has been requested, defer the submission of its notice concerning the proposed assignment by six months from the date of publication of the information according to § 2.2.

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[1] The calculation methods and the interference criteria to be employed in evaluating the interference should be based upon relevant ITU-R Recommendations agreed by the administrations concerned either as a result of Resolution **703 (Rev.WRC-07)** or otherwise. In the event of disagreement on an ITU-R Recommendation or in the absence of such Recommendations, the methods and criteria shall be agreed between the administrations concerned. Such agreements shall be concluded without prejudice to other administrations.

Section B − Coordination procedure between space stations in the BSS and space systems of other administrations

3 An administration intending to bring into use a space station in the BSS shall, for the purpose of coordination with space systems of other administrations, apply the following provisions of Article **11** of the Radio Regulations (edition of 1990, revised in 1994):

3.1 Nos. **1041** to **1058** inclusive.

3.2.1 Nos. **1060** to **1065**[2].

3.2.2 No coordination under § 3.2.1 is required when an administration proposes to change the characteristics of an existing assignment in such a way as not to increase the probability of harmful interference to stations in the space radiocommunication service of other administrations.

3.2.3 Nos. **1074** to **1105** inclusive.

Section C − Notification, examination and recording in the Master Register of assignments to space stations in the BSS dealt with under this Resolution

4.1 Any frequency assignment[3] to a space station in the BSS shall be notified to the Bureau. The notifying administration shall apply for this purpose the provisions of Nos. **1495** to **1497** of the Radio Regulations (edition of 1990, revised in 1994).

4.2 Notices made under § 4.1 shall initially be treated in accordance with No. **1498** of the Radio Regulations (edition of 1990, revised in 1994).

5.1 The Bureau shall examine each notice with respect to:

5.2 *a)* its conformity with the Convention, the Table of Frequency Allocations and the other provisions of the Radio Regulations, with the exception of those relating to the coordination procedures and to the probability of harmful interference, which are the subject of § 5.3, 5.4, and 5.5;

5.3 *b)* its conformity, where applicable, with the provisions of § 2.1 of Section A above, relating to coordination of the use of the frequency assignment with the other administrations concerned;

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[2] See footnote 1.

[3] The expression *frequency assignment*, wherever it appears in this Resolution, shall be understood to refer either to a new frequency assignment or to a change in an assignment already recorded in the Master International Frequency Register (hereinafter called the *Master Register*).

5.4 *c)* its conformity, where applicable, with the provisions of § 3.2.1 of Section B above, relating to coordination of the use of the frequency assignment with the other administrations concerned;

5.5 *d)* where appropriate, the probability of harmful interference to the service rendered by a station in a space or terrestrial radiocommunication service for which a frequency assignment has already been recorded in the Master Register in conformity with the provisions of No. **1240** or **1503** of the Radio Regulations (edition of 1990, revised in 1994), or No. **11.31**, as appropriate, if that assignment has not, in fact, caused harmful interference to the service rendered by a station for which an assignment has been previously recorded in the Master Register and which itself is in conformity with No. **1240** or **1503** of the Radio Regulations (edition of 1990, revised in 1994), or No. **11.31**, as appropriate.

6.1 Depending upon the findings of the Bureau subsequent to the examination prescribed in § 5.2, 5.3, 5.4 and 5.5, further action shall be as follows:

6.2 Where the Bureau reaches an unfavourable finding with respect to § 5.2, the notice shall be returned immediately by airmail to the notifying administration with the reasons of the Bureau for this finding together with such suggestions as the Bureau is able to offer with a view to a satisfactory solution of the problem.

6.3 Where the Bureau reaches a favourable finding with respect to § 5.2, or where it reaches the same finding after resubmission of the notice, it shall examine the notice with respect to the provisions of § 5.3 and 5.4.

6.4 Where the Bureau finds that the coordination procedures mentioned in § 5.3 and 5.4 have been successfully completed with all administrations whose services may be affected, the assignment shall be recorded in the Master Register. The date of receipt by the Bureau of the notice shall be entered in Column 2d of the Master Register with an entry in the Remarks Column indicating that such recording does not prejudge in any way the decisions to be included in the agreements and associated plans referred to in Resolution **507 (Rev.WRC-15)**.

6.5 Where the Bureau finds that the coordination procedures mentioned in § 5.3 or 5.4 have not, as appropriate, been applied or have been unsuccessfully applied, the notice shall be returned immediately by airmail to the notifying administration with the reason for its return together with such suggestions as the Bureau is able to offer with a view to a satisfactory solution of the problem.

6.6 Where the notifying administration resubmits the notice and states that it has been unsuccessful in endeavouring to effect the coordination, the notice shall be examined by the Bureau with respect to § 5.5.

6.7 Where the notifying administration resubmits the notice and the Bureau finds that the coordination procedures have been successfully completed with all administrations whose services may be affected, the assignment shall be treated as indicated in § 6.4.

6.8 Where the Bureau reaches a favourable finding with respect to § 5.5, the assignment shall be recorded in the Master Register. The appropriate symbol indicating the finding by the Bureau shall indicate that the coordination procedures, as appropriate, referred to in § 2.1 or 3.2.1 were not successfully completed. The date of receipt by the Bureau of the notice shall be entered in Column 2d of the Master Register, with the remark mentioned in § 6.4.

6.9 Where the Bureau reaches an unfavourable finding with respect to § 5.5, the notice shall be returned immediately by airmail to the notifying administration with the reasons for the Bureau's finding together with such suggestions as the Bureau is able to offer with a view to a satisfactory solution of the problem.

6.10 If the administration resubmits the notice unchanged with the insistence that it be reconsidered, but should the Bureau's unfavourable finding under § 5.5 remain unchanged, the assignment shall be recorded in the Master Register. However, this entry shall be made only if the notifying administration informs the Bureau that the assignment has been in use for at least four months without any complaint of harmful interference having been received. The date of receipt by the Bureau of the original notice shall be entered in Column 2d of the Master Register, with the remark mentioned in § 6.4. An appropriate remark shall be placed in Column 13 to indicate that the assignment is not in conformity with the provisions of § 5.3, 5.4 or 5.5, as appropriate. In the event that the administration concerned receives no complaint of harmful interference concerning the operation of the station in question for a period of one year from the commencement of operation, the Bureau shall review its finding.

6.11 If harmful interference is actually caused to the reception of any space station in the BSS whose frequency assignment has been recorded in the Master Register as a result of a favourable finding with respect to § 5.2, 5.3, 5.4 and 5.5 of this Resolution, as appropriate, by the use of a frequency assignment to a space station which has been subsequently recorded in the Master Register in accordance with the provisions of § 6.10 of this Resolution or of No. **1544** of the Radio Regulations (edition of 1990, revised in 1994), or No. **11.41**, as appropriate, the station using the latter frequency assignment must, upon receipt of advice thereof, immediately eliminate this harmful interference.

6.12 If harmful interference is actually caused to the reception of any space radiocommunication station using an assignment recorded in the Master Register as a result of a favourable finding with respect to Nos. **1503** to **1512** of the Radio Regulations (edition of 1990, revised in 1994), or Nos. **11.31** to **11.34**, as appropriate, by the use of an assignment to a space station in the BSS which has been subsequently recorded in the Master Register in accordance with the provisions of § 6.10 of this Resolution, the station using the latter assignment must, on receipt of advice thereof, immediately eliminate this harmful interference.

6.13 If harmful interference is actually caused to the reception of any terrestrial station using an assignment recorded in the Master Register as a result of a favourable finding with respect to No. **1240** of the Radio Regulations (edition of 1990, revised in 1994), or No. **11.31**, as appropriate, by the use of an assignment to a space station in the BSS which has been subsequently recorded in the Master Register in accordance with the provisions of § 6.10 of this Resolution, the station, using the latter assignment must, on receipt of advice thereof, immediately eliminate this harmful interference.

6.14 If harmful interference to the reception of any station whose assignment is in accordance with § 5.2 of this Resolution is actually caused by the use of a frequency assignment which is not in conformity with No. **1240**, **1352** or **1503** of the Radio Regulations (edition of 1990, revised in 1994), or No. **11.31**, as appropriate, the station using the latter frequency assignment must, upon receipt of advice thereof, immediately eliminate this harmful interference.

MOD

RESOLUTION 34 (REV.WRC-15)

Establishment of the broadcasting-satellite service in Region 3 in the 12.5-12.75 GHz frequency band and sharing with space and terrestrial services in Regions 1, 2 and 3

The World Radiocommunication Conference (Geneva, 2015),

considering

that the World Administrative Conference (Geneva, 1979) has allocated the frequency band 12.5-12.75 GHz to the broadcasting-satellite service for community reception in Region 3,

recognizing

that under Resolution **507 (Rev.WRC-15)** the Council may wish to empower a future competent radiocommunication conference to establish a plan for the broadcasting-satellite service in the frequency band 12.5-12.75 GHz in Region 3,

resolves

1 that, until such time as a plan may be established for the broadcasting-satellite service in the frequency band 12.5-12.75 GHz in Region 3, the relevant provisions of Sections A and B of Resolution **33 (Rev.WRC-15)** or of Article **9**, as appropriate (see Resolution **33 (Rev.WRC-15)**) shall continue to apply to the coordination between stations in the broadcasting-satellite service in Region 3 and:

a) space stations in the broadcasting-satellite and fixed-satellite services in Regions 1, 2 and 3;

b) terrestrial stations in Regions 1, 2 and 3;

2 that the ITU-R shall study urgently the technical provisions which may be appropriate for the sharing between stations in the broadcasting-satellite service in Region 3 and:

a) space stations in the broadcasting-satellite and fixed-satellite services in Regions 1 and 2;

b) terrestrial stations in Regions 1 and 2;

3 that, until such time as technical provisions are developed by the ITU-R and accepted by administrations concerned under Resolution **703 (Rev.WRC-07)** the sharing between space stations in the broadcasting-satellite service in Region 3 and terrestrial services in Regions 1, 2 and 3 shall be based on the following criteria as appropriate:

a) the power flux-density at the Earth's surface, produced by emissions from a space station in the broadcasting-satellite service in Region 3 for all conditions and for all methods of modulation shall not exceed the limits given in Annex 5 of Appendix 30;

b) in addition to *resolves* 3 *a)* above, the provisions of Article **21** (Table **21-4**) shall apply in the countries mentioned in Nos. **5.494** and **5.496**;

c) the limits given in *resolves* 3 *a)* and *b)* above may be exceeded on the territory of any country provided the administration of that country has so agreed.

MOD

RESOLUTION 42 (REV.WRC-15)

Use of interim systems in Region 2 in the broadcasting-satellite and fixed-satellite (feeder-link) services in Region 2 for the frequency bands covered by Appendices 30 and 30A

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the Regional Administrative Conference for the Planning of the Broadcasting-Satellite Service in Region 2, Geneva, 1983, prepared a Plan for the broadcasting-satellite service in the frequency band 12.2-12.7 GHz and a Plan for the associated feeder links in the frequency band 17.3-17.8 GHz with provisions for implementing interim systems in accordance with Resolution 2 (Sat-R2);

b) that in the implementation of their assignments in the Plans, administrations of Region 2 may find it more appropriate to adopt a phased approach and initially use characteristics different from those appearing in the appropriate Region 2 Plan;

c) that some administrations of Region 2 may cooperate in the joint development of a space system with a view to covering two or more service areas from the same orbital position or to using a beam which would encompass two or more service areas;

d) that some administrations of Region 2 may cooperate in the joint development of a space system with a view to covering two or more feeder-link service areas from the same orbital position or to using a beam which encompasses two or more feeder-link service areas;

e) that interim systems shall not adversely affect the Plans nor hamper the implementation and evolution of the Plans;

f) that the number of assignments to be used in an interim system shall not in any case exceed the number of assignments appearing in the Region 2 Plan which are to be suspended;

g) that the interim systems shall not in any case use orbital positions that are not in the Region 2 Plan;

h) that an interim system shall not be introduced without the agreement of all administrations whose space and terrestrial services are considered to be affected;

i) that WRC-2000 revised Regions 1 and 3 downlink and feeder-link Plans and established Lists together with regulatory procedures, protection criteria and calculation methods for sharing between services in the frequency bands of Appendices **30** and **30A**;

j) that WRC-03 modified the regulatory procedures, protection criteria and calculation methods for sharing between services in the frequency bands of Appendices **30** and **30A**,

resolves

that administrations and the Radiocommunication Bureau shall apply the procedure contained in the Annex to this Resolution, so long as Appendices **30** and **30A** remain in force.

ANNEX TO RESOLUTION 42 (REV.WRC-15)

1 An administration or a group of administrations in Region 2 may, after successful application of the procedure contained in this Annex and with the agreement of the affected administrations, use an interim system during a specified period not exceeding ten years in order:

1.1 For an interim system in the broadcasting-satellite service

a) to use an increased e.i.r.p. in any direction relative to that appearing in the Region 2 Plan provided that the power flux-density does not exceed the limits given in Annex 5 to Appendix **30**;

b) to use modulation characteristics[1] different from those appearing in the Annexes to the Region 2 Plan and resulting in an increased probability of harmful interference or in a wider assigned bandwidth;

c) to change the coverage area by displacing boresight, or by increasing the major or minor axis, or by rotating them from an orbital position which shall be one of the corresponding orbital positions appearing in the Region 2 Plan;

d) to use a coverage area appearing in the Region 2 Plan or a coverage area encompassing two or more coverage areas appearing in the Region 2 Plan from an orbital position which shall be one of the corresponding positions appearing in the Region 2 Plan;

e) to use a polarization different from that in the Region 2 Plan.

[1] For example, modulation with sound channels frequency-multiplexed within the bandwidth of a television channel, digital modulation of sound and television signals, or other pre-emphasis characteristics.

1.2 For an interim feeder-link system

a) to use an increased e.i.r.p. in any direction relative to that appearing in the Region 2 feeder-link Plan;

b) to use modulation characteristics[1] different from those appearing in the Annexes to the Plan and resulting in an increased probability of harmful interference or in a wider assigned bandwidth;

c) to change the feeder-link beam area by displacing the boresight, or by increasing the major or minor axis, or by rotating them in relation to an orbital position which shall be one of the corresponding orbital positions appearing in the Region 2 feeder-link Plan;

d) to use a feeder-link beam area appearing in the Region 2 feeder-link Plan or a feeder-link beam area encompassing two or more feeder-link beam areas appearing in the Region 2 feeder-link Plan in relation to an orbital position which shall be one of the corresponding orbital positions appearing in the Region 2 feeder-link Plan;

e) to use a polarization different from that in the Region 2 feeder-link Plan.

2 In all cases, an interim system shall correspond to assignments in the appropriate Region 2 Plan; the number of assignments to be used in an interim system shall not in any case exceed the number of assignments appearing in the Region 2 Plan which are to be suspended. During the use of an interim system, the use of the corresponding assignments in the Region 2 Plan is suspended; they shall not be brought into use before the cessation of the use of the interim system. However, the suspended assignments, but not the interim system's assignments, of an administration shall be taken into account when other administrations apply the procedure of Article 4 of Appendix **30** or of Article 4 of Appendix **30A**, as appropriate, in order to modify the Region 2 Plan or to include new or modified assignments in the Regions 1 and 3 List, or the procedure of this Annex in order to bring an interim system into use. The assignments of interim systems shall not be taken into account in applying the procedure of Article 6 or Article 7 of Appendix **30** and the procedure of Article 6 or Article 7 of Appendix **30A**.

3 As a specific consequence of § 2 above, Region 2 interim system assignments shall not obtain protection from, or cause harmful interference to, new or modified assignments appearing in the Regions 1 and 3 List following the successful application of the procedure of Article 4 of Appendix **30** or of Article 4 of Appendix **30A**, as appropriate, even if the assignment modification procedure is concluded and the assignments become operational within the time-limits specified in § 4 *a)*.

4 When an administration proposes to use an assignment in accordance with § 1, it shall communicate to the Bureau the information listed in Appendix **4** not earlier than eight years but, preferably, not later than two years before the date of bringing into use. An assignment shall lapse if it is not brought into use by that date. The administration shall also indicate:

a) the maximum specified period during which the interim assignment is intended to remain in use;

b) the assignments in the Region 2 Plans the use of which will remain suspended for the duration of the use of the corresponding interim assignment;

c) the names of the administrations with which an agreement for the use of the interim assignment has been reached, together with any comment relating to the period of use so agreed and the names of administrations with which an agreement may be required but has not yet been reached.

5 Administrations are considered to be affected as follows:

5.1 For an interim system in the broadcasting-satellite service

a) an administration of Region 2 is considered to be affected if any overall equivalent protection margin of one of its assignments in the Region 2 Plan, calculated in accordance with Annex 5 to Appendix **30** including the cumulative effect of all interim uses during the maximum specified period of use of the interim system, but excluding the corresponding suspended assignments (§ 4 *b)*), becomes negative or a former negative value is made more negative;

b) an administration of Region 1 or 3 is considered to be affected if it has an assignment which is in conformity with the Regions 1 and 3 Plan contained in Appendix **30** or with the List or in respect of which proposed new or modified assignments have been received by the Bureau in accordance with the provisions of Article 4 of that Appendix with a necessary bandwidth which falls within the necessary bandwidth of the proposed interim assignment and the appropriate limits of § 3 of Annex 1 to Appendix **30** are exceeded;

c) an administration of Region 1 or 3 is considered to be affected if it has a frequency assignment in the fixed-satellite service which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. **9.7** or under Article 7 of Appendix **30** or which has been published in accordance with No. **9.2B** and the appropriate limits of § 6 of Annex 1 to Appendix **30** are exceeded;

d) an administration of Region 1 or 3 is considered to be affected if, although having no frequency assignment in the appropriate Regions 1 and 3 Plan or List in the channel concerned, it nevertheless would receive on its territory a power flux-density value which exceeds the limits given in § 4 of Annex 1 to Appendix **30** as a result of the proposed interim assignment, or if it has such an assignment for which its associated service area does not cover the whole of the territory of the administration, and in its territory outside that service area the power flux-density from the interim system space station exceeds the above-mentioned limits;

e) an administration of Region 2 is considered to be affected if, although having no frequency assignment in the appropriate Region 2 Plan in the channel concerned, it nevertheless would receive on its territory a power flux-density value which exceeds the limits given in § 4 of Annex 1 to Appendix **30** as a result of the proposed interim assignment, or if it has such an assignment for which its associated service area does not cover the whole of the territory of the administration, and in its territory outside that service area the power flux-density from the interim system space station exceeds the above-mentioned limits;

f) an administration of Region 3 is considered to be affected if it has a frequency assignment to a space station in the broadcasting-satellite service in the frequency band 12.5-12.7 GHz with a necessary bandwidth any portion of which falls within the necessary bandwidth of the proposed assignment, and which:

– is recorded in the Master Register; *or*

– has been coordinated or is being coordinated under the provisions of Sections A and B of Resolution **33 (Rev.WRC-15)** or under the provisions of Articles **9** to **14**, as appropriate (see Resolution **33 (Rev.WRC-15)**); *or*

– appears in a Region 3 Plan to be adopted at a future radiocommunication conference, taking account of modifications which may be introduced subsequently in accordance with the Final Acts of that conference,

and the limits of § 3, Annex 1 to Appendix **30** are exceeded.

5.2 For interim feeder-link systems

a) an administration of Region 2 is considered to be affected if any overall equivalent protection margin of one of its assignments in the Plan, calculated in accordance with Annex 3 to Appendix **30A** including the cumulative effect of all interim uses during the maximum specified period of use of the interim system, but excluding the corresponding suspended assignment(s) (§ 4 *b)*), becomes negative or a former negative value is made more negative;

b) an administration in Region 1 or 3 is considered to be affected if it has an assignment for feeder links in the fixed-satellite service (Earth-to-space), any portion of the necessary bandwidth of which falls within the necessary bandwidth of the proposed assignment, which is in conformity with the feeder-link Plan or List for Regions 1 and 3, or in respect of which proposed new or modified assignments in the List have already been received by the Bureau in accordance with the provisions of Article 4 of Appendix **30A** and for which the limits set out in § 5 of Annex 1 to Appendix **30A** are exceeded.

6 The Bureau shall publish in a Special Section of its International Frequency Information Circular (BR IFIC) the information received under § 4, together with the names of the administrations which the Bureau has identified in applying § 5.

7 When the Bureau finds that the suspended assignment of an administration having an interim system is not affected, it shall examine the projected interim system with respect to the interim system of that administration and if there is an incompatibility, it shall request the two administrations concerned to adopt any measures that may enable the new interim system to be operated.

8 The Bureau shall send a telegram to the administrations listed in the Special Section of the BR IFIC, drawing their attention to the information it contains and shall send them the results of its calculations.

9 Any administration not listed in the special section which considers that its planned interim assignment may be affected shall so inform the administration responsible for the interim system and the Bureau, and the two administrations shall endeavour to resolve the difficulty before the proposed date of bringing the interim assignment into use.

10 An administration which has not sent 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 § 6 shall be understood as having agreed to the proposed interim use.

11 On the expiry of four months following the date of publication of the BR IFIC referred to in § 6, the Bureau shall review the matter, and, depending on the results obtained, shall inform the administration proposing the interim assignment that:

a) it may notify its proposed use under Article 5 of Appendix **30** or Article 5 of Appendix **30A**, as appropriate, if no agreement is required or the required agreement has been obtained from the administrations concerned. In this case the Bureau shall update the Interim List;

b) it may not bring into use its interim system before having obtained the agreement of the administrations affected, either directly or by applying the procedure described in Article 4 of Appendix **30** or Article 4 of Appendix **30A**, as appropriate, as a means of obtaining that agreement.

12 The Bureau shall include all the interim assignments in an Interim List in two parts, one each for the broadcasting-satellite service and the feeder-link assignments, and shall update it in accordance with this Annex. The Interim List shall be published together with the Region 2 Plans but does not constitute part of them.

13 One year prior to the expiry of the interim period, the Bureau shall draw the attention of the administration concerned to this fact and request it to notify in due time the deletion of the assignment from the Master Register and the Interim List.

14 If, notwithstanding the reminders by the Bureau, an administration does not reply to its request sent in application of § 13, the Bureau shall, at the termination of the interim period:

a) enter a symbol in the Remarks Column of the Master Register to indicate the lack of response and that the entry is for information only;

b) not take that assignment into account in the Interim List;

c) inform the administrations concerned and affected of its action.

15 When an administration confirms the termination of the use of the interim assignment, the Bureau shall delete the assignment concerned from the Interim List and the Master Register. Any corresponding assignment in the Plan(s), suspended earlier, may then be brought into use.

16 An administration which considers that its interim system may continue to be used after the expiry of the interim period may extend it by not more than four years and to this effect shall apply the procedure described in this Annex.

17 When an administration applies the procedure in accordance with § 16, but is unable to obtain the agreement of one or more affected administrations, the Bureau shall indicate this situation by inserting an appropriate symbol in the Master Register. Upon receipt of a complaint of harmful interference, the administration shall immediately cease operation of the interim assignment.

18 When an administration, having been informed of a complaint of harmful interference, does not cease transmission within a period of thirty days after the receipt of complaint, the Bureau shall apply the provisions of § 14.

MOD

RESOLUTION 49[1] (REV.WRC-15)

Administrative due diligence applicable to some satellite radiocommunication services

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that Resolution 18 of the Plenipotentiary Conference (Kyoto, 1994) instructed the Director of the Radiocommunication Bureau 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 the Bureau 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 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

g) that WRC-97 decided to reduce the regulatory time-frame for bringing a satellite network into use;

h) that WRC-2000 has 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),

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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.

resolves

1 that the administrative due diligence procedure contained in Annex 1 to this Resolution shall be applied as from 22 November 1997 for a satellite network or satellite system of the fixed-satellite service, mobile-satellite service or broadcasting-satellite service for which the advance publication information under No. **9.2B**, 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 orbit positions, or for 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 of information under supplementary provisions applicable to additional uses in the planned bands as defined in Article 2 of Appendix **30B** (Section III of Article 6) has been received by the Bureau from 22 November 1997, or for which submission under Article 6 of Appendix **30B (Rev.WRC-07)** is received on or after 17 November 2007, 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;

2 that for a satellite network or satellite system within the scope of § 1 or 3 of Annex 1 to this Resolution not yet recorded in the Master International Frequency Register (MIFR) by 22 November 1997, for which the advance publication information under No. **1042** of the Radio Regulations (Edition of 1990, revised in 1994) or for the application of Section III of Article 6 of Appendix **30B** has been received by the Bureau before 22 November 1997, the responsible administration shall submit to the Bureau the complete due diligence information in accordance with Annex 2 to this Resolution not later than 21 November 2004, or before the expiry of the notified period for bringing the satellite network into use, plus any extension period which shall not exceed three years pursuant to the application of No. **1550** of the Radio Regulations (Edition of 1990, revised in 1994) or the dates specified in the relevant provisions Article 6 of Appendix **30B**, whichever date comes earlier. If the date of bringing into use, including extension specified above, is before 1 July 1998, the responsible administration shall submit to the Bureau the complete due diligence information in accordance with Annex 2 to this Resolution not later than 1 July 1998;

2*bis* that for a satellite network or satellite system within the scope of § 2 of Annex 1 to this Resolution not recorded in the MIFR by 22 November 1997, for which the request for a modification to the Plans of Appendices **30** and **30A** has been received by the Bureau before 22 November 1997, the responsible administration shall submit to the Bureau the complete due diligence information in accordance with Annex 2 to this Resolution as early as possible before 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**;

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[2] See § 2.3 of Appendix **30B (Rev.WRC-07)**.

3 that for a satellite network or satellite system within the scope of § 1, 2 or 3 of Annex 1 to this Resolution recorded in the MIFR by 22 November 1997, the responsible administration shall submit to the Bureau the complete due diligence information in accordance with Annex 2 to this Resolution not later than 21 November 2000, or before the notified date of bringing the satellite network into use (including any extension period), whichever date comes later;

4 that six months before the expiry date specified in *resolves* 2 or 2*bis* above, if the responsible administration has not submitted the due diligence information, the Bureau shall send a reminder to that administration;

5 that if the due diligence information is found to be incomplete, the Bureau shall immediately request the administration to submit the missing information. In any case, the complete due diligence information shall be received by the Bureau before the expiry date specified in *resolves* 2 or 2*bis* above, as appropriate, and shall be published by the Bureau in the International Frequency Information Circular (BR IFIC);

6 that if the complete due diligence information is not received by the Bureau before the expiry date specified in *resolves* 2 or 2*bis* above, the request for coordination or request for a modification to the Plans of Appendices **30** and **30A** or for application of Section III of Article 6 of Appendix **30B** as covered by *resolves* 1 above submitted to the Bureau shall be cancelled. Any modifications of the Plans (Appendices **30** and **30A**) shall lapse and any recording in the MIFR as well as recordings in the Appendix **30B** List shall be deleted by the Bureau after it has informed the concerned administration. The Bureau shall publish this information in the BR IFIC,

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-15)

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** and Resolution **33 (Rev.WRC-03)** 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 (Rev.WRC-07)**, 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 An administration requesting coordination for a satellite network under § 1 above shall send to the Bureau as early as possible before 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 and the spacecraft manufacturer 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 the Bureau as early as possible before 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 and the spacecraft manufacturer specified in Annex 2 to this Resolution.

6 An administration applying Article 6 of Appendix **30B (Rev.WRC-07)** under § 3 above shall send to the Bureau as early as possible before the end of the period established as a limit to bringing into use in § 6.1 of that Article, the due diligence information relating to the identity of the satellite network and the spacecraft manufacturer 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.

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[3] See § 2.3 of Appendix **30B (Rev.WRC-07)**.

8 On receipt of the due diligence information under § 4, 5 or 6 above, the Bureau shall promptly examine that information for completeness. If the information is found to be complete, the Bureau shall publish the complete information in a special section of the BR IFIC within 30 days.

9 If the information is found to be incomplete, the Bureau shall immediately request the administration to submit the missing information. In all cases, the complete due diligence information shall be received by the Bureau within the appropriate time period specified in § 4, 5 or 6 above, as the case may be, relating to the date of bringing the satellite network into use.

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, the Bureau shall send a reminder to the responsible administration.

11 If the complete due diligence information is not received by the Bureau within the time limits specified in this Resolution, the networks covered by § 1, 2 or 3 above shall be cancelled by the Bureau. The provisional recording in the MIFR shall be deleted by the Bureau after it has informed the concerned administration. The Bureau 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 due diligence information is not submitted in accordance with this Resolution.

With respect to the request for application of Article 6 of Appendix **30B (Rev.WRC-07)** under § 3 above, the network shall also be deleted from the Appendix **30B** List. 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 (Rev.WRC-07)**.

12 An administration notifying a satellite network under § 1, 2 or 3 above for recording in the MIFR shall send to the Bureau, as early as possible before the date of bringing into use, the due diligence information relating to the identity of the satellite network and the launch services provider specified in Annex 2 to this Resolution.

13 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-15)

A Identity of the satellite network

a) Identity of the satellite network

b) Name of the administration

c) Country symbol

d) Reference to the advance publication information or 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 (Rev.WRC-07)**

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-15)

Electronic submission of notice forms for satellite networks, earth stations and radio astronomy stations

The World Radiocommunication Conference (Geneva, 2015),

considering

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 and of administrations, and would accelerate the processing of these notices,

recognizing

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,

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-15)**) for satellite networks and earth stations submitted to the Radiocommunication Bureau 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 the Radiocommunication Bureau pursuant to Articles **9** and **11**, as well as Appendices **30** and **30A** and Resolution **49 (Rev.WRC-15)**, 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 the Radiocommunication Bureau 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 the Bureau 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 § 4.1.7, 4.1.9, 4.1.10, 4.2.10, 4.2.13 or 4.2.14 of Appendices **30** and **30A** with respect to modification to the Region 2 Plan or to additional uses in Regions 1 and 3 under Article 4 and use of the guardbands under Article 2A of those Appendices, 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 the Bureau 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 the Bureau's data capture software (graphical interference management system (GIMS)); submission of graphics in paper form, however, continues to be accepted,

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,

urges administrations

to submit, as soon as practicable, the graphical data relating to their notices in a format compatible with the Bureau's graphic data capture software.

MOD

RESOLUTION 76 (REV.WRC-15)

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 (Geneva, 2015),

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 systems 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 systems should not exceed the aggregate epfd levels in Tables 1A to 1D;

f) 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**;

g) that the orbital characteristics of such systems are likely to be inhomogeneous;

h) 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;

i) 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 systems;

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 systems 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

Recommendation ITU-R S.1588 “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”,

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 those given in Tables 1A to 1D, or to higher levels where those levels are acceptable to the affected GSO administration (see No. 22.5K),

invites the ITU Radiocommunication Sector

1 to continue its studies and to develop , as appropriate, a suitable methodology for calculating the aggregate epfd produced by all non-GSO FSS systems operating or planning to operate co-frequency 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;

2 to continue its studies and to develop a Recommendation on the accurate modelling of interference from non-GSO FSS systems into GSO FSS and GSO BSS networks in the frequency bands referred to in *considering a)* above, in order to assist administrations planning or operating non-GSO FSS systems in their efforts to limit the aggregate epfd levels produced by their systems into GSO networks, and to provide guidance to GSO network designers on the maximum epfd↓ levels expected to be produced by all non-GSO FSS systems when accurate modelling assumptions are used;

3 to develop a Recommendation containing procedures to be used among administrations in order to ensure that the aggregate epfd limits given in Tables 1A to 1D are not exceeded by operators of non-GSO FSS systems;

4 to attempt to develop measurement techniques to identify the interference levels from non-GSO systems in excess of the aggregate limits given in Tables 1A to 1D, and to confirm compliance with these limits,

instructs the Director of the Radiocommunication Bureau

1 to assist in the development of the methodology referred to in *invites the ITU Radiocommunication Sector* 1 above;

2 to report to a future competent conference on the results of studies in *invites the ITU Radiocommunication Sector* 1 and 3 above.

ANNEX 1 TO RESOLUTION 76 (REV.WRC-15)

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/m^2))**	**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/m^2))	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.

MOD

RESOLUTION 81 (REV.WRC-15)

Evaluation of the administrative due diligence procedure for satellite networks

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that WRC-97 adopted Resolution **49 (WRC-97)** establishing administrative due diligence procedure applicable to some satellite radiocommunication services with effect from 22 November 1997;

b) that the Plenipotentiary Conference adopted Resolution 85 (Minneapolis, 1998) on evaluation of the administrative due diligence procedure for satellite networks;

c) that Resolution 85 (Minneapolis, 1998) instructs the Director of the Radiocommunication Bureau to inform WRC-2000 about the effectiveness of the administrative due diligence procedure, in accordance with Resolution **49 (WRC-97)**;

d) that Resolution 85 (Minneapolis, 1998) resolves that WRC-2000 shall evaluate the results of the implementation of the administrative due diligence procedure and shall inform the next Plenipotentiary Conference, in 2002, of its conclusions in that regard;

e) the report of the Director of the Radiocommunication Bureau on the administrative due diligence procedure applicable to some satellite networks;

f) the proposals made to this Conference to strengthen the administrative due diligence procedure, and to adopt financial due diligence procedures,

noting

a) that the Bureau has not encountered any administrative difficulty in applying the provisions and in gathering and publishing information;

b) that the Bureau has taken action pursuant to *resolves* 6 of Resolution **49 (WRC-97)** to cancel the submissions, and accordingly publish the related special sections, in respect of 36 satellite networks;

c) that, for all of these cancellations, the maximum (nine-year) period for bringing into use pursuant to *resolves* 1 and 2 of Resolution **51 (WRC-97)** and No. **11.44** had been reached and hence the submissions would have been cancelled in any event;

d) that, when requested to provide due diligence information (triggered by the original date of bringing into use of their satellite networks), administrations have generally requested, wherever possible, extensions of the regulatory period for bringing into use up to the maximum limit authorized by the Radio Regulations;

e) that the effect of the administrative due diligence procedure may not, therefore, be fully apparent until at least 21 November 2003,

recognizing

that the administrative due diligence procedure has not yet had any impact on the problem of reservation of orbit and spectrum capacity without actual use,

resolves

1 that further experience is needed in the application of the administrative due diligence procedures adopted by WRC-97, and that several years may be needed to see whether the procedure produces satisfactory results;

2 that it is premature to consider the adoption, among other procedures, of any financial due diligence procedures.

MOD

RESOLUTION 114 (REV.WRC-15)

Compatibility between the aeronautical radionavigation service and the fixed-satellite service (Earth-to-space) (limited to feeder links of the non-geostationary mobile-satellite systems in the mobile-satellite service) in the frequency band 5 091-5 150 MHz

The World Radiocommunication Conference (Geneva, 2015),

considering

a) the current allocation of the frequency band 5 000-5 250 MHz to the aeronautical radionavigation service;

b) the requirements of both the aeronautical radionavigation and the fixed-satellite (FSS) (Earth-to-space) (limited to feeder links of non-geostationary satellite (non-GSO) systems in the mobile-satellite service (MSS)) services in the above-mentioned band,

recognizing

a) that priority must be given to the microwave landing system (MLS) in accordance with No. **5.444** and to other international standard systems of the aeronautical radionavigation service in the frequency band 5 030-5 091 MHz;

b) that, in accordance with Annex 10 of the Convention of the International Civil Aviation Organization (ICAO) on international civil aviation, it may be necessary to use the frequency band 5 091-5 150 MHz for the MLS if its requirements cannot be satisfied in the frequency band 5 030-5 091 MHz;

c) that the FSS providing feeder links for non-GSO systems in the MSS will need continuing access to the frequency band 5 091-5 150 MHz,

noting

a) that Recommendation ITU-R S.1342 describes a method for determining coordination distances between international standard MLS stations operating in the frequency band 5 030-5 091 MHz and FSS earth stations providing Earth-to-space feeder links in the frequency band 5 091-5 150 MHz;

b) the small number of FSS stations to be considered,

resolves

that administrations authorizing stations providing feeder links for non-GSO systems in the MSS in the frequency band 5 091-5 150 MHz shall ensure that they do not cause harmful interference to stations of the aeronautical radionavigation service,

invites administrations

when assigning frequencies in the frequency band 5 091-5 150 MHz to stations of the aeronautical radionavigation service or to earth stations of the FSS providing feeder links of the non-GSO systems in the MSS (Earth-to-space), to take all practicable steps to avoid mutual interference between them,

instructs the Secretary-General

to bring this resolution to the attention of ICAO.

MOD

RESOLUTION 140 (REV.WRC-15)

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 (Geneva, 2015),

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) systems 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) Recommendation ITU-R S.1715 "Guidelines developed in response to the studies requested in Resolution **140 (WRC-03)**",

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 19.7-20.2 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 144 (REV.WRC-15)

Special requirements of geographically small or narrow countries operating earth stations in the fixed-satellite service in the frequency band 13.75-14 GHz

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that WARC-92 made an additional allocation to the fixed-satellite service (FSS) (Earth-to-space) in the frequency band 13.75-14 GHz;

b) that this frequency band is shared with the radiolocation and radionavigation services;

c) that, following a decision by WRC-2000 and the completion of ITU-R studies, WRC-03 reviewed and revised the sharing conditions for the services in this band and adopted new regulations which govern sharing between the FSS, radiolocation and radionavigation services (see No. **5.502)**;

d) that these revised sharing conditions additionally permit the operation of geostationary FSS earth stations in the frequency band 13.75-14 GHz with antennas having diameters between 1.2 m and 4.5 m,

recognizing

a) that these sharing conditions of No. **5.502** will mean that countries which are geographically small or narrow will have significant difficulties deploying geostationary FSS earth stations in this frequency band with antennas having diameters between 1.2 m and 4.5 m;

b) that in order to further facilitate sharing between the FSS and the maritime radiolocation systems operating in the radiolocation service, there may be a need to develop technical and operational methods;

c) that these technical and operational methods may be used to allow a greater deployment of FSS earth stations in the frequency band 13.75-14 GHz in conformity with No. **5.502** while protecting the radiolocation service,

noting

Recommendation ITU-R S.1712 “Methodologies for determining whether an FSS earth station at a given location could transmit in the frequency band 13.75-14 GHz without exceeding the pfd limits in No. **5.502** of the Radio Regulations, and guidelines to mitigate excesses”,

resolves

that the administrations of geographically small or narrow countries may exceed the limitations on FSS earth station power flux-density at the low-water mark in No. **5.502** if such operation is in conformance with bilateral agreements with administrations deploying maritime radiolocation systems in the frequency band 13.75-14 GHz, this being in order to provide due consideration to administrations of geographically small or narrow countries,

encourages

administrations deploying maritime and land mobile radiolocation systems in the frequency band 13.75-14 GHz to rapidly reach bilateral agreements relating to the operation of FSS earth stations in this frequency band with administrations of those geographically small or narrow countries deploying these FSS earth stations, this being in order to provide due consideration to administrations of geographically small or narrow countries.

MOD

RESOLUTION 148 (REV.WRC-15)

Satellite systems formerly listed in Part B of the Plan of Appendix 30B (WARC Orb-88)

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that WARC Orb-88 adopted a 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 contained in Appendix **30B (WARC Orb-88)**;

b) that, when the Plan was adopted, some satellite systems in the same frequency bands were under coordination or had been recorded in the Master International Frequency Register (MIFR), or had information relating to advance publication that was received by the Radiocommunication Bureau before 8 August 1985, and which in all cases were listed in Part B of the Plan at WARC Orb-88;

c) that in the original provisions of Appendix **30B (WARC Orb-88)**, the satellite systems mentioned in *considering b)* above were referred to as "existing systems";

d) that satellite systems identified in *considering b)* have either been included in the List of Appendix **30B** or cancelled, and thus Part B of the Plan is empty;

e) that, therefore, WRC-07 suppressed Part B of the Plan in Appendix **30B**,

recognizing

a) that § 9.2 of Appendix **30B (WARC Orb-88)** indicates that "The existing systems listed in Part B of the Plan may continue in operation for a maximum period of 20 years from the date of entry into force of this Appendix", and consequently the period of operation of satellite systems in Part B of the Plan expires after 16 March 2010;

b) that some administrations expressed their wish to continue operation of these systems after the deadline mentioned in *recognizing a)*;

c) that satellite systems referred to in *considering b)* are compatible with satellite networks in Appendix **30B**,

resolves

that an administration wishing to further extend the notified period of validity of assignments to "existing system(s)" as referred to in *considering c)* shall inform the Bureau accordingly more than three years before the expiry of the notified period of validity and, if the characteristics of that assignment remain unchanged, the Bureau shall amend, as requested, the notified period of validity and publish that information in a special section of the Bureau's International Frequency Information Circular (BR IFIC),

instructs the Radiocommunication Bureau

1 to cancel from the Master Register and the List assignments to "existing system(s)" as referred to in *considering c)* upon expiry of their notified period of validity;

2 to calculate aggregate *C*/*I* of the "existing systems" as referred to in *considering c)* without taking into account the interference between these systems;

3 to take the appropriate actions in accordance with *resolves* above.

MOD

RESOLUTION 154 (REV.WRC-15)

Consideration of technical and regulatory actions in order to support existing and future operation of fixed-satellite service earth stations within the frequency band 3 400-4 200 MHz, as an aid to the safe operation of aircraft and reliable distribution of meteorological information in some countries in Region 1

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the frequency band 3 400-4 200 MHz is allocated worldwide to the fixed-satellite service (FSS) in the space-to-Earth direction and to the fixed service on a primary basis;

b) that the frequency band 3 400-3 600 MHz is allocated on a primary basis to the mobile, except aeronautical mobile, service and identified for International Mobile Telecommunications (IMT) in Region 1 countries as specified in Article **5** of the Radio Regulations;

c) that in Region 1, the allocation to the mobile, except aeronautical mobile, service in the frequency band 3 400-3 600 MHz is subject to technical and regulatory conditions aimed at ensuring compatibility with co-primary services of neighbouring countries;

d) that a number of developing countries rely, to a great extent, on FSS systems using very small aperture terminals (VSAT) in the frequency band 3 400-4 200 MHz for the provision of communications as an aid to safe operation of aircraft and reliable distribution of meteorological information;

e) that, in some cases, where an adequate terrestrial communication infrastructure is not available, VSAT networks referred to in *considering d)* above are the only viable option to augment the communication infrastructure in order to satisfy the overall communications infrastructure requirements of the International Civil Aviation Organization (ICAO) and to ensure distribution of meteorological information under the auspices of the World Meteorological Organization (WMO);

f) that the relevant ITU Radiocommunication Sector (ITU-R) studies showed a potential for interference from fixed wireless access and IMT stations into FSS receiving earth stations at distances from less than one kilometre up to hundreds of kilometres, depending on the parameters and deployment of stations of these services;

g) that WRC-12, taking into account the studies mentioned in *considering f)* above, decided to study technical and regulatory measures to support the FSS earth stations referred to in *considering e)* above,

noting

a) that, by the date of this conference, several cases of harmful interference to the FSS VSATs used for aeronautical safety communications from fixed wireless access or IMT stations were reported;

b) that these reported cases of interference indicated difficulties that some administrations have encountered in the coordination of frequencies between the fixed wireless access or IMT systems and frequency assignments for VSATs used for aeronautical and meteorological purposes;

c) that, in many countries, FSS VSAT earth stations are not subject to individual licensing and not registered as specific stations in their national frequency databases and in the ITU Master International Frequency Register (MIFR) due to the considerable administrative work involved;

d) that knowledge of the location and operational frequencies of VSAT stations used for communications as an aid to the safe operation of aircraft and/or distribution of meteorological information is critically important for ensuring compatibility with applications of other services,

recognizing

a) that ITU-R conducted comprehensive studies of compatibility between FSS on the one hand and fixed wireless access systems and IMT applications on the other hand in the frequency band 3 400-4 200 MHz, and summarized the results of the studies in Recommendation ITU-R SF.1486 as well as Reports ITU-R S.2199, ITU-R M.2109 and ITU-R S.2368;

b) that the Recommendation and Reports identified in *recognizing a)* offer a set of mitigation techniques that could be employed for international coordination and at a national level and to facilitate coexistence of FSS, fixed service and mobile service systems;

c) that Recommendation ITU-R S.1856 contains methodologies for verification of compliance with the relevant power flux-density (pfd) limit set forth in the Radio Regulations,

resolves

1 to recommend that administrations in countries where the frequency band 3 400-3 600 MHz is allocated on a primary basis to the mobile, except aeronautical mobile, service in Region 1 and identified for IMT in Region 1 ensure compliance of IMT stations with the relevant provisions set forth in the Radio Regulations and apply the relevant coordination procedures before bringing these applications into use;

2 to urge administrations in Region 1, when planning and/or licensing fixed point-to-point, fixed wireless access and IMT systems in frequency bands referred to in *considering b)* above, to take into account the protection needs of existing and planned FSS earth stations within the frequency band 3 400-4 200 MHz, as an aid to the safe operation of aircraft and reliable distribution of meteorological information in some countries in Region 1;

3 to invite administrations in Region 1, taking into account the number of earth stations involved for this particular type of usage, to consider the possibility of licensing the FSS earth stations used for communications as an aid to the safe operation of aircraft and/or distribution of meteorological information on an individual basis and registering them in the MIFR as specific earth stations;

4 to encourage administrations in Region 1 to employ the appropriate mitigation techniques described in the ITU-R publications referred to in *recognizing a)* above;

5 to invite administrations to ensure that the application of these technical and regulatory measures to FSS and the mobile service does not limit the use of the frequency band 3 400-4 200 MHz by other existing and planned systems and services in other countries,

instructs the Secretary-General

to bring this resolution to the attention of ICAO and WMO.

MOD

RESOLUTION 205 (REV.WRC-15)

Protection of the systems operating in the mobile-satellite service in the frequency band 406-406.1 MHz

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that WARC-79 allocated the frequency band 406-406.1 MHz to the mobile-satellite service (MSS) in the Earth-to-space direction;

b) that No. **5.266** limits the use of the frequency band 406-406.1 MHz to low-power satellite emergency position-indicating radiobeacons (EPIRBs);

c) that WARC Mob-83 made provision in the Radio Regulations for the introduction and development of a global distress and safety system;

d) that the use of satellite EPIRBs is an essential element of this system;

e) that, like any frequency band reserved for a distress and safety system, the frequency band 406-406.1 MHz is entitled to full protection against all harmful interference;

f) that Nos. **5.267** and **4.22** and Appendix **15** (Table **15-2**) require the protection of the MSS within the frequency band 406-406.1 MHz from all emissions of systems, including systems operating in the lower and upper adjacent frequency bands;

g) that Recommendation ITU-R M.1478 provides protection requirements for the various types of instruments mounted on board operational satellites receiving EPIRB signals in the frequency band 406-406.1 MHz against both broadband out-of-band emissions and narrowband spurious emissions;

h) that Report ITU-R M.2359 provides the results of studies covering various scenarios between the MSS and other relevant active services operating in the frequency bands 390-406 MHz and 406.1-420 MHz or in separate parts of these frequency bands;

i) that unwanted emissions from services outside the frequency band 406-406.1 MHz have the potential to cause interference to MSS receivers within 406-406.1 MHz;

j) that long-term protection against harmful interference of the Cospas-Sarsat satellite system operating in the MSS in the frequency band 406-406.1 MHz is vital to the response times of emergency services;

k) that, in most cases, the frequency bands adjacent or near to those used by Cospas-Sarsat will continue to be used for various applications in the services to which they are allocated,

considering further

a) that some administrations have initially developed and implemented an operational low-altitude, near-polar orbiting satellite system (Cospas-Sarsat) operating in the frequency band 406-406.1 MHz to provide alerting and to aid in the locating of distress incidents;

b) that thousands of human lives have been saved through the use of spaceborne distress-beacon detection instruments, initially on 121.5 MHz and 243 MHz, and subsequently in the frequency band 406-406.1 MHz;

c) that the 406 MHz distress transmissions are relayed through many instruments mounted on geostationary, low-Earth and medium-Earth satellite orbits;

d) that the digital processing of these emissions provides accurate, timely and reliable distress alert and location data to help search and rescue authorities assist persons in distress;

e) that the International Maritime Organization (IMO) has decided that satellite EPIRBs operating in the Cospas-Sarsat system form part of the Global Maritime Distress and Safety System (GMDSS);

f) that observations of the use of frequencies in the frequency band 406-406.1 MHz show that they are being used by stations other than those authorized by No. **5.266**, and that these stations have caused harmful interference to the MSS, and particularly to the reception of satellite EPIRB signals by the Cospas-Sarsat system;

g) that the results of spectrum monitoring and ITU-R studies contained in Report ITU-R M.2359 indicate that emissions from stations operating in the frequency bands 405.9-406 MHz and 406.1-406.2 MHz have the potential to severely impact the performance of MSS systems in the frequency band 406-406.1 MHz;

h) that the results of ITU-R studies indicate that increased deployment of land mobile systems operating in the vicinity of the 406-406.1 MHz frequency band may degrade the receiver performance of mobile-satellite systems operating in the frequency band 406-406.1 MHz;

i) that the maximum permissible level of interference to the MSS in the 406-406.1 MHz frequency band may be exceeded due to frequency drift of the radiosondes operating above 405 MHz,

recognizing

a) that it is essential for the protection of human life and property that frequency bands allocated exclusively to a service for distress and safety purposes be kept free from harmful interference;

b) that the deployment of mobile systems near the frequency band 406-406.1 MHz is ongoing and more such systems are envisaged;

c) that this increased deployment raises significant concerns on the reliability of future distress and safety communications due to the increases in the noise level measured in many areas of the world for the frequency band 406-406.1 MHz;

d) that it is essential to preserve the MSS frequency band 406-406.1 MHz free from out-of-band emissions that would degrade the operation of the 406 MHz satellite transponders and receivers, with the risk that satellite EPIRB signals would go undetected,

noting

a) that the 406 MHz search and rescue system will be enhanced by placing 406-406.1 MHz transponders on global navigation satellite systems such as Galileo, GLONASS and GPS, relaying search and rescue emissions at 406 MHz, in addition to already-operational and future low-Earth orbiting and geostationary satellites, thus providing a large constellation of satellites relaying search and rescue messages;

b) that this enhanced constellation of spaceborne search and rescue instruments was designed to improve geographic coverage and reduce distress-alert transmission delays by means of larger uplink footprints, an increased number of satellites and improvement in the accuracy of the location of the distress signal;

c) that the characteristics of these spacecraft with larger footprints, and the low power available from satellite EPIRB transmitters, means that aggregate levels of electromagnetic noise, including noise from transmissions in adjacent frequency bands, may present a risk of satellite EPIRB transmissions being undetected, or delayed in reception, or lead to reduced accuracy of the calculated locations, thereby putting lives at risk,

noting further

a) that the MSS systems contributing to the emergency location system "Cospas-Sarsat" provide a worldwide emergency location system to the benefit of all countries, even if those mobile-satellite systems are not operated by their country;

b) that many Cospas-Sarsat satellites implement efficient out-of-band filtering, which would be further improved in upcoming satellites,

resolves

1 to request administrations not to make new frequency assignments within the frequency bands 405.9-406.0 MHz and 406.1-406.2 MHz under the mobile and fixed services;

2 that administrations take into account frequency drift characteristics of radiosondes when selecting their operating frequencies above 405 MHz to avoid transmitting in the 406-406.1 MHz frequency band and take all practical steps to avoid frequency drifting close to 406 MHz,

instructs the Director of the Radiocommunication Bureau

1 to continue to organize monitoring programmes in the frequency band 406-406.1 MHz in order to identify the source of any unauthorized emission in that frequency band;

2 to organize monitoring programmes on the impact of unwanted emissions from systems operating in the frequency bands 405.9-406 MHz and 406.1-406.2 MHz on MSS reception in the frequency band 406-406.1 MHz in order to assess the effectiveness of this resolution, and to report to subsequent world radiocommunication conferences,

encourages administrations

to take measures such as authorizing new assignments to stations in the fixed and mobile services with priority given to selecting channels with greater frequency separation from the 406 to 406.1 MHz frequency band and ensuring that the e.i.r.p. of new fixed and mobile systems at all but low elevation angles is kept to the minimum required level,

urges administrations

1 to take part in monitoring programmes referred to in *instructs the Director of the Radiocommunication Bureau* above;

2 to ensure that stations other than those operated under No. **5.266** abstain from using frequencies in the frequency band 406-406.1 MHz;

3 to take the appropriate measures to eliminate harmful interference caused to the distress and safety system;

4 when designing Cospas-Sarsat satellite receiver payloads in the 406-406.1 MHz frequency band, to improve, to the extent possible, out-of-band filtering of such receivers, in order to reduce constraints on adjacent services while preserving the ability of the Cospas-Sarsat system to detect all kinds of emergency beacons and to maintain an acceptable rate of detection, which is vital to search and rescue missions;

5 to take all practical steps to limit the levels of unwanted emissions of stations operating within the 403-406 MHz and 406.1-410 MHz frequency ranges in order not to cause harmful interference to mobile-satellite systems operating in the 406-406.1 MHz frequency band;

6 to actively cooperate with the administrations participating in the monitoring programme and the Bureau to resolve reported cases of interference to the Cospas-Sarsat system.

MOD

RESOLUTION 207 (REV.WRC-15)

Measures to address unauthorized use of and interference to frequencies in the frequency bands allocated to the maritime mobile service and to the aeronautical mobile (R) service

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the HF frequencies currently used by the aeronautical and maritime mobile services for distress, safety and other communications, including allotted operational frequencies, suffer from harmful interference and are often subject to difficult propagation conditions;

b) that WRC-97 considered some aspects of the use of the HF bands for distress and safety communications in the context of the Global Maritime Distress and Safety System (GMDSS), especially with regard to regulatory measures;

c) that unauthorized operations using maritime and aeronautical frequencies in the HF bands are continuing to increase and are already a serious risk to HF distress, safety and other communications;

d) that some administrations have resorted to, for example, transmitting warning messages on operational HF channels as a means of deterring unauthorized users;

e) that provisions of the Radio Regulations prohibit the unauthorized use of certain safety frequencies for communications other than those related to safety;

f) that enforcing compliance with these regulatory provisions is becoming increasingly difficult with the availability of low-cost HF single side-band (SSB) transceivers;

g) that monitoring observations of the use of frequencies in the frequency band 2 170-2 194 kHz and in the frequency bands allocated exclusively to the maritime mobile service between 4 063 kHz and 27 500 kHz and to the aeronautical mobile (R) service between 2 850 kHz and 22 000 kHz show that a number of frequencies in these frequency bands are still being used by stations of other services, many of which are operating in contravention of No. **23.2**;

h) that, in certain situations, HF radio is the sole means of communication for the maritime mobile service and that certain frequencies in the frequency bands mentioned in *considering g)* are reserved for distress and safety purposes;

i) that, in certain situations, HF radio is the sole means of communication for the aeronautical mobile (R) service and that this is a safety service;

j) that WRC-2000 and following conferences have reviewed the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting operational, distress and safety communications;

k) that this Resolution identifies several interference mitigation techniques that can be employed by administrations on a non-mandatory basis,

considering in particular

a) that it is of paramount importance that the distress and safety channels of the maritime mobile service be kept free from harmful interference, since they are essential for the protection of the safety of life and property;

b) that it is also of paramount importance that channels directly concerned with the safe and regular conduct of aircraft operations be kept free from harmful interference, since they are essential for the safety of life and property,

resolves to invite ITU-R and ITU-D, as appropriate

to increase regional awareness of appropriate practices in order to help mitigate interference in the HF bands, especially on distress and safety channels,

invites administrations

1 to ensure that stations of services other than the maritime mobile service abstain from using frequencies in distress and safety channels and their guardbands and in the frequency bands allocated exclusively to that service, except under the conditions expressly specified in Nos. **4.4**, **5.128**, **5.137** and **4.13** to **4.15**; and to ensure that stations of services other than the aeronautical mobile (R) service abstain from using frequencies allocated to that service except under the conditions expressly specified in Nos. **4.4** and **4.13**;

2 to make every effort to identify and locate the source of any unauthorized emission capable of endangering human life or property and the safe and regular conduct of aircraft operations, and to communicate their findings to the Radiocommunication Bureau;

3 to participate, in accordance with item 4 in the Annex, in any monitoring programmes organized by the Bureau or administrations, if so agreed among those administrations, without adversely affecting the rights of other administrations or conflicting with any provisions of the Radio Regulations;

4 to make every effort to prevent unauthorized transmissions in frequency bands allocated to the maritime mobile service and the aeronautical mobile (R) service;

5 to request their competent authorities to take, within their respective jurisdiction, such legislative or regulatory measures which they consider necessary or appropriate in order to prevent stations from unauthorized use of distress and safety channels or from operating in contravention of No. **23.2**;

6 to take all necessary steps in such cases of contravention of No. **23.2** to ensure the cessation of any transmissions contravening the provisions of the Radio Regulations on the frequencies or in the frequency bands referred to in this Resolution;

7 to employ as many of the interference mitigation techniques referred to in the Annex as are appropriate for the maritime mobile and aeronautical mobile (R) services,

instructs the Radiocommunication Bureau

1 to seek the cooperation of administrations in identifying the sources of those emissions by all available means and in securing the cessation of those emissions;

2 when the station of another service transmitting in a frequency band allocated to the maritime mobile service or to the aeronautical mobile (R) service has been identified, to inform the administration concerned;

3 to include the problem of interference to maritime and aeronautical distress and safety channels on the agenda of relevant regional radiocommunication seminars,

instructs the Secretary-General

to bring this Resolution to the attention of the International Maritime Organization and the International Civil Aviation Organization for such actions as they may consider appropriate.

ANNEX TO RESOLUTION 207 (REV.WRC-15)

Interference mitigation techniques

This Annex lists several possible HF interference mitigation techniques that may be used, either in combination or singly, depending on the resources of administrations. Use of any or all of these techniques is not mandatory.

1 Alternative modulation methods

The use of digitally modulated emissions, such as QPSK, to replace or supplement analogue SSB voice (J3E) and data (J2B) emissions. This initiative would need to be adopted internationally to allow the interoperability of equipment. For example, ICAO has adopted an HF data-link standard to provide packet data communications using automated link establishment and adaptive frequency control techniques as a supplement to analogue SSB voice communications (see ICAO Convention, Annex 10).

2 Passive and active/adaptive antenna systems

Use of passive and active/adaptive antenna systems to reject unwanted signals.

3 Channel barring

Administrations should ensure through their licensing, equipment standardization and inspection arrangements that, in compliance with No. **43.1**, HF radio equipment cannot transmit on frequencies exclusively allocated to the aeronautical mobile (R) service, as detailed in Appendix **27**, except for frequencies allocated for worldwide use and shared with the aeronautical mobile (OR) service (see Appendix **26**/3.4).

4 Regional HF monitoring and direction-finding facilities

Collaboration and cooperation between regional administrations to coordinate the use of monitoring and direction-finding facilities.

5 Transmission of warning messages

Transmission of multilanguage warning messages on specific channels affected by strong or persistent interference. Such transmissions should be conducted after coordination with the users of the affected services and the administration(s) or competent authorities concerned.

6 Education and publicity initiatives

Administrations should provide education and publicity initiatives on the proper use of the radio-frequency spectrum in these frequency bands.

MOD

RESOLUTION 212 (REV.WRC-15)

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

The World Radiocommunication Conference (Geneva, 2015),

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 space techniques are an integral part of IMT;

e) that, in No. **5.388**, WARC-92 identified frequency bands to accommodate certain mobile services, now called IMT,

noting

a) that the terrestrial component of IMT has already been deployed or is being considered for deployment in the frequency bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz;

b) that both the terrestrial and satellite components of IMT have already been deployed or are being considered for deployment in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz;

c) 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 implementation and the attractiveness 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;

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 in adjacent geographical areas, technical or operational measures may need to be implemented to avoid harmful interference, and further studies by ITU-R are required in this regard;

c) that some difficulties have been raised in addressing potential interference between the satellite and terrestrial components of IMT;

d) that Report ITU-R M.2041 addresses sharing and adjacent band compatibility in the 2.5 GHz band between the terrestrial and satellite components of IMT-2000,

resolves

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 ITU-R and ITU-T Recommendations,

invites ITU-R

to study possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT (in the mobile service) and the satellite component of IMT (in the mobile service and the mobile-satellite service) in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz where those frequency bands are shared by 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,

encourages administrations

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

2 to participate actively in the ITU-R studies in accordance with *invites ITU-R* above,

instructs the Director of the Radiocommunication Bureau

to include in his report, for consideration by WRC-19, the results of the ITU-R studies referred to in *invites ITU-R* above,

further invites ITU-R

to continue its studies with a view to developing suitable and acceptable technical characteristics for IMT that will facilitate worldwide use and roaming, and ensure that IMT can also meet the telecommunication needs of the developing countries and rural areas.

MOD

RESOLUTION 223 (REV.WRC-15)

Additional frequency bands identified for International Mobile Telecommunications

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that International Mobile Telecommunications (IMT), including IMT-2000 and IMT-Advanced, 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. PSTN/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 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-15)**;

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 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 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 this conference has 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 band compatibility between 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 this conference has identified the frequency band 3 300-3 400 MHz for use by administrations wishing to implement terrestrial IMT systems in Nos. **5.R1b**, **5.C11** and **5.R3e**;

ad) that the frequency band 3 300-3 400 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 service on a primary basis;

ag) that this conference has identified the frequency band 4 800-4 990 MHz for use by administrations wishing to implement terrestrial IMT systems in No. **5.R3f** and No. **5.A11** for Region 2;

ah) that appropriate technical measures may be considered by administrations at a national level to facilitate adjacent 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,

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-15)** and **225 (Rev.WRC-12)**, 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 fixed, mobile (second-generation systems), space operations, space research and aeronautical mobile 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 fixed, mobile, amateur and radiolocation which are currently in operation or planned to be in operation in the future;

i) that services such as broadcasting-satellite, broadcasting-satellite (sound), mobile-satellite (in Region 3) and fixed (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 ITU-R has identified additional work to address further developments in IMT;

l) 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, to provide enhanced services and services beyond those envisaged in the initial implementation;

m) 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;

n) that the provisions of Nos. **5.317A**, **5.384A**, **5.388**, **5.R1b**, **5.C11** and **5.R3e** 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.R2a**, **5.384A**, **5.R1b**, **5.C11** and **5.R3e** 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.R2a**, **5.384A** and **5.388** do not confer differences in regulatory status,

invites ITU-R

1 to conduct compatibility studies in order to provide technical measures to ensure coexistence between MSS in the frequency band 1 518-1 525 MHz and IMT in the frequency band 1 492-1 518 MHz;

2 to develop harmonized frequency arrangements to facilitate IMT deployment in the frequency band 1 427-1 518 MHz, taking into account the results of sharing and compatibility studies;

3 to further study operational measures to enable the coexistence of IMT and radiolocation service in the frequency band 3 300-3 400 MHz;

4 to develop an ITU-R Recommendation providing technical and operational measures regarding adjacent band compatibility between IMT systems operating below 3 400 MHz and FSS earth stations operating above 3 400 MHz;

5 to further study adjacent band compatibility between IMT in the frequency band 3 300-3 400 MHz and radiolocation service below 3 300 MHz, in particular unwanted emissions of IMT systems in this frequency band;

6 to develop harmonized frequency arrangements for the frequency bands 3 300-3 400 MHz and 4 800-4 990 MHz for operation of the terrestrial component of IMT, taking into account the results of the sharing studies;

7 to study the technical and regulatory conditions for the use of IMT in the frequency band 4 800-4 990 MHz in order to protect the aeronautical mobile service;

8 to continue its studies on further enhancements of IMT, including the provision of Internet Protocol (IP)-based applications that may require unbalanced radio resources between the mobile and base stations;

9 to continue providing guidance to ensure that IMT can meet the telecommunication needs of the developing countries and rural areas in the context of the studies referred to above;

10 to include these frequency arrangements and the results of these studies in one or more ITU-R Recommendations.

MOD

RESOLUTION 224 (REV.WRC-15)

Frequency bands for the terrestrial component of International Mobile Telecommunications below 1 GHz

The World Radiocommunication Conference (Geneva, 2015),

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-15)**);

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.idR2a, 5.idR2b** 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.idR2a**, **5.idR2b** and **5.idR3**, based on user demand and other considerations;

2 to encourage administrations to take into account results of the existing relevant ITU-R 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.idR3** and in the frequency band 698-790 MHz, or portions thereof, for those administrations mentioned in No. **5.313A**;

3 that administrations should take into account the need to protect the 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 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 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.

MOD

RESOLUTION 359 (REV.WRC-15)

Consideration of regulatory provisions for updating and modernization of the Global Maritime Distress and Safety System

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that there is a continuing need in the Global Maritime Distress and Safety System (GMDSS), on a global basis, for improved communications to enhance maritime capabilities;

b) that the International Maritime Organization (IMO) is considering GMDSS modernization;

c) that advanced maritime MF/HF/VHF data systems and satellite communication systems may be used to deliver Maritime Safety Information (MSI) and other GMDSS communications;

d) that IMO is considering recognition of additional global and regional GMDSS satellite communication systems;

e) that GMDSS satellite systems need to provide protection of incumbent services in accordance with the Radio Regulations, including those in adjacent frequency bands, from harmful interference, and such GMDSS satellite systems should operate within the interference environment of existing systems,

noting

a) that WRC-12 reviewed Appendix **17** to improve efficiency and introduce bands for new digital technology;

b) that WRC-12 reviewed the regulatory provisions and spectrum allocations for use by maritime safety systems for ships and ports,

further noting

that WRC-12 and this conference have reviewed Appendix **18** to improve efficiency and introduce bands for new digital technology,

recognizing

a) that advanced maritime communication systems may support the implementation of GMDSS modernization;

b) that IMO efforts to implement GMDSS modernization may require modification of the Radio Regulations to accommodate advanced maritime communication systems;

c) that due to the importance of GMDSS communication systems in ensuring the safe operation of shipping and commerce and security at sea, they must be resilient to interference;

d) that IMO has received an application to recognize an existing satellite system as part of the GMDSS, and consequential regulatory actions may need to be considered;

e) that Nos. **4.6**, **5.369** and **5.372** provide information on the use of the frequency band 1 616-1 626.5 MHz, or parts thereof,

resolves to invite ITU-R

1 to conduct studies, taking into consideration the activities of IMO, as well as information and requirements provided by IMO, in order to determine the regulatory provisions to support GMDSS modernization;

2 to conduct studies, taking into consideration the activities of IMO and the recognition of additional satellite systems for use in the GMDSS, including consideration of the mobile-satellite service (MSS) allocations used and the potential impact of possible modifications to the provisions of the Radio Regulations on sharing and compatibility with other services and systems in the frequency band and adjacent frequency bands,

invites the 2019 World Radiocommunication Conference

1 to consider the result of ITU Radiocommunication Sector (ITU-R) studies and take necessary actions, as appropriate, to support GMDSS modernization;

2 to consider regulatory provisions, if appropriate, based on the ITU-R studies, and taking into consideration the activities of IMO, related to the introduction of additional satellite systems into the GMDSS, including consideration of the MSS allocations used, while ensuring the protection of all incumbent services, including those in adjacent frequency bands, from harmful interference, as stated in *recognizing e)*,

invites

1 IMO to actively participate in the studies by providing requirements and information that should be taken into account in ITU-R studies;

2 the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), the International Electrotechnical Commission (IEC), the International Hydrographic Organization (IHO), the International Organization for Standardization (ISO) and the World Meteorological Organization (WMO) to contribute to these studies,

instructs the Secretary-General

to bring this resolution to the attention of IMO and other international and regional organizations concerned.

MOD

RESOLUTION 360 (REV.WRC-15)

Consideration of regulatory provisions and spectrum allocations to the maritime mobile-satellite service to enable the satellite component of the VHF Data Exchange System and enhanced maritime radiocommunication

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the ITU Radiocommunication Sector (ITU-R) has developed the technical characteristics of a VHF Data Exchange System (VDES) as described in Recommendation ITU-R M.2092;

b) that the Automatic Identification System (AIS) as described in Recommendation ITU-R M.1371 is an integral part of the VDES;

c) that VDES uses the timing and frame structure of AIS;

d) that AIS is used primarily for surveillance and safety of navigation purposes in ship-to-ship use, ship reporting and vessel traffic services applications;

e) that there is a growing need for the establishment of a future VDES satellite component which would offer potential enhancements to maritime safety;

f) that the VDES satellite component should not interfere with AIS, application specific messages (ASM) and the VDES terrestrial component, while making efficient use of the VHF maritime spectrum and accommodating all users;

g) that the VDES satellite component should not cause harmful interference to digital selective calling (DSC), AIS, voice distress, safety and calling channels;

h) that the VDES satellite component may operate in the relevant part of the VHF maritime frequency bands 156.0125-157.4375 MHz and 160.6125-162.0375 MHz,

noting

that the International Maritime Organization (IMO) has developed an international code for ships operating in polar waters (“Polar Code”),

recognizing

a) that a satellite component for VDES is necessary to expand the system from the coastal area to a global coverage;

b) that a satellite component of the VDES offers potential enhancement to VHF safety communication on a global basis to satisfy the increasing need for maritime communication for enhanced maritime safety;

c) that this satellite component should be capable of operating with the terrestrial VDES (AIS, ASM and VDE) and should not interfere with it, or block it;

d) that the satellite component should not cause harmful interference to incumbent services and those in adjacent frequency bands, which are defined for the lower adjacent frequency band from 154 MHz to 156 MHz and for the higher adjacent frequency band from 162 to 164 MHz, and to all other components of the existing VDES as described in Recommendation ITU-R M.2092, DSC, AIS and voice distress, safety and calling channels;

e) that the receiver on the satellite should be resilient to harmful interference from incumbent services and those services in adjacent bands, which are defined for the lower adjacent frequency band from 154 MHz to 156 MHz and for the higher adjacent frequency band from 162 MHz to 164 MHz;

f) that since the VDES as described in Recommendation ITU-R M.2092 uses the frequency bands of Appendix **18**, the implementation of the VDES satellite component would be more effective when using the frequency bands within Appendix **18**;

g) that studies should be carried out to identify spectrum needed for the VDES satellite component;

h) that some administrations have initiated testing of the satellite component for VDES which will continue,

resolves to invite the 2019 World Radiocommunication Conference

to consider, based on the results of ITU-R studies, modifications of the Radio Regulations, including new spectrum allocations to the maritime mobile-satellite service (MMSS) (Earth-to-space and space-to-Earth), preferably within the frequency bands 156.0125-157.4375 MHz and 160.6125-162.0375 MHz of Appendix **18**, to enable a new VDES satellite component, while ensuring that this component will not degrade the current terrestrial VDES components, ASM and AIS operations and not impose any additional constraints on existing services in these and adjacent frequency bands as stated in *recognizing d)* and *e)*,

invites ITU-R

to conduct, as a matter of urgency, and in time for WRC-19, sharing and compatibility studies between VDES satellite components and incumbent services in the same and adjacent frequency bands specified in *recognizing d)* and *e)* to determine potential regulatory actions, including spectrum allocations to the MMSS (Earth-to-space and space-to-Earth) for VDES applications,

further invites

all members of ITU-R, IMO, the World Meteorological Organization (WMO), the International Hydrographic Organization (IHO), the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), the International Electrotechnical Commission (IEC) and the International Radio Maritime Committee (CIRM) to contribute to these studies,

invites administrations

to participate in, and support, field trials of the VDES satellite component,

instructs the Secretary-General

to bring this resolution to the attention of IMO, WMO, IHO, IEC, IALA, CIRM and other international and regional organizations concerned.

MOD

RESOLUTION 417 (REV.WRC-15)

Use of the frequency band 960-1 164 MHz by the aeronautical mobile (R) service

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that WRC-07 allocated the frequency band 960-1 164 MHz to the aeronautical mobile (R) service (AM(R)S) in order to make available this frequency band for AM(R)S systems, and in doing so enabled further technical developments, investments and deployment;

b) that the frequency band 960-1 164 MHz is currently allocated to the aeronautical radionavigation service (ARNS);

c) that new technologies are being developed to support communications and air navigation, including airborne and ground surveillance applications;

d) that the allocation of the frequency band 960-1 164 MHz to the aeronautical mobile (R) service 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;

e) that in Armenia, Azerbaijan, Belarus, Bulgaria, China, the Russian Federation, Kazakhstan, Mongolia, Uzbekistan, Kyrgyzstan, Tajikistan and Ukraine, the frequency band 960-1 164 MHz is also used by systems in the ARNS for which standards and recommended practices (SARPs) have not been developed nor published by the International Civil Aviation Organization (ICAO);

f) that, furthermore, the frequency band 960-1 164 MHz is also used by a non-ICAO system operating in the ARNS that has characteristics similar to those of ICAO standard distance measuring equipment,

recognizing

a) that Annex 10 to the Convention on International Civil Aviation contains SARPs for aeronautical radionavigation and radiocommunication systems used by international civil aviation;

b) that all compatibility issues between the ICAO Standard Universal Access Transceiver (UAT) operating under the AM(R)S allocation and other systems which operate in the same frequency range, excluding the system identified in *considering e),* have been addressed;

c) that in the frequency band 1 024-1 164 MHz the sharing conditions are more complex than in the frequency band 960-1 024 MHz,

noting

a) that the development of compatibility criteria between AM(R)S systems proposed for operations in the frequency band 960-1 164 MHz and ICAO-standardized aeronautical systems in this frequency band is the responsibility of ICAO;

b) that the development of compatibility criteria between AM(R)S systems operating in the frequency band 960-1 164 MHz and radionavigation-satellite service (RNSS) receivers on the same aircraft is the responsibility of ICAO;

c) that practical operational measures should be developed to facilitate the coordination between AM(R)S systems and non-ICAO ARNS systems,

resolves

1 that any AM(R)S system operating in the frequency band 960-1 164 MHz shall meet SARPs requirements published in Annex 10 to the Convention on International Civil Aviation;

2 that, with the exception of the system described in *recognizing b)*, any operation of AM(R)S systems in the frequency band 960-1 164 MHz with aircraft stations operating within 934 km or/and ground stations operating within 465 km from the border of the territory of Armenia, Azerbaijan, Belarus, Bulgaria, China, the Russian Federation, Kazakhstan, Mongolia, Uzbekistan, Kyrgyzstan, Tajikistan and Ukraine is subject to coordination with the concerned administrations of the countries listed above for the protection of aeronautical radionavigation systems (see *considering e)*) operating in the same frequency band in these countries. An administration not responding within a four-month period after receiving a request to seek agreement shall be regarded as unaffected;

3 the system described in *recognizing b)* shall not cause harmful interference to, or claim protection from, the systems described in *considering e)*;

4 that administrations authorizing AM(R)S systems in the frequency band 960-1 164 MHz shall ensure compatibility with systems indicated under *considering f)* whose characteristics are described in Annex 1 of Recommendation ITU-R M.2013-0;

5 that such compatibility between any AM(R)S systems in the frequency band 960-1 164 MHz and systems in *considering f)* is a matter to be dealt with in ICAO;

6 that administrations intending to implement AM(R)S in the frequency band 960-1 164 MHz, in order not to cause harmful interference to the RNSS in the frequency band 1 164-1 215 MHz, shall utilize the criteria set forth below:

– any ground station operating under the AM(R)S allocation in the frequency band 960-1 164 MHz shall limit its maximum equivalent isotropically radiated power (e.i.r.p.) to the values presented in the following table:

Emissions in the frequency band 960-1 164 MHz (Maximum allowable e.i.r.p. in the frequency band 960-1 164 MHz as a function of the carrier central frequency) for non-pulsed AM(R)S ground station transmissions				**Emissions in the frequency band 1 164-1 215 MHz**	
AM(R)S centre frequency < 1 091 MHz	AM(R)S centre frequency 1 091-1 119 MHz	AM(R)S centre frequency 1 119-1 135 MHz	AM(R)S centre frequency 1 135-1 164 MHz	1 164-1 197.6 MHz	1 197.6-1 215 MHz
51.6 dBW	Linearly decreasing from 51.6 to 23.6 dBW	Linearly decreasing from 23.6 to −2.4 dBW	Linearly decreasing from −2.4 to −68.4 dBW	−90.8 dBW in any 1 MHz of the frequency band 1 164-1 197.6 MHz	−90.8 dBW in any 1 MHz of the frequency band 1 197.6-1 215 MHz

– any airborne station operating under the AM(R)S allocation in the frequency band 960-1 164 MHz shall limit its maximum e.i.r.p. to the values presented in the following table:

Emissions in the frequency band 960-1 164 MHz (Maximum allowable e.i.r.p. in the frequency band 960-1 164 MHz as a function of the carrier central frequency) for non-pulsed AM(R)S airborne station transmissions				**Emissions in the frequency band 1 164-1 215 MHz**	
AM(R)S centre frequency < 1 091 MHz	AM(R)S centre frequency 1 091-1 119 MHz	AM(R)S centre frequency 1 119-1 135 MHz	AM(R)S centre frequency 1 135-1 164 MHz	1 164-1 197.6 MHz	1 197.6-1 215 MHz
55.3 dBW	Linearly decreasing from 55.3 to 27.3 dBW	Linearly decreasing from 27.3 to −1.3 dBW	Linearly decreasing from −1.3 to −64.7 dBW	−84 dBW in any 1 MHz of the frequency band 1 164-1 197.6 MHz	−92.4 dBW in any 1 MHz of the frequency band 1 197.6-1 215 MHz

7 that future AM(R)S systems operating in the frequency band 960-1 164 MHz with pulsed emissions shall demonstrate that they limit AM(R)S ground and airborne station emission characteristics in order to provide protection to RNSS systems equivalent to the protection provided by non-pulsed emission AM(R)S ground and airborne stations operating in the 960-1 164 MHz frequency band at the maximum e.i.r.p. levels in *resolves* 6 above,

instructs the Secretary-General

to bring this resolution to the attention of ICAO.

MOD

RESOLUTION 418 (REV.WRC-15)

Use of the frequency band 5 091-5 250 MHz by the aeronautical mobile service for telemetry applications

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that there is a need to provide global spectrum to the mobile service for wideband aeronautical telemetry systems;

b) that the operation of aircraft stations is subject to national and international rules and regulations;

c) that the frequency band 5 030-5 150 MHz is allocated to the aeronautical radionavigation service on a primary basis;

d) that the allocation of the frequency band 5 091-5 250 MHz to the fixed-satellite service (Earth-to-space) is limited to feeder links of non-geostationary satellite systems in the mobile-satellite service;

e) that the frequency band 5 091-5 150 MHz is also allocated to the aeronautical mobile-satellite (R) service on a primary basis, subject to agreement obtained under No. **9.21**;

f) that WRC-07 allocated the frequency band 5 091-5 150 MHz to the aeronautical mobile service on a primary basis subject to No. **5.444B**;

g) that the frequency band 5 150-5 250 MHz is also allocated to the mobile, except aeronautical mobile, service on a primary basis;

h) that WRC-07 additionally allocated the frequency band 5 150-5 250 MHz to the aeronautical mobile service on a primary basis, subject to No. **5.446C**;

i) that aeronautical mobile telemetry (AMT) in the aeronautical mobile service is not considered an application of a safety service as defined in No. **1.59**,

noting

a) that results of studies show the feasibility of using the frequency band 5 091-5 250 MHz for the aeronautical mobile service on a primary basis, limited to transmissions of telemetry for flight testing, under certain conditions and arrangements;

b) that the identification by ITU-R of technical and operational requirements for aircraft stations operating in the frequency band 5 091-5 250 MHz should prevent unacceptable interference to other services;

c) that the frequency band 5 091-5 150 MHz is to be used for the operation of the international standard microwave landing system (MLS) for precision approach and landing;

d) that MLS can be protected through the implementation of an adequate separation distance between an aeronautical mobile service transmitter to support telemetry and MLS receivers;

e) that ITU-R studies have generated methods, described in Report ITU-R M.2118, for ensuring compatibility and sharing between the aeronautical mobile service and the fixed-satellite service operating in the frequency band 5 091-5 250 MHz, which result in interference of no more than 1% $\Delta T_{satellite}/T_{satellite}$ from AMT aircraft station transmissions to fixed-satellite service spacecraft receivers;

f) that a method to facilitate sharing between MLS and aeronautical mobile service is contained in Recommendation ITU-R M.1829;

g) that Recommendation ITU-R M.1828 provides the technical and operational requirements for aircraft stations of the aeronautical mobile service, limited to transmissions of telemetry for flight testing;

h) that ITU-R compatibility studies have been performed for AMT, limited to flight testing; such application is for the testing of aircraft during non-commercial flights for the purpose of development, evaluation and/or certification of aircraft in airspace designated by administrations for this purpose,

recognizing

a) that priority is to be given to MLS in accordance with No. **5.444** in the frequency band 5 030-5 091 MHz;

b) that studies have been performed within ITU-R concerning the sharing and compatibility of AMT for flight testing with other services in the frequency band 5 091-5 250 MHz;

c) that Resolution **748 (Rev.WRC-15)** also provides guidance on the use of the frequency band 5 091-5 150 MHz by the aeronautical mobile service,

resolves

1 that administrations choosing to implement AMT shall limit AMT applications to those identified in *noting h)* in the frequency band 5 091-5 250 MHz, and shall utilize the criteria set forth in Annex 1 to this resolution;

2 that the pfd limits in § 3 and 4 of Annex 1 to this resolution which protect terrestrial services may be exceeded on the territory of any country whose administration has so agreed,

invites the ITU Radiocommunication Sector

to continue studying the conditions and arrangements stipulated in *noting a).*

ANNEX 1 TO RESOLUTION 418 (REV.WRC-15)

1 In implementing aeronautical mobile telemetry (AMT), administrations shall utilize the following criteria:

– limit transmissions to those from aircraft stations only (see No. **1.83**);

– the operation of aeronautical telemetry systems within the frequency band 5 091-5 150 MHz shall be coordinated with administrations operating microwave landing systems (MLS) and whose territory is located within a distance D of the AMT flight area, where D is determined by the following equation:

$$D = 43 + 10^{(127.55 - 20 \log(f) + E)/20}$$

where:

D : separation distance (km) triggering the coordination

f : minimum frequency (MHz) used by the AMT system

E : peak equivalent isotropically radiated power density (dBW in 150 kHz) of the aircraft transmitter.

2 For the protection of the fixed-satellite service (FSS), a telemetry aircraft station in the frequency band 5 091-5 250 MHz shall be operated in such a manner that one aircraft station transmitter power flux-density be limited to −198.9 dB(W/(m^2 · Hz)) at the FSS satellite orbit for spacecraft using Earth coverage receive antennas. Such pfd limit per aircraft transmitter has been derived under the assumptions that the FSS satellite orbit is at 1 414 km altitude and that a total of 21 co-frequency AMT transmitters operate concurrently within the field of view of the FSS satellite. In case of fewer than 21 AMT co-frequency transmitters operating simultaneously in view of the satellite, the transmitter power can be adjusted so as not to exceed an aggregate pfd at the satellite of −185.7 dB(W/(m^2 · Hz)), which corresponds to a $\Delta T_{satellite}/T_{satellite}$ of 1%.

3 For the protection of the mobile service in the frequency band 5 150-5 250 MHz, the maximum pfd produced at the surface of the Earth by emissions from an aircraft station of an aeronautical mobile service system, limited to transmissions of telemetry for flight testing, shall not exceed: −79.4 dB(W/(m^2 · 20 MHz)) − G_r (θ).

G_r(θ) represents the mobile service receiver antenna gain versus elevation angle θ and is defined as follows:

Wireless access system elevation antenna pattern

Elevation angle, θ (degrees)	**Gain G_r(θ) (dBi)**
45 < θ ≤ 90	−4
35 < θ ≤ 45	−3
0 < θ ≤ 35	0
−15 < θ ≤ 0	−1
−30 < θ ≤ −15	−4
−60 < θ ≤ −30	−6
−90 < θ ≤ −60	−5

4 For the protection of the aeronautical mobile (R) service (AM(R)S) in the frequency band 5 091-5 150 MHz, the maximum pfd produced at the surface of the Earth, where AM(R)S may be deployed in accordance with No. **5.444B**, by emissions from an aircraft station of an aeronautical mobile service system, limited to transmissions of telemetry for flight testing, shall not exceed: -89.4 dB(W/(m^2 · 20 MHz)) $- G_r\,(\theta)$.

$G_r\,(\theta)$ represents the mobile service receiver antenna gain versus elevation angle θ and is defined as follows:

$$G_r\,(\theta) = \max\left[G_1(\theta), G_2(\theta)\right]$$

$$G_1(\theta) = 6 - 12\left(\frac{\theta}{27}\right)^2$$

$$G_2(\theta) = -6 + 10\log\left[\left(\max\left\{\frac{|\theta|}{27}.1\right\}\right)^{-1.5} + 0.7\right]$$

where:

$G(\theta)$: gain relative to an isotropic antenna (dBi)

(θ) : absolute value of the elevation angle relative to the angle of maximum gain (degrees).

MOD

RESOLUTION 507 (REV.WRC-15)

Establishment of agreements and associated plans for the broadcasting-satellite service[1]

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that it is important to make the best possible use of the geostationary-satellite orbit and of the frequency bands allocated to the broadcasting-satellite service;

b) that the great number of receiving installations using such directional antennas as could be set up for a broadcasting-satellite service may be an obstacle to changing the location of space stations in that service on the geostationary-satellite orbit, as of the date of their being brought into use;

c) that satellite broadcasts may create harmful interference over a large area of the Earth's surface;

d) that the other services with allocations in the same frequency band need to use the frequency band before the broadcasting-satellite service is set up,

resolves

1 that stations in the broadcasting-satellite service shall be established and operated in accordance with agreements and associated plans adopted by world or regional radiocommunication conferences, as the case may be, in which all the administrations concerned and the administrations whose services are liable to be affected may participate;

2 that during the period before the entry into force of such agreements and associated plans the administrations and the Radiocommunication Bureau shall apply the procedure contained in Resolution **33 (Rev.WRC-15)**,

invites the Council

to keep under review the question of world radiocommunication conferences, and/or regional radiocommunication conferences, as required, with a view to fixing suitable dates, places and agenda.

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[1] This Resolution does not apply to the frequency band 21.4-22 GHz.

MOD

RESOLUTION 517 (REV.WRC-15)

Introduction of digitally modulated emissions in the high-frequency bands between 3 200 kHz and 26 100 kHz allocated to the broadcasting service

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that digital techniques are being introduced into many existing services;

b) that digital techniques allow more effective utilization of the frequency spectrum than double-sideband (DSB) techniques;

c) that digital techniques enable reception quality to be improved;

d) the relevant parts of Appendix **11** concerning the digital system specification in the HF broadcasting services;

e) that ITU-R, in its Recommendation ITU-R BS.1514, has recommended system characteristics for digital sound broadcasts in the broadcast bands below 30 MHz;

f) that digital modulation techniques are expected to provide the means to achieve the optimum balance between sound quality, circuit reliability and bandwidth;

g) that digitally modulated emissions can, in general, provide more efficient coverage than amplitude-modulated transmissions by using fewer simultaneous frequencies and less power;

h) that it may be economically attractive, using current technology, to convert modern conventional DSB broadcasting systems to digital operation in accordance with *considering d)*;

i) that some DSB transmitters have been used with digital modulation techniques without transmitter modifications;

j) that ITU-R is carrying out further studies on the development of broadcasting using digitally modulated emissions in the frequency bands allocated to the broadcasting service below 30 MHz;

k) that a long period could be needed for the introduction of digital broadcasting, taking into account the cost impact of replacement of transmitters and receivers,

resolves

1 that the early introduction of digitally modulated emissions as recommended by ITU-R in the HF bands between 3 200 kHz and 26 100 kHz allocated to the broadcasting service is to be encouraged;

2 that digitally modulated emissions shall comply with the characteristics specified in the relevant parts of Appendix **11**;

3 that whenever an administration replaces a DSB emission by an emission using digital modulation techniques, it shall ensure that the level of interference is not greater than that caused by the original DSB emission, and shall use the RF protection values specified in Resolution **543 (WRC-03)**;

4 that the continued use of DSB emissions may be reviewed by a future competent world radiocommunication conference based on administrations' experience with the introduction of digital HF broadcasting services,

instructs the Director of the Radiocommunication Bureau

to compile and provide to the future competent world radiocommunication conference referred to in *resolves* 4 the latest available complete statistics on the worldwide distribution of digital HF broadcasting receivers and transmitters,

invites ITU-R

to continue its studies on digital techniques in HF broadcasting with a view to assisting in the development of this technology for future use,

invites administrations

to encourage the inclusion in all new HF broadcasting transmitters put into service after 1 January 2004 of the capability to offer digital modulation,

further invites administrations

1 to assist the Director of the Radiocommunication Bureau by providing the relevant statistical data and to participate in ITU-R studies on matters relating to the development and introduction of digitally modulated emissions in the HF bands between 3 200 kHz and 26 100 kHz allocated to the broadcasting service;

2 to bring to the notice of transmitter and receiver manufacturers the recent results of relevant ITU-R studies on spectrum-efficient modulation techniques suitable for use at HF as well as the information referred to in *considering d)* and *e)*, and encourage the availability of affordable low-cost digital receivers.

MOD

RESOLUTION 528 (REV.WRC-15)

Introduction of the broadcasting-satellite service (sound) systems and complementary terrestrial broadcasting in the frequency bands allocated to these services within the range 1-3 GHz

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that WARC-92 has made frequency allocations to the broadcasting-satellite service (sound) and complementary terrestrial broadcasting;

b) that it is necessary to ensure that the introduction of the broadcasting-satellite service (sound) and complementary terrestrial broadcasting proceeds in a flexible and equitable manner;

c) that efficient use of the spectrum will be enhanced by a worldwide allocation;

d) that a worldwide allocation may cause difficulties to some countries in relation to their existing services;

e) that future planning may limit the effect on other services,

resolves

1 that a competent conference should be convened for the planning of the broadcasting-satellite service (sound) in the frequency bands allocated to this service in the range 1-3 GHz; and the development of procedures for the coordinated use of complementary terrestrial broadcasting;

2 that this conference should review criteria for sharing with other services;

3 that in the interim period, broadcasting-satellite systems may only be introduced within the upper 25 MHz of the appropriate frequency band in accordance with the procedures contained in Sections A to C of Resolution **33 (Rev.WRC-15)**, or in Articles **9** to **14**, as appropriate (see *resolves* 1 and 2 of Resolution **33 (Rev.WRC-15)**). The complementary terrestrial service may be introduced during this interim period subject to coordination with administrations whose services may be affected;

4 that the calculation methods and the interference criteria to be employed in evaluating the interference should be based upon relevant ITU-R Recommendations agreed by the administrations concerned as a result of Resolution **703 (Rev.WRC-07)** or otherwise,

invites the ITU-R

to conduct the necessary studies prior to the conference,

instructs the Secretary-General

to bring this Resolution to the attention of the Council to consider including in the agenda of a radiocommunication conference the matters addressed above.

MOD

RESOLUTION 535 (REV.WRC-15)

Information needed for the application of Article 12 of the Radio Regulations

The World Radiocommunication Conference (Geneva, 2015),

considering

that WRC-97 adopted Article **12** as a simple and flexible seasonal planning procedure for high-frequency broadcasting (HFBC) based on coordination,

considering further

that appropriate Rules of Procedure are to be developed by the Radiocommunication Bureau and adopted by the Radio Regulations Board,

instructs the Director of the Radiocommunication Bureau

1 to consider the information contained in the Annex to this Resolution in developing the Rules of Procedure;

2 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

1 to support the Director of the Radiocommunication Bureau in the preparation of these Rules of Procedure and in the development and testing of any accompanying computer software;

2 to submit their schedules in a common electronic format to be defined in the Rules of Procedure,

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 radiocommunications seminars.

ANNEX TO RESOLUTION 535 (REV.WRC-15)

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.

1 Software development

The Procedure will require a number of user-friendly software modules to be developed, tested and supplied to administrations by the Bureau. This will ensure that the same software modules are used by administrations and the Bureau for the analysis of the schedules.

The Bureau should:

– develop the aforementioned software with assistance from administrations;

– distribute the software, together with user instructions and relevant documentation;

– organize training in the use of the software;

– monitor the functional performance of the software and, if required, make necessary modifications.

2 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 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.

Figure 1 shows, in flow chart form, the time sequence for the Procedure.

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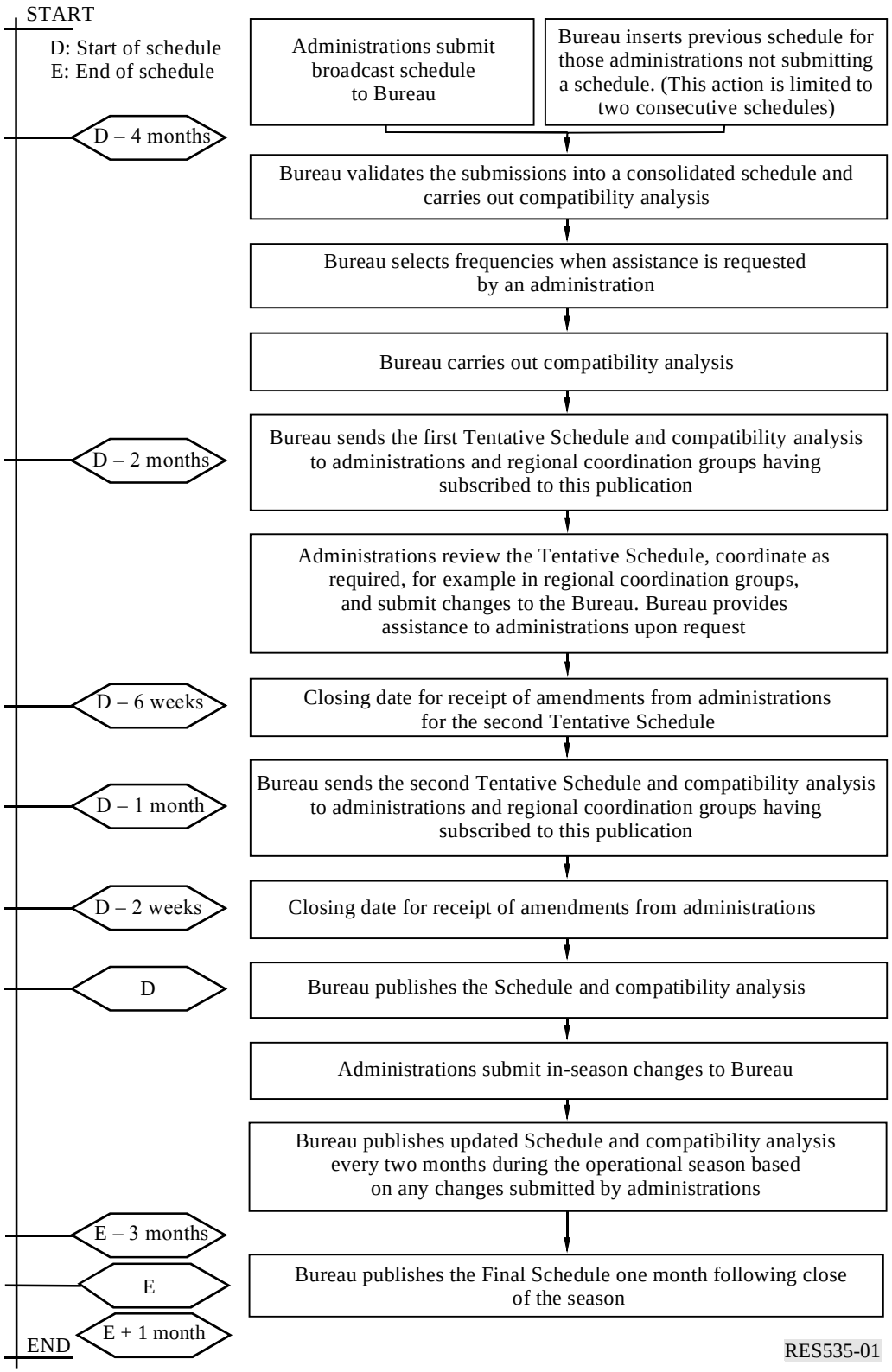
[1] See Description 3.

[2] See Description 4. The schedules and the results of the analyses should be available on CD-ROM and in TIES.

FIGURE 1

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) (see Recommendation ITU-R BS.640) or digital emission (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 (WRC-03)**.

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.

MOD

RESOLUTION 539 (REV.WRC-15)

Use of the frequency band 2 605-2 655 MHz in certain Region 3 countries by non-geostationary satellite systems in the broadcasting-satellite service (sound)

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the frequency band 2 535-2 655 MHz is allocated under No. **5.418** to the broadcasting-satellite service (BSS) (sound) in certain Region 3 countries;

b) that the provisions of Resolution **528 (Rev.WRC-15)** currently limit the use of this frequency band by systems in the BSS (sound) to the upper 25 MHz of the frequency band;

c) that, prior to WRC-2000, there were no coordination procedures applicable to non-geostationary (non-GSO) BSS (sound) systems in this frequency band in relation to other non-GSO or GSO satellite networks;

d) that satellite technology has now advanced to the stage where non-GSO systems in the BSS (sound) are technically and economically feasible when operated with high elevation angles and that there are practical designs available to ensure that the radiation of the non-GSO satellite in the BSS (sound) outside the main beam is kept at low levels;

e) that satellite systems in the BSS as described in *considering d)* can be used for the delivery of high-quality, spectrally efficient BSS (sound) to portable and mobile terminals;

f) that non-GSO systems in the BSS (sound) in the frequency band 2 630-2 655 MHz in Region 3 have been notified to ITU and are expected to be brought into use in the near future;

g) that, prior to WRC-2000, the protection of existing terrestrial services was addressed through the coordination procedures of No. **9.11**;

h) that the provision cited in *considering g)* may be inadequate to ensure the future deployment of terrestrial services in this frequency band;

i) that a regulatory procedure is required in order to meet the dual objectives of providing adequate long-term protection to existing and planned terrestrial services while not placing undue constraints on the development and implementation of the non-GSO BSS (sound) system;

j) that there are non-GSO systems being planned for operation in the BSS (sound) in the frequency band 2 605-2 655 MHz in Region 3 that have highly elliptical orbits;

k) that ITU-R has undertaken studies of the likely aggregate interference from a number of co-frequency broadcasting-satellite systems sharing with the terrestrial services on a co-primary basis;

l) that ITU-R has undertaken studies that assumed there is only one satellite active at any time in a non-GSO system operating in a highly elliptical orbit,

invites

a) administrations planning to operate non-GSO BSS (sound) systems in accordance with this Resolution, to take measures to design the system to minimize interference to terrestrial services outside the non-GSO BSS (sound) service area, for example as in *considering d)* above;

b) administrations, whose territory is geographically close to the territory of an administration planning to operate a non-GSO BSS (sound) system in accordance with this Resolution, and for which there is a correspondingly high elevation angle to the active satellite, to take measures to facilitate the operation of non-GSO BSS (sound) systems,

resolves

1 that any BSS (sound) system using non-geostationary orbits brought into operation in the frequency band 2 605-2 655 MHz in Region 3 shall be operated such that the minimum elevation angle over the service area is not less than 55°, for the purposes of sharing with terrestrial services;

2 that, before an administration notifies to the Radiocommunication Bureau or brings into use a frequency assignment for a BSS (sound) system using non-GSO satellites in the frequency band 2 630-2 655 MHz, for which complete Appendix 4 coordination information or notification information has been received after 2 June 2000, and in the frequency band 2 605-2 630 MHz for which complete Appendix 4 coordination information or notification information has been received after 4 July 2003, the following regulatory arrangements shall apply.

The following mask of power flux-density values at the Earth's surface produced by emissions from a space station for all conditions and for all methods of modulation shall be used as the basis of the regulatory procedures of this Resolution:

-130	dB(W/(m^2 · MHz))	for	$0° \le \theta \le 5°$
$-130 + 0.4\ (\theta - 5$	dB(W/(m^2 · MHz))	for	$5° < \theta \le 25°$
-122	dB(W/(m^2 · MHz))	for	$25° < \theta \le 45°$
$-122 + 0.2\ (\theta - 45)$	dB(W/(m^2 · MHz))	for	$45° < \theta \le 65°$
$-118 + 0.09\ (\theta - 65)$	dB(W/(m^2 · MHz))	for	$65° < \theta \le 76°$
-117	dB(W/(m^2 · MHz))	for	$76° < \theta \le 90°$

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

These values relate to the power flux-density and angles of arrival which would be obtained under free-space propagation conditions.

Furthermore:

– for angles of arrival less than 76° in the power flux-density mask above, if the limits are exceeded, the notifying administration shall obtain the explicit agreement from any administration identified by the Bureau in its examination below;

– for angles of arrival from 76° to 90° in the power flux-density mask above, the coordination procedure with respect to those administrations identified by the Bureau in its examination below will be that of No. **9.11**;

3 that systems in the BSS (sound) using non-GSO satellites shall be limited to national services unless agreement has been reached to include the territories of other administrations in the service area;

4 that, within the context of this Resolution, an administration listed in No. **5.418** shall not have simultaneously two overlapping frequency assignments, one under that provision, and the other one under provision No. **5.416**;

5 that, as from 5 July 2003, the Bureau and administrations shall apply the provisions of Articles **9** and **11** taking into account Nos. **5.418**, **5.418A**, **5.418B**, **5.418C** and this Resolution, as revised by WRC-03,

instructs the Radiocommunication Bureau

1 when applying *resolves* 2, to use the power flux-density mask in *resolves* 2; and

– for angles of arrival less than 76°, identify the affected administrations which have a primary allocation to terrestrial services in the same frequency band and on whose territory the power flux-density is exceeded and inform both the notifying and the affected administrations. At the notification stage the lack of any necessary agreement is considered as non-conformity with No. **11.31**;

– for angles of arrival from 76° to 90°, identify the affected administrations which have a primary allocation to terrestrial services in the same frequency band and on whose territory the power flux-density is exceeded and inform both the notifying and the affected administrations. At the notification stage each notice shall be examined in the application of No. **11.32** and, if appropriate, under No. **11.32A** with respect to the probability of harmful interference that may be caused to assignments for which coordination could not be successfully completed;

2 as from 5 July 2003, to apply *resolves* 5 in its examination of requests for coordination and notifications for any BSS (sound) systems using non-GSO satellites in the frequency band 2 630-2 655 MHz for which complete Appendix 4 coordination information or notification information has been received after 2 June 2000.

MOD

RESOLUTION 552 (REV.WRC-15)

Long-term access to and development in the frequency band 21.4-22 GHz in Regions 1 and 3

The World Radiocommunication Conference (Geneva, 2015),

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 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;

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 to 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 geostationary-satellite 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 Bureau 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;

3 that for frequency assignments to satellite networks as described in *resolves* 1 for which the confirmation of the date of bringing into use under the provisions of Article **11** was received by the Bureau before 18 February 2012, the provisions of § 5 to 8 of Annex 1 to this Resolution and the procedure contained in Annex 3 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-15)

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 Bureau 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, the Bureau shall promptly examine its completeness. If the information is found to be complete, the Bureau shall publish the complete information in a special section of the BR IFIC within two months. If the information is found to be incomplete, the Bureau shall request the notifying administration to submit the missing information within 30 days.

5 The information submitted in accordance with § 1 above and § 1 of Annex 3 to this Resolution shall be updated and resubmitted to the Bureau 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 and § 1 of Annex 3 to this Resolution. In case of end of life of a spacecraft, the corresponding ITU ID number associated to such a spacecraft shall no longer be used.

6 On receipt of the information under § 5 above, the Bureau shall promptly examine its completeness. If the information is found to be complete, the Bureau shall publish the complete information in a special section of the BR IFIC within two months. If the information is found to be incomplete, the Bureau 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, the Bureau 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 the Bureau of the relevant complete information under Nos. **9.1A** or **9.2C,** as appropriate, 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 the Bureau, the corresponding frequency assignments shall be cancelled by the Bureau, which subsequently informs the administration accordingly.

ANNEX 2 TO RESOLUTION 552 (REV.WRC-15)

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 advance publication information

e) Reference to the request for coordination

f) Reference to the notification, when available

g) Frequency band(s) included in the relevant special sections of the satellite network

h) First date of bringing into use[1]

i) 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)

[1] This information has already been provided by the administration under the provisions of Article **11** and will be inserted by the Bureau.

2 Identity of the spacecraft[2] (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

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[3]

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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[2] 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 the Bureau to this spacecraft at that time shall be indicated.

[3] This information has already been provided by the administration under the provisions of Article **11** and will be inserted by the Bureau.

ANNEX 3 TO RESOLUTION 552 (REV.WRC-15)

Transitional measures

1 For frequency assignments to satellite networks as described in *resolves* 3 to this Resolution, the notifying administration shall submit to the Bureau, not later than 17 August 2012, the complete information relevant to the operational situation as of 18 February 2012, in accordance with Annex 2 to this Resolution.

2 The information to be submitted in accordance with § 1 above could be supplemented by a copy of the contract with the spacecraft manufacturer and/or launch services provider.

3 On receipt of the information under § 1 above, the Bureau shall promptly examine its completeness. If the information is found to be complete, the Bureau shall publish the complete information in a special section of the BR IFIC within two months. If the information is found to be incomplete, the Bureau shall request the notifying administration to submit the missing information within 30 days.

4 If the complete information specified in § 1 above is not received by the Bureau before the expiry date specified in § 1 or 3 above, as appropriate, the frequency assignments of a satellite network in the broadcasting-satellite service in the frequency band 21.4-22 GHz shall be cancelled by the Bureau, if appropriate. The Bureau shall publish this information in the BR IFIC.

MOD

RESOLUTION 553 (REV.WRC-15)

Additional regulatory measures for broadcasting-satellite networks in the frequency band and 21.4-22 GHz in Regions 1 and 3 for the enhancement of equitable access to this frequency band

The World Radiocommunication Conference (Geneva, 2015),

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;

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-15)

Special procedure to be applied for an assignment for a BSS 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 once (except as described in § 3 below) by an administration or an administration acting on behalf of a group of named administrations when none of those administrations have a network in the MIFR, notified under Article **11** or successfully examined under No. **9.34** and published under No. **9.38** for the frequency band 21.4-22 GHz. In case of countries complying with § 3 below, the special procedures 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 successfully examined under No. **9.34** and published under No. **9.38** 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 procedures 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.

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 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:

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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**.

[2] The number of orbital locations shall not exceed the number of orbital locations for national assignments in the Appendix **30** Plan.

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];

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[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.

d) include their names in the publication under *e)* below;

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-15)

Technical parameters to be used for submissions for Regions 1 and 3 BSS 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.

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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)).

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**.

f) The minimum coverage ellipse, generated from not more than 20 points with associated geographical coordinates[9].

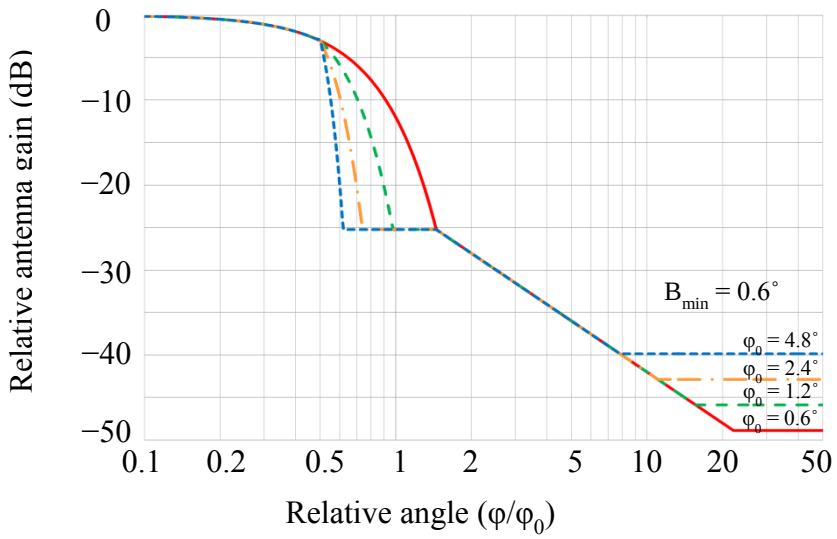
g) The reference pattern of the transmitting space station shall be in compliance with Figure 1 below.

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



$G_{max} = 44.45 - 10 \log (\varphi_{01} \cdot \varphi_{02})$ dBi (WRC-12)

Curve A: dB relative to main beam gain

$-12 (\varphi/\varphi_0)^2$ for $0 \leq (\varphi/\varphi_0) \leq 0.5$

$-12\left[\frac{(\varphi/\varphi_0) - x}{B_{min}/\varphi_0}\right]^2$ for $0.5 < (\varphi/\varphi_0) \leq \left(\frac{1.45 B_{min}}{\varphi_0} + x\right)$

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)

–25.23 for $\left(\frac{1.45B_{min}}{\varphi_0} + x\right) < (\varphi/\varphi_0) \le 1.45$

$-(22 + 20 \log (\varphi/\varphi_0))$ 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:

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-15)

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	$1.05° \leq \theta < 2.65°$
$-138.1 + 1.3\ \theta^2$	dB(W/(m^2 · MHz))	for	$2.65° \leq \theta < 4.35°$
$-130.2 + 26.1 \log \theta$	dB(W/(m^2 · MHz))	for	$4.35° \leq \theta < 9.1°$
-105	dB(W/(m^2 · MHz))	for	$9.1° \leq \theta$

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;

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,

at the date of receipt of complete information under § 8 and 9 of the Attachment to this Resolution,

-149.88	dB(W/(m^2 · MHz))	for	$0° \leq \theta < 0.6°$
$-153.2 + 9.3\ \theta^2$	dB(W/(m^2 · MHz))	for	$0.6° \leq \theta < 1.05°$
$-143.5 + 27.2 \log \theta$	dB(W/(m^2 · MHz))	for	$1.05° \leq \theta < 2.65°$
$-141.1 + 1.3\ \theta^2$	dB(W/(m^2 · MHz))	for	$2.65° \leq \theta < 4.35°$
$-133.2 + 26.1 \log \theta$	dB(W/(m^2 · MHz))	for	$4.35° \leq \theta < 12°$
-105	dB(W/(m^2 · 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.

MOD

RESOLUTION 555 (REV.WRC-15)

Additional regulatory provisions for broadcasting-satellite service 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 (Geneva, 2015),

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 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,

further considering

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 interim arrangements for the use of the frequency bands were on a first-come first-served basis,

recognizing

a) that the number of filings made by some administrations in this frequency band is extremely large, which may not be realistic and may be difficult to implement within the regulatory time-limit under Article **11**;

b) that the number of filings (291 coordination requests received by the Bureau as at December 2011), including those referred to in *recognizing a)* above, is limiting the possibility of successful coordination of BSS systems already submitted or planned to be submitted by other administrations,

resolves

1 to urge administrations to make the utmost efforts to accommodate submissions received from other administrations with few filings, especially covering their own territories;

2 that, for submissions received before 18 February 2012 and processed by the Bureau, for which the regulatory validity period specifies in RR No. **11.44** has not yet expired, the notifying administration may modify, without any change in their initial date of receipt, the characteristics within the ranges specified in Annex 1 to the Attachment to Resolution **553 (WRC-12)** or Report ITU-R BO.2071, provided that such modifications do not cause more interference than the current submitted parameters.

MOD

RESOLUTION 608 (REV.WRC-15)

Use of the frequency band 1 215-1 300 MHz by systems of the radionavigation-satellite service (space-to-Earth)

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that WRC-2000 introduced a new allocation for the radionavigation-satellite service (RNSS) in the frequency band 1 260-1 300 MHz;

b) that the frequency bands 1 215-1 240 MHz and 1 240-1 260 MHz were already allocated to the RNSS;

c) that, in the frequency band 1 215-1 260 MHz, RNSS (space-to-Earth) systems have been successfully operating for more than 20 years without any reports of interference to the radars which operate in this frequency band;

d) the importance of the continuing need for protection for the radiodetermination systems operating in the frequency band 1 215-1 300 MHz,

noting

a) Recommendation ITU-R M.1902 "Characteristics and protection criteria for receiving earth stations in the radionavigation-satellite service (space-to-Earth) operating in the frequency band 1 215-1 300 MHz";

b) Report ITU-R M.2284 "Compatibility of radionavigation-satellite service (space-to-Earth) systems and radars operating in the frequency band 1 215-1 300 MHz",

further noting

that the provisions of No. **5.329** as adopted by WRC-03, will provide for the operation of the RNSS (space-to-Earth) in the frequency band 1 215-1 300 MHz and will protect the radiolocation systems operating in that frequency band, in addition to the protection already provided to radionavigation service systems operating in the countries listed in No. **5.331**,

recognizing

1 that ITU-R carried out studies related to the protection of the radiodetermination systems operating in the frequency band 1 215-1 300 MHz and that these studies should continue pursuant to relevant ITU-R Questions, such as Questions ITU-R 62/5 and ITU-R 217/4, so as to prepare, as appropriate, ITU-R Recommendations;

2 that up to the end of WRC-2000, use of the RNSS in the frequency band 1 215-1 260 MHz was subject only to the constraint that no harmful interference was caused to the radionavigation service in Algeria, Germany, Austria, Bahrain, Belgium, Benin, Bosnia and Herzegovina, Burundi, Cameroon, China, Croatia, Denmark, United Arab Emirates, France, Greece, India, Iran (Islamic Republic of), Iraq, Kenya, The Former Yugoslav Rep. of Macedonia, Liechtenstein, Luxembourg, Mali, Mauritania, Norway, Oman, Pakistan, Netherlands, Portugal, Qatar, Serbia and Montenegro*, Senegal, Slovenia, Somalia, Sudan**, Sri Lanka, Sweden, Switzerland and Turkey, furthermore, that No. **5.43** was applied,

resolves

that no constraints in addition to those in place prior to WRC-2000 (see *recognizing* 2) shall be placed on the use of RNSS (space-to-Earth) frequency assignments in the frequency band 1 215-1 260 MHz brought into use until 2 June 2000,

instructs the Secretary-General

to communicate the contents of this Resolution to the International Civil Aviation Organization (ICAO) for such actions as it may consider appropriate, and to invite ICAO to participate actively in the study activity identified under *recognizing* 1.

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* *Note by the Secretariat:* Serbia and Montenegro became independent states in 2006.

** *Note by the Secretariat:* Sudan was partitioned into two independent States in 2011 (Sudan and South Sudan).

MOD

RESOLUTION 646 (REV.WRC-15)

Public protection and disaster relief

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the term "public protection radiocommunication" refers to radiocommunications used by responsible agencies and organizations dealing with maintenance of law and order, protection of life and property and emergency situations;

b) that the term "disaster relief radiocommunication" refers to radiocommunications used by agencies and organizations dealing with a serious disruption of the functioning of society, posing a significant widespread threat to human life, health, property or the environment, whether caused by accident, natural phenomena or human activity, and whether developing suddenly or as a result of complex, long-term processes;

c) the growing telecommunication and radiocommunication needs of public protection agencies and organizations, including those dealing with emergency situations and disaster relief, that are vital to the maintenance of law and order, protection of life and property, disaster relief and emergency response;

d) that many administrations wish to promote interoperability and interworking between systems used for public protection and disaster relief (PPDR), both nationally and for cross-border operations in emergency situations and for disaster relief;

e) that existing systems for PPDR applications mainly support narrowband/wideband voice and data applications;

f) that, although narrowband and wideband systems will continue to be used to meet PPDR requirements, there is a growing need for broadband applications to support improved data and multimedia capabilities, which require higher data rates and higher capacity, and appropriate spectrum may need to be made available on a national basis to meet these growing needs;

g) that new technologies for broadband PPDR applications are being developed in various standards organizations, e.g. International Mobile Telecommunications (IMT) technologies that support higher data rates and higher capacity for PPDR applications, and these technologies are also being used to meet the needs of PPDR agencies and organizations;

h) that continuing development of new technologies and systems, such as IMT and Intelligent Transportation Systems (ITS), may be able to further support or supplement advanced PPDR applications;

i) that some commercial terrestrial and satellite systems are complementing the dedicated systems in support of PPDR, and that the use of commercial solutions will be in response to technology development and market demands;

j) that administrations may have different operational needs and spectrum requirements for PPDR applications depending on the circumstances;

k) that an approach based on global and/or regional frequency ranges[1] may enable administrations to benefit from harmonization while continuing to meet national planning requirements,

recognizing

a) the benefits of spectrum harmonization such as:

– increased potential for interoperability;

– clear guidance for standardization;

– increased volume of equipment resulting in economies of scale, more cost-efficient equipment and expanded equipment availability;

– improved spectrum management and planning;

– more effective international aid during disasters and major events; and

– enhanced cross-border coordination and circulation of equipment;

b) that the organizational distinction between public protection activities and disaster relief activities are matters for administrations to determine at the national level;

c) that national spectrum planning for PPDR needs to have regard to cooperation and bilateral consultation with other concerned administrations, which should be facilitated by greater levels of spectrum harmonization;

d) that the Tampere Convention on the Provision of Telecommunications Resources for Disaster Mitigation and Relief Operations (Tampere, 1998), an international treaty deposited with the United Nations Secretary-General and related United Nations General Assembly resolutions and reports are also relevant in this regard;

e) that Resolution 36 (Rev. Guadalajara, 2010) of the Plenipotentiary Conference urges Member States Parties to the Tampere Convention to take all practical steps for the application of the Tampere Convention and to work closely with the operational coordinator as provided for therein;

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[1] In the context of this resolution, the term “frequency range” means a range of frequencies over which radio equipment is envisaged to be capable of operating but limited to specific frequency band(s) according to national conditions and requirements.

f) that Recommendation ITU-R M.1637 offers guidance to facilitate the global cross-border circulation of radiocommunication equipment in emergency and disaster relief situations;

g) that Recommendation ITU R M.2009 identifies radio interface standards applicable to PPDR operations;

h) that Report ITU-R M.2291 provides details of the capabilities of IMT technologies to meet the requirements of applications supporting broadband PPDR operations;

i) that Report ITU-R M.2377 provides details of systems and applications supporting PPDR operations in narrowband, wideband and broadband use;

j) that PPDR agencies and organizations have an initial set of requirements, including but not limited to interoperability, secure and reliable communications, sufficient capacity to respond to emergencies, priority access in the use of non-dedicated systems, fast response times, ability to handle multiple group calls and the ability to cover large areas, as described in Reports ITU-R M.2377 and ITU-R M.2291;

k) that Report ITU-R BT.2299 provides a compilation of supporting evidence to the effect that terrestrial broadcasting plays an important role in disseminating information to the public in times of emergencies;

l) that Recommendation ITU-R M.2015 contains regionally harmonized PPDR frequency arrangements, as well as frequency arrangements of individual administrations[2];

m) that in times of disasters, if most terrestrial-based networks are destroyed or impaired, amateur, satellite and other non-ground-based networks may be available to provide communication services to assist in PPDR efforts;

n) that the amount of spectrum needed for public protection on a daily basis differs significantly between countries, and that certain amounts of spectrum are already in use in various countries for PPDR applications;

o) that in response to a disaster or emergency, access to additional spectrum on a temporary basis may be required for PPDR operations;

p) that not all frequencies within an identified common frequency range will be available for PPDR use within each country;

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[2] For example, some countries in Region 3 have adopted parts of the frequency ranges 138-174 MHz, 351-370 MHz and 380-400 MHz for narrowband PPDR applications and the frequency ranges 174-205 MHz and 1 447-1 467 MHz for broadband PPDR applications.

q) that the identification of common frequency ranges within which equipment could operate may ease interoperability and/or interworking, with mutual cooperation and consultation, especially in national, regional and cross-border emergency situations and disaster relief operations;

r) that when a disaster occurs, the PPDR agencies and organizations are usually the first responders on the scene using their day-to-day communication systems and, additionally, other agencies and organizations may also become involved in disaster relief operations;

s) that some countries in Region 1 have identified certain parts of the frequency range 694-791 MHz for broadband PPDR deployment;

t) that some countries in Region 1 have identified certain parts of the frequency range 790-862 MHz for broadband PPDR deployment;

u) the provisions contained in Nos. **5.266** and **5.267**, and Resolution **205 (Rev.WRC-15)**;

v) that Metaids and Metsat services operate on a globally harmonized basis in the frequency band 400.15-406 MHz;

w) that the radio astronomy service operates on a primary basis in the frequency band 406.1-410 MHz and there may be PPDR operations adjacent to that frequency band,

noting

a) that many administrations will continue to use different frequency bands below 1 GHz for narrowband systems and applications supporting PPDR and may decide to use the same range for future PPDR systems;

b) that some administrations also use certain frequency bands above 1 GHz for broadband PPDR applications;

c) that applications requiring large coverage areas and providing good signal availability would generally be accommodated in lower frequency bands;

d) that many administrations have made significant investments in PPDR systems;

e) that flexibility allows disaster relief agencies and organizations to use current and future radiocommunications, so as to facilitate their humanitarian operations;

f) that disasters and emergency events require response not only from PPDR agencies and organizations but also from humanitarian agencies and organizations;

g) that broadband PPDR can be realized and deployed in the frequency bands identified for IMT;

h) the benefits of cooperation between countries for the provision of effective and appropriate humanitarian assistance in case of disasters, particularly in view of the special operational requirements of such activities involving multinational response;

i) the needs of countries, particularly the developing countries[3], for cost-efficient communication equipment;

j) that the use of technologies based on Internet protocols is well established,

emphasizing

a) that the frequency ranges that are covered by the *resolves* part of this resolution are allocated to a variety of services in accordance with the relevant provisions of the Radio Regulations and are currently used intensively by the fixed, mobile, mobile-satellite and broadcasting services;

b) that PPDR applications in the ranges listed in *resolves* 2 and 3 are intended to operate in the mobile service allocated on a primary basis according to the provisions of the Radio Regulations;

c) that flexibility must be afforded to administrations

to determine:

– how much spectrum to make available at a national level for PPDR from the ranges in the *resolve*s part of this resolution in order to meet their particular national requirements;

– the need and timing of availability as well as the conditions of usage of the bands used for PPDR, including those covered in this resolution and Recommendation ITU-R M.2015, in order to meet specific regional or national situations[4];

d) that the provisions of Nos. **1.59** and **4.10** of the Radio Regulations do not apply to PPDR;

e) that administrations can adopt their frequency arrangements for the terrestrial component of IMT, from those detailed in Recommendation ITU-R M.1036,

resolves

1 to encourage administrations to use harmonized frequency ranges for PPDR to the maximum extent possible, taking into account the national and regional requirements and also having regard to any needed consultation and cooperation with other concerned countries;

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[3] Taking into account, for example, the latest version of the ITU-D Handbook on disaster relief.

[4] For example, some countries in Region 1 have identified certain parts of the frequency range 694-862 MHz for broadband PPDR applications.

2 to encourage administrations to consider parts of the frequency range 694-894 MHz, as described in the most recent version of Recommendation ITU-R M.2015, when undertaking their national planning for their PPDR applications, in particular broadband, in order to achieve harmonization, taking into account *emphasizing c)* and *e)* above;

3 to further encourage administrations to also consider parts of the following regionally harmonized frequency ranges, for their PPDR applications:

– in Region 1: 380-470 MHz;

– in Region 3: 406.1-430 MHz, 440-470 MHz and 4 940-4 990 MHz;

4 that PPDR frequency arrangements within the frequency ranges specified in *resolves* 2 and 3, as well as countries' frequency arrangements for PPDR, should be included in Recommendation ITU-R M.2015;

5 that the use of the frequency ranges for PPDR in *resolves* 2 and 3 above, as well as the use of the countries' frequency arrangements for PPDR, as described in the most recent version of Recommendation ITU-R M.2015, must not cause unacceptable interference, nor constrain the use of these frequency ranges by applications of the services to which these ranges are allocated in the Radio Regulations;

6 to encourage administrations, in emergency and disaster relief situations, to satisfy temporary needs for frequencies in addition to what may be normally provided for in agreements with the concerned administrations;

7 to encourage administrations to facilitate cross-border circulation of radiocommunication equipment intended for use in emergency and disaster relief situations through mutual cooperation and consultation without hindering national legislation;

8 that administrations encourage PPDR agencies and organizations to utilize relevant ITU-R Recommendations in planning spectrum use and implementing technology and systems supporting PPDR;

9 to encourage administrations to continue to work closely with their PPDR community to further refine the operational requirements for PPDR activities,

invites the ITU Radiocommunication Sector

1 to continue its technical studies and to make recommendations concerning technical and operational implementation, as necessary, to meet the needs of PPDR radiocommunication applications, taking into account the capabilities, evolution and any resulting transition requirements of the existing systems, particularly those of many developing countries, for national and international operations;

2 to review and revise Recommendation ITU-R M.2015 and other relevant ITU-R Recommendations and Reports, as appropriate.

MOD

RESOLUTION 647 (REV.WRC-15)

Radiocommunication aspects, including spectrum management guidelines, for early warning, disaster prediction, detection, mitigation and relief operations relating to emergencies and disasters

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that natural disasters have underscored the importance of utilizing effective measures to mitigate their effects, including prediction, detection and alerting through the coordinated and effective use of radio-frequency spectrum;

b) ITU's comprehensive role in emergency communications, not only in the field of radiocommunications, but also in the area of technical standards to facilitate interconnection and interoperability of networks for monitoring and management at the onset of and during emergency and disaster situations, and as an integral part of the telecommunication development agenda through the Hyderabad Action Plan;

c) that administrations have been urged to take all practical steps to facilitate the rapid deployment and effective use of telecommunication resources for early warning, emergency, disaster mitigation and relief operations by reducing and, where possible, removing regulatory barriers and strengthening global, regional and transborder cooperation between States;

d) that effective use of telecommunications/information and communication technologies (ICTs), at the onset of and during critical emergencies, is essential for disaster forecasting and prediction, timely detection, early warning, mitigation, management, relief strategies and operations, and plays a vital role in the safety and security of relief workers in the field;

e) the particular needs of developing countries and the special requirements of the inhabitants of high-risk areas exposed to disasters, as well as those living in remote areas;

f) the work carried out by the ITU Telecommunication Standardization Sector in standardizing the common alerting protocol (CAP), through the approval of the relevant CAP Recommendation,

recognizing

a) that the Tampere Convention on the Provision of Telecommunications Resources for Disaster Mitigation and Relief Operations (Tampere, 1998)[1], an international treaty deposited with the United Nations Secretary-General, calls on the States Parties, when possible, and in conformity with their national law, to develop and implement measures to facilitate the availability of telecommunication resources for such operations;

b) Article 40 of the ITU Constitution, on priority of telecommunications concerning safety of life;

c) Article 46 of the Constitution, on distress calls and messages;

d) Resolution 34 (Rev. Dubai, 2014) of the World Telecommunication Development Conference, on the role of telecommunications/ICTs in disaster preparedness, early warning, rescue, mitigation, relief and response, as well as ITU Telecommunication Development Sector Question 5/2 "Utilization of telecommunications/ICTs for disaster preparedness, mitigation and response";

e) Resolution 36 (Rev. Guadalajara, 2010) of the Plenipotentiary Conference, on telecommunications/ICTs in the service of humanitarian assistance;

f) Resolution 136 (Rev. Busan, 2014) of the Plenipotentiary Conference, on the use of telecommunications/ICTs for monitoring and management in emergency and disaster situations for early warning, prevention, mitigation and relief;

g) Resolution ITU-R 55, on the ITU Radiocommunication Sector (ITU-R) studies of disaster prediction, detection, mitigation and relief;

h) that Resolution **646 (Rev.WRC-15)** addresses the broader category of public protection and disaster relief (PPDR), as well as the harmonization of frequency bands/ranges for PPDR solutions[2];

i) that some administrations may have different operational needs and spectrum requirements for emergency and disaster-relief applications, depending on their circumstances;

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1 However, a number of countries have not ratified the Tampere Convention.

2 Resolution **646** (**Rev.WRC-15**) includes *considering paragraphs to the effect* that the term "public protection radiocommunication" refers to radiocommunications used by responsible agencies and organizations dealing with maintenance of law and order, protection of life and property and emergency situations, and that the term "disaster relief radiocommunication" refers to radiocommunications used by agencies and organizations dealing with a serious disruption of the functioning of society, posing a significant widespread threat to human life, health, property or the environment, whether caused by accident, natural phenomena or human activity, and whether developing suddenly or as a result of complex, long-term processes.

j) that the immediate availability of spectrum to support emergency radiocommunication equipment and administration contact information on disaster relief issues are important for successful telecommunications in the very early stages of humanitarian assistance intervention for disaster relief,

aware

of the progress made in regional organizations around the world, and in particular in regional telecommunication organizations, on matters related to emergency communications planning and response,

recognizing further

a) that ITU-R has developed a Handbook on Emergency and Disaster Relief as well as various Reports and Recommendations relating to emergency and disaster relief operations and radiocommunication resources;

b) that relevant provisions of Resolution **644 (Rev.WRC-12)** were incorporated into this resolution and Resolution **644 (Rev.WRC-12)** was consequently suppressed at WRC-15; past versions of the resolution will continue to be available on the ITU website for reference[3],

noting

a) the close relation of this resolution with Resolution **646 (Rev.WRC-15)**, on public protection and disaster relief;

b) that when a disaster occurs, the disaster relief agencies are usually the first on the scene using their day-to-day communication systems, but that in most cases other agencies and organizations may also be involved in disaster relief operations;

c) that there is a critical requirement to perform immediate spectrum management actions, including frequency coordination, sharing and spectrum reuse, within a disaster area;

d) that national spectrum planning for emergency and disaster relief should take into account the need for cooperation and bilateral consultation with other concerned administrations, which can be facilitated by spectrum harmonization, as well as agreed spectrum management guidelines pertaining to disaster relief and emergency planning;

e) that in times of disasters, radiocommunication facilities may be destroyed or impaired and the national regulatory authorities may not be able to provide the necessary spectrum management services for the deployment of radio systems for relief operations;

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3 http://itu.int/go/PPDR

f) that availability of information, such as the identification of administration disaster-relief contact information, frequency availability within individual administrations within which equipment could operate, and any relevant instructions or procedures may ease the interoperability and/or interworking, with mutual cooperation and consultation, especially in national, regional and cross-border emergency situations and disaster relief activities,

noting further

a) that flexibility must be afforded to disaster relief agencies and organizations to use current and future radiocommunications, so as to facilitate their humanitarian operations;

b) that it is in the interest of administrations and disaster relief agencies and organizations to have access to updated information on national spectrum planning for emergency and disaster relief,

taking into account

that the Radiocommunication Bureau (BR) has established and maintains a database[4] containing administration contact information, available frequencies/frequency bands for use by terrestrial and space services, and any additional information or instructions relevant to emergency situations within these administrations,

resolves

1 that ITU-R continue through its study groups to study those aspects of radiocommunication/ICTs that are relevant to early warning, disaster prediction, detection, mitigation and relief operations taking into account Resolution ITU-R 55;

2 to encourage administrations to communicate to BR the relevant up-to-date administration contact information and, where available, the frequencies or frequency bands for use in emergency and disaster relief operations;

3 to reiterate to administrations the importance of having up-to-date information referred to in *resolves* 2 above available for use in the very early stages of humanitarian assistance intervention for disaster relief,

instructs the Director of the Radiocommunication Bureau

1 to support administrations in their work towards the implementation of both Resolutions 36 (Rev. Guadalajara, 2010) and 136 (Rev. Busan, 2014), as well as the Tampere Convention;

2 to coordinate activities between this resolution and Resolution **646 (Rev.WRC-15)** in order to minimize possible overlap;

[4] The database may be accessed at http://www.itu.int/ITU-R/go/res647.

3 to continue to assist Member States with their emergency communication preparedness activities by maintaining the database[5] of information from administrations for use in emergency situations, which includes contact information and optionally includes available frequencies;

4 to facilitate online access to the database by administrations, national regulatory authorities, disaster relief agencies and organizations, in particular the United Nations Emergency Relief Coordinator, in accordance with the operating procedures developed for disaster situations;

5 to collaborate with the United Nations Office for the Coordination of Humanitarian Affairs and other organizations, as appropriate, in the development and dissemination of standard operating procedures and relevant spectrum management practices for use in the event of a disaster situation;

6 to collaborate, as appropriate, with the United Nations Working Group on Emergency Telecommunications (WGET) and the radio frequency and radio standards group under the UN Emergency Telecommunications Cluster (ETC) for which the World Food Programme (WFP) is the cluster lead;

7 to take into consideration, and collaborate in, as appropriate, all relevant activities in ITU's other two Sectors and General Secretariat;

8 to report on the progress on this resolution to subsequent world radiocommunication conferences,

invites the ITU Radiocommunication Sector

to continue conducting studies as necessary, in accordance with *resolves* 1 and in support of developing and maintaining appropriate spectrum management guidelines applicable in emergency and disaster relief operations,

invites the Director of the Telecommunication Standardization Bureau and the Director of the Telecommunication Development Bureau

to collaborate closely with the Director of BR to ensure that a consistent and coherent approach is adopted in the development of strategies in response to emergency and disaster situations,

urges administrations

to participate in the emergency communication preparedness activities described above and to provide to BR their information and, in particular, up-to-date contact information related to emergency and disaster relief radiocommunications for inclusion in the database, taking into account Resolution ITU-R 55.

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[5] The database may be accessed at http://www.itu.int/ITU R/go/res647.

MOD

RESOLUTION 705 (REV.WRC-15)

Mutual protection of radio services operating in the frequency band 70-130 kHz

The World Radiocommunication Conference (Geneva,2015),

considering

a) that various radio services, including radionavigation systems used by maritime and aeronautical services, operate in frequency bands between 70 and 130 kHz;

b) that, radionavigation being a safety service, all practical steps consistent with the Radio Regulations should be taken to prevent harmful interference to any radionavigation system;

c) that the ITU-R has noted that users of phased pulse radionavigation systems in the frequency band 90-110 kHz receive no protection outside the frequency band, yet may receive benefit from their signals outside the occupied bandwidth,

noting

that ITU-R studies show:

– that for continuous wave radionavigation systems in the frequency bands 70-90 kHz and 110-130 kHz, the protection ratio should be 15 dB within the receiver passband of ±7 Hz at 3 dB;

– that phased pulse radionavigation systems require a 15 dB protection ratio within the frequency band 90-110 kHz;

– that these pulse radionavigation systems would be aided by protection ratios of 5 dB and 0 dB for frequency separations between wanted and interfering signal of 10-15 kHz and 15-20 kHz, respectively,

further noting

that the ITU-R has recommended the exchange of information between authorities operating radionavigation systems in the frequency band 90-110 kHz and those operating other systems in the frequency band 70-130 kHz employing emissions of very high stability,

recognizing

a) that radio services other than radionavigation operating in the frequency bands 70-90 kHz and 110-130 kHz fulfil essential functions that may be affected;

b) the provisions of Nos. **4.5**, **4.10**, **5.60** and **5.62**,

resolves that administrations

1 in assigning frequencies to services in the frequency bands 70-90 kHz, 90-110 kHz and 110-130 kHz, consider the potential mutual impairment to other stations operating in accordance with the Table of Frequency Allocations and apply protective measures;

2 use the relevant ITU-R Recommendations and encourage the exchange of information between authorities operating radionavigation systems in the frequency band 90-110 kHz and those operating other systems in the frequency band 70-130 kHz employing emissions of very high stability, to assist in preventing potential interference problems;

3 encourage consultation, both nationally and internationally, between operators of radionavigation systems using the frequency band 90-110 kHz and of other systems using the frequency band 70-130 kHz,

requests the ITU-R

to continue studies in this matter, particularly the development of technical criteria and standards to permit compatible operations within the allocated frequency bands.

MOD

RESOLUTION 739 (REV.WRC-15)

Compatibility between the radio astronomy service and the active space services in certain adjacent and nearby frequency bands

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that adjacent or nearby primary service allocations have been made to the radio astronomy service, and to various space services, such as the fixed-satellite service (FSS), radionavigation-satellite service (RNSS), mobile-satellite service (MSS) and broadcasting-satellite service (BSS), hereafter referred to as "active space services";

b) that, in many cases, the frequencies used by the radio astronomy service (RAS) are chosen to study natural phenomena producing radio emissions at frequencies fixed by the laws of nature, so shifting frequency to avoid or mitigate interference problems may not be possible;

c) that Report ITU-R SM.2091 provides a methodology for conducting, and a framework for documenting the results of, compatibility studies between active space service and the radio astronomy service band-pairs;

d) that Report ITU-R SM.2091 also provides the results of compatibility studies between the radio astronomy service and an active space service in certain adjacent and nearby frequency bands;

e) that appropriate consultation between administrations has the potential to lead to the development of innovative solutions and to the rapid deployment of systems;

f) that, for technical or operational reasons, more stringent spurious emission limits than the general limits in Appendix **3** may be required to protect the RAS from active services in specific frequency bands,

noting

a) that the additional burden of undertaking any technical examination should not be placed on the Radiocommunication Bureau;

b) that a consultation procedure, as contained in this Resolution, would not place an additional burden on the Bureau;

c) that Recommendation ITU-R M.1583 provides a methodology based on the equivalent power flux-density (epfd) concept for calculation of interference resulting from unwanted emissions from non-geostationary (non-GSO) satellite systems of the MSS or RNSS into radio astronomy stations;

d) that Recommendation ITU-R S.1586 provides a methodology based on the epfd concept for calculation of interference resulting from unwanted emissions from non-GSO systems of the FSS into radio astronomy stations;

e) that the methodology described in these Recommendations may also be used to study the case of non-GSO systems in the BSS;

f) that Recommendation ITU-R RA.1631 provides antenna patterns to be used for compatibility analyses between non-GSO systems and RAS stations, based on the epfd concept;

g) that Recommendation ITU-R RA.1513 provides acceptable levels of data loss to radio astronomy observations, stating in particular that the percentage of data loss caused by any system should be lower than 2%;

h) that some of the results documented in Report ITU-R SM.2091 may be used as threshold levels to initiate the consultation procedure;

i) that the results of successful consultation between concerned administrations would ensure that the interests of both the active and radio astronomy services are considered;

j) that measures taken by active space services to protect radio astronomy stations from interference may result in increased costs and/or reduced capabilities for those services;

k) that conversely, not taking such measures may result in additional operating costs and reduced operational effectiveness for the radio astronomy stations concerned;

l) that the implementation of additional interference mitigation measures at the radio astronomy station may increase operating costs and reduce observational effectiveness;

m) that conversely, not implementing such measures may impose upon the active space services an additional cost burden and reduction in service capability,

recognizing

a) that unwanted emissions produced by stations of the active space services may cause unacceptable interference to stations of the RAS;

b) that, although some unwanted emissions from transmitters on space stations can be controlled through careful design methods and appropriate testing procedures, other unwanted emissions, such as narrow-band spurious emissions, generated by uncontrollable and/or unpredictable physical mechanisms, may only be detected after the spacecraft is launched;

c) that there is an uncertainty in the pre-launch assessment of the levels of unwanted emissions;

d) that it is necessary to ensure an equitable sharing of burden for achieving compatibility between the active space services and the RAS;

e) that for those cases where difficulties are encountered in meeting the values in Annex 1, a consultation procedure could be used to resolve the difficulties,

resolves

1 that an administration takes all reasonable steps to ensure that any space station or satellite system being designed and constructed to operate in the frequency bands in Annex 1 meets the values given therein at any radio astronomy station operating in the corresponding frequency bands identified in this Annex;

2 that in the event that during construction and prior to launch it is determined that, after having considered all reasonable means, the unwanted emissions from the space station or satellite system cannot meet the values given in Annex 1, the administration that notified the space station or satellite system contacts, as soon as possible, the administration operating the radio astronomy station to confirm that *resolves* 1 has been fulfilled, and the concerned administrations enter into a consultation process in order to achieve a mutually acceptable solution;

3 that in the event, following the space station launch, an administration operating a radio astronomy station determines that, due to unexpected circumstances, a space station or satellite system does not meet the values for unwanted emissions given in Annex 1 at that radio astronomy station, it contacts the administration that notified the space station or satellite system so that the administration that notified the space station or satellite system confirms that *resolves* 1 has been fulfilled, and the concerned administrations enter into a consultation process in order to identify further steps with a view to achieving a mutually acceptable solution;

4 that the radio astronomy stations to be taken into account in applying *resolves* 1, 2 and 3 are those which are operating in the frequency band(s) identified in Annex 1 and which are notified before the date of reception of the advance publication information of the space station or satellite system to which this Resolution applies;

5 that the space stations or satellite systems to be considered in the application of *resolves* 1 to 4 above are those designed to operate in the space service frequency bands listed in the tables of Annex 1 for which advance publication information (API) is received by the Bureau following the entry into force of the Final Acts of the appropriate conference, as specified in these tables;

6 that the objective of the consultation process in *resolves* 1, 2 and 3 is to achieve a mutually acceptable solution, using as guidance Report ITU-R SM.2091 and any other ITU-R Recommendations deemed relevant by the concerned administrations;

7 that the Bureau shall make no examination or finding with respect to this Resolution under either Article **9** or **11**,

invites administrations

1 to take all appropriate and practicable steps, from the design phase onward, to ensure that unwanted emissions are minimized from space stations that are planned to operate in one or more space service allocations, in order to avoid exceeding the threshold levels of unwanted emissions identified in Annex 1 at any radio astronomy station;

2 to take all practicable steps, from the design phase onward, to minimize the sensitivity of radio astronomy stations to interference and to take into account the need to implement interference mitigation measures.

ANNEX 1 TO RESOLUTION 739 (REV.WRC-15)

Unwanted emission threshold levels

The unwanted emission threshold levels applicable to geostationary space stations are given in Table 1-1 in terms of power flux-density (pfd) in a reference bandwidth produced at a radio astronomy station.

In Table 1-1 the unwanted emission threshold levels given in the fourth, sixth and eighth columns (associated with the reference bandwidth contained in the adjacent columns) should be met by any geostationary space station operating in the frequency bands indicated in the second column at the radio astronomy station operating in the frequency band mentioned in the third column.

The unwanted emission threshold levels applicable to space stations of a non-geostationary system are given in Table 1-2 in terms of the equivalent power flux-density (epfd), produced at a radio astronomy station in a reference bandwidth by all the space stations in a non-geostationary satellite system that are visible to the radio astronomy station considered, not to be exceeded during a given percentage of time, over the whole sky.

In Table 1-2 the epfd value given in the fourth, sixth and eighth columns (associated with the reference bandwidths contained in the adjacent column) should be met by all the space stations of a non-geostationary satellite system operating in the frequency bands indicated in the second column at the radio astronomy station operating in the frequency band mentioned in the third column. The epfd value at a given radio astronomy station shall be evaluated by using the antenna pattern and the RAS maximum antenna gain given in Recommendation ITU-R RA.1631-0. Guidance on the calculation of epfd can be found in Recommendations ITU-R S.1586 and ITU-R M.1583. The elevation angles of the radio astronomy stations to be taken into account in the epfd calculation are those higher than the minimum elevation angle θ_{min} of the radio telescope. In the absence of such information a value of 5° shall be taken. The percentage of time during which the epfd level shall not be exceeded is mentioned in Note (1) of Table 1-2.

Some sections of Report ITU-R SM.2091 indicate levels of unwanted emissions in radio astronomy bands that certain satellite systems, by design, do not exceed.

TABLE 1-1

pfd thresholds for unwanted emissions from any geostationary space station at a radio astronomy station

Space service	Space service frequency band	Radio astronomy frequency band	Single dish, continuum observations		Single dish, spectral line observations		VLBI		Condition of application: the API is received by the Bureau following the entry into force of the Final Acts of:
			pfd[(1)]	Reference bandwidth	pfd[(1)]	Reference bandwidth	pfd[(1)]	Reference bandwidth	
	(MHz)	(MHz)	(dB(W/m^2))	(MHz)	(dB(W/m^2))	(kHz)	(dB(W/m^2))	(kHz)	
MSS (space-to-Earth)	387-390	322-328.6	−189	6.6	−204	10	−177	10	WRC-07
BSS MSS (space-to-Earth)	1 452-1 492 1 525-1 559	1 400-1 427	−180	27	−196	20	−166	20	WRC-03
MSS (space-to-Earth) MSS (space-to-Earth)	1 525-1 559 1 613.8-1 626.5	1 610.6-1 613.8	NA	NA	−194	20	−166	20	WRC-03
RNSS (space-to-Earth)	1 559-1 610	1 610.6-1 613.8	NA	NA	−194	20	−166	20	WRC-07
BSS FSS (space-to-Earth)	2 655-2 670	2 690-2 700	−177	10	NA	NA	−161	20	WRC-03
FSS (space-to-Earth)	2 670-2 690	2 690-2 700 (in Regions 1 and 3)	−177	10	NA	NA	−161	20	WRC-03
	(GHz)	(GHz)	–	–	–	–	–	–	
BSS	21.4-22.0	22.21-22.5	−146	290	−162	250	−128	250	WRC-03 for VLBI, and WRC-07 for other types of observation

NA: Not applicable, measurements of this type are not made in this frequency band.

(1) Integrated over the reference bandwidth with an integration time of 2 000 s.

TABLE 1-2

epfd thresholds[1] for unwanted emissions from all space stations of a non-GSO satellite system at a radio astronomy station

Space service	Space service frequency band	Radio astronomy frequency band	Single dish, continuum observations		Single dish, spectral line observations		VLBI		Condition of application: the API is received by the Bureau following the entry into force of the Final Acts of:
			epfd[2]	Reference bandwidth	epfd[2]	Reference bandwidth	epfd[2]	Reference bandwidth	
	(MHz)	(MHz)	(dB(W/m^2))	(MHz)	(dB(W/m^2))	(kHz)	(dB(W/m^2))	(kHz)	
MSS (space-to-Earth)	137-138	150.05-153	−238	2.95	NA	NA	NA	NA	WRC-07
MSS (space-to-Earth)	387-390	322-328.6	−240	6.6	−255	10	−228	10	WRC-07
MSS (space-to-Earth)	400.15-401	406.1-410	−242	3.9	NA	NA	NA	NA	WRC-07
MSS (space-to-Earth)	1 525-1 559	1 400-1 427	−243	27	−259	20	−229	20	WRC-07
RNSS (space-to-Earth)[3]	1 559-1 610	1 610.6-1 613.8	NA	NA	−258	20	−230	20	WRC-07
MSS (space-to-Earth)	1 525-1 559	1 610.6-1 613.8	NA	NA	−258	20	−230	20	WRC-07
MSS (space-to-Earth)	1 613.8-1 626.5	1 610.6-1 613.8	NA	NA	−258	20	−230	20	WRC-03

NA: Not applicable, measurements of this type are not made in this frequency band.

(1) These epfd thresholds should not be exceeded for more than 2% of time.

(2) Integrated over the reference bandwidth with an integration time of 2 000 s.

(3) This Resolution does not apply to current and future assignments of the radionavigation-satellite system GLONASS/GLONASS-M in the frequency band 1 559-1 610 MHz, irrespective of the date of reception of the related coordination or notification information, as appropriate. The protection of the radio astronomy service in the frequency band 1 610.6-1 613.8 MHz is ensured and will continue to be in accordance with the bilateral agreement between the Russian Federation, the notifying administration of the GLONASS/GLONASS-M system, and IUCAF, and subsequent bilateral agreements with other administrations.

MOD

RESOLUTION 741 (REV.WRC-15)

Protection of the radio astronomy service in the frequency band 4 990-5 000 MHz from unwanted emissions of the radionavigation-satellite service (space-to-Earth) operating in the frequency band 5 010-5 030 MHz

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that unwanted emissions from space stations of the radionavigation-satellite service (RNSS) operating in the frequency band 5 010-5 030 MHz may cause interference to the radio astronomy service (RAS) in the frequency band 4 990-5 000 MHz;

b) that WRC-2000 decided to introduce a provisional power flux-density (pfd) limit in the frequency band 4 990-5 000 MHz to protect the RAS, and invited ITU-R to conduct studies to review this limit;

c) that protection requirements for the RAS are given in Recommendations ITU-R RA.769 and ITU-R RA.1513, and are different for geostationary (GSO) and non-GSO satellite systems,

noting

a) that Recommendation ITU-R M.1583 provides a methodology based on the equivalent pfd (epfd) concept for calculation of interference resulting from unwanted emissions from non-GSO systems of the mobile-satellite service or RNSS into radio astronomy stations;

b) that Recommendation ITU-R RA.1631 provides antenna patterns and maximum antenna gain to be used for compatibility analyses between non-GSO systems and RAS stations based on the epfd concept;

c) that Recommendation ITU-R RA.1513 recommends acceptable levels of data loss to radio astronomy observations, stating in particular that the percentage of data loss caused by any system should be lower than 2%;

d) that as from the end of WRC-03, the Radiocommunication Bureau reviewed all RNSS systems for which complete coordination or notification information, as appropriate, had been received for the frequency band 5 010-5 030 MHz, and revised its findings regarding compliance with No. **5.443B**, taking into account additional information received under *resolves* 4,

resolves

1 that in order not to cause harmful interference to the RAS in the frequency band 4 990-5 000 MHz, the pfd produced in this frequency band by any GSO RNSS network operating in the 5 010-5 030 MHz frequency band shall not exceed −171 dB(W/m^2) in a 10 MHz frequency band at any radio astronomy station;

2 that in order not to cause harmful interference to the RAS in the frequency band 4 990-5 000 MHz, over the whole sky, for elevations higher than the minimum operating elevation angle θ_{min}[1] specified for the radio telescope, the epfd produced in this frequency band by all space stations within any non-GSO RNSS system operating in the 5 010-5 030 MHz frequency band shall not exceed −245 dB(W/m^2) in a 10 MHz frequency band at any radio astronomy station for more than 2% of the time, using the methodology in Recommendation ITU-R M.1583-1 and a reference antenna with a radiation pattern and maximum antenna gain given in Recommendation ITU-R RA.1631-0;

3 that the limits referred to in *resolves* 1 and 2 shall apply to RNSS systems as from 3 June 2000;

4 that administrations planning to operate a GSO or a non-GSO RNSS system in the frequency band 5 010-5 030 MHz, for which complete coordination or notification information, as appropriate, has been received by the Bureau after 2 June 2000, shall send to the Bureau the value of the maximum level of pfd as referred to in *resolves* 1 or the value of the maximum level of epfd as referred to in *resolves* 2, as appropriate.

[1] Until adoption of a definition of θ_{min} by ITU-R, and publication of notified radio astronomy observatory data, a value of 5° should be assumed in appropriate calculations.

MOD

RESOLUTION 748 (REV.WRC-15)

Compatibility between the aeronautical mobile (R) service and the fixed-satellite service (Earth-to-space) in the frequency band 5 091-5 150 MHz

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the allocation of the frequency band 5 091-5 150 MHz to the fixed-satellite service (FSS) (Earth-to-space) is limited to feeder links of non-geostationary-satellite (non-GSO) systems in the mobile-satellite service (MSS);

b) that the frequency band 5 000-5 150 MHz is currently allocated to the aeronautical mobile-satellite (R) service (AMS(R)S), subject to agreement obtained under No. **9.21**, and to the aeronautical radionavigation service (ARNS);

c) that WRC-07 allocated the frequency band 5 091-5 150 MHz to the aeronautical mobile service (AMS) on a primary basis subject to No. **5.444B**;

d) that the International Civil Aviation Organization (ICAO) is in the process of identifying the technical and operating characteristics of new systems operating in the AM(R)S in the frequency band 5 091-5 150 MHz;

e) that the compatibility of one AM(R)S system, to be used by aircraft operating on the airport surface, and the FSS has been demonstrated in the frequency band 5 091-5 150 MHz;

f) that ITU-R studies have examined potential sharing among the separate AMS applications and the FSS in the frequency band 5 091-5 150 MHz;

g) that the frequency band 117.975-137 MHz currently allocated to the AM(R)S is reaching saturation in certain areas of the world, and therefore that frequency band would not be available to support additional surface applications at airports;

h) that this new allocation is intended to support the introduction of applications and concepts in air traffic management which are data intensive, and which will support data links that carry safety-critical aeronautical data,

recognizing

a) that in the frequency band 5 030-5 091 MHz priority is to be given to the microwave landing system (MLS) in accordance with No. **5.444**;

b) that ICAO publishes recognized international aeronautical standards for AM(R)S systems;

c) that Resolution **114 (Rev.WRC-15)** applies to the sharing conditions between the FSS and ARNS in the frequency band 5 091-5 150 MHz,

noting

a) that the number of FSS transmitting earth stations required may be limited;

b) that the use of the frequency band 5 091-5 150 MHz by the AM(R)S needs to ensure protection of the current or planned use of this frequency band by the FSS (Earth-to-space);

c) that ITU-R studies describe methods for ensuring compatibility between the AM(R)S and FSS operating in the frequency band 5 091-5 150 MHz, and compatibility has been demonstrated for the AM(R)S system referred to in *considering e)*,

resolves

1 that any AM(R)S systems operating in the frequency band 5 091-5 150 MHz shall not cause harmful interference to, nor claim protection from, systems operating in the ARNS;

2 that any AM(R)S systems operating in the frequency band 5 091-5 150 MHz shall meet the SARPs requirements published in Annex 10 of the ICAO Convention on International Civil Aviation and the requirements of Recommendation ITU-R M.1827-1, to ensure compatibility with FSS systems operating in that frequency band;

3 that, in part to meet the provisions of No. **4.10**, the coordination distance with respect to stations in the FSS operating in the frequency band 5 091-5 150 MHz shall be based on ensuring that the signal received at the AM(R)S station from the FSS transmitter does not exceed −143 dB(W/MHz), where the required basic transmission loss shall be determined using the methods described in Recommendations ITU-R P.525-2 and ITU-R P.526-13,

invites

1 administrations to supply technical and operational criteria necessary for sharing studies for the AM(R)S, and to participate actively in such studies;

2 ICAO and other organizations to actively participate in such studies,

instructs the Secretary-General

to bring this resolution to the attention of ICAO.

MOD

RESOLUTION 749 (REV.WRC-15)

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 (Geneva, 2015),

considering

a) that the favourable propagation characteristics of the frequency band 470-862 MHz are beneficial to provide cost-effective solutions for coverage, including 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** of the Radio Regulations, the frequency band 790-862 MHz, or parts of that frequency band, 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 Iran (Islamic Republic of) 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 stand-alone usage of analogue broadcasting systems;

d) that the switch-over to digital may result in spectrum opportunities for new applications;

e) that the timing of the switch-over 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 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 ITU-R pursuant to Resolution **749 (WRC-07)** 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-07)**, which need to take into account the cumulative effect of interference,

further recognizing

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 Iran (Islamic Republic of)) since 1971 (prior to WRC-07);

b) that the GE06 Agreement, in its relevant Annexes, establishes the relation between digital terrestrial broadcasting, on the one hand, and other primary terrestrial services, including the aeronautical radionavigation service in the countries mentioned in No. **5.312**, on the other hand;

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 aeronautical radionavigation service 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 International Mobile Telecommunications (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 the 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 Iran (Islamic Republic of), on the one hand, and the other countries of Region 3, on the other hand, 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-15)** applies,

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, aeronautical radionavigation (in accordance with No. **5.312**), fixed and broadcasting services, 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)** 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 Annex 1 to this Resolution, administrations implementing the mobile service in Region 1 shall seek agreement under No. **9.21** with respect to the aeronautical radionavigation service in the countries mentioned in No. **5.312** of the Radio Regulations;

2 that for Region 1 and Iran (Islamic Republic of):

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 Recommendations ITU-R BT.1368 and ITU-R BT.2033;

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

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

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

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

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 1 TO RESOLUTION 749 (REV.WRC-15)

The 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 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 base stations of MS (km)	Coordination distances for transmitting base stations of MS (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 aggregate 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 750 (REV.WRC-15)

Compatibility between the Earth exploration-satellite service (passive) and relevant active services

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that primary allocations have been made to various space services such as the fixed-satellite service (Earth-to-space), the space operation service (Earth-to-space) and the inter-satellite service and/or to terrestrial services such as the fixed service, the mobile service and the radiolocation service, hereinafter referred to as "active services", in frequency bands adjacent or nearby to frequency bands allocated to the Earth exploration-satellite service (EESS) (passive) subject to No. **5.340**;

b) that unwanted emissions from active services have the potential to cause unacceptable interference to EESS (passive) sensors;

c) that, for technical or operational reasons, the general limits in Appendix **3** may be insufficient in protecting the EESS (passive) in specific frequency bands;

d) that, in many cases, the frequencies used by EESS (passive) sensors 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;

e) that the frequency band 1 400-1 427 MHz is used for measuring soil moisture, and also for measuring sea-surface salinity and vegetation biomass;

f) that long-term protection of the EESS in the frequency bands 23.6-24 GHz, 31.3-31.5 GHz, 50.2-50.4 GHz, 52.6-54.25 GHz and 86-92 GHz is vital to weather prediction and disaster management, and measurements at several frequencies must be made simultaneously in order to isolate and retrieve each individual contribution;

g) that, in many cases, the frequency bands adjacent or nearby to passive service frequency bands are used and will continue to be used for various active service applications;

h) that it is necessary to ensure equitable burden sharing for achieving compatibility between active and passive services operating in adjacent or nearby frequency bands,

noting

a) that the compatibility studies between relevant active and passive services operating in adjacent and nearby frequency bands are documented in Report ITU-R SM.2092;

b) that the compatibility studies between IMT systems in the frequency bands 1 375-1 400 MHz and 1 427-1 452 MHz and EESS (passive) systems in the frequency band 1 400-1 427 MHz are documented in Report ITU-R RS.2336;

c) that Report ITU-R F.2239 provides the results of studies covering various scenarios between the fixed service, operating in the frequency band 81-86 GHz and/or 92-94 GHz, and the Earth exploration-satellite service (passive), operating in the frequency band 86-92 GHz;

d) that Recommendation ITU-R RS.1029 provides the interference criteria for satellite passive remote sensing,

noting further

that, for the purpose of this resolution:

– point-to-point communication is defined as radiocommunication provided by a link, for example a radio-relay link, between two stations located at specified fixed points;

– point-to-multipoint communication is defined as radiocommunication provided by links between a single station located at a specified fixed point (also called "hub station") and a number of stations located at specified fixed points (also called "customer stations"),

recognizing

1 that studies documented in Report ITU-R SM.2092 do not consider point-to-multipoint communication links in the fixed service in the frequency bands 1 350-1 400 MHz and 1 427-1 452 MHz;

2 that, in the frequency band 1 427-1 452 MHz, mitigation measures, such as channel arrangements, improved filters and/or guardbands, may be necessary in order to meet the limits of unwanted emission for IMT stations in the mobile service specified in Table 1-1 of this resolution;

3 that, in the frequency band 1 427-1 452 MHz, IMT mobile stations typically perform better than the equipment specifications as stated by relevant standards organizations, which may be taken into account in meeting the limits specified in Table 1-1 (see also sections 4 and 5 of Report ITU-R RS.2336),

resolves

1 that unwanted emissions of stations brought into use in the frequency bands and services listed in Table 1-1 below shall not exceed the corresponding limits in that table, subject to the specified conditions;

2 to urge administrations to take all reasonable steps to ensure that unwanted emissions of active service stations in the frequency bands and services listed in Table 1-2 below do not exceed the recommended maximum levels contained in that table, noting that EESS (passive) sensors provide worldwide measurements that benefit all countries, even if these sensors are not operated by their country;

3 that the Radiocommunication Bureau shall not make any examination or finding with respect to compliance with this resolution under either Article **9** or **11**.

TABLE 1-1

EESS (passive) band	**Active service band**	**Active service**	**Limits of unwanted emission power from active service stations in a specified bandwidth within the EESS (passive) band**[1]
1 400-1 427 MHz	1 427-1 452 MHz	Mobile	−72 dBW in the 27 MHz of the EESS (passive) band for IMT base stations −62 dBW in the 27 MHz of the EESS (passive) band for IMT mobile stations[2, 3]
23.6-24.0 GHz	22.55-23.55 GHz	Inter-satellite	−36 dBW in any 200 MHz of the EESS (passive) band for non-geostationary (non-GSO) inter-satellite service (ISS) systems for which complete advance publication information is received by the Bureau before 1 January 2020, and −46 dBW in any 200 MHz of the EESS (passive) band for non-GSO ISS systems for which complete advance publication information is received by the Bureau on or after 1 January 2020
31.3-31.5 GHz	31-31.3 GHz	Fixed (excluding HAPS)	For stations brought into use after 1 January 2012: −38 dBW in any 100 MHz of the EESS (passive) band. This limit does not apply to stations that have been authorized prior to 1 January 2012
50.2-50.4 GHz	49.7-50.2 GHz	Fixed-satellite (E-to-s)[4]	For stations brought into use after the date of entry into force of the Final Acts of WRC-07: −10 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 57 dBi −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 57 dBi
50.2-50.4 GHz	50.4-50.9 GHz	Fixed-satellite (E-to-s)[4]	For stations brought into use after the date of entry into force of the Final Acts of WRC-07: −10 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 57 dBi −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 57 dBi
52.6-54.25 GHz	51.4-52.6 GHz	Fixed	For stations brought into use after the date of entry into force of the Final Acts of WRC-07: −33 dBW in any 100 MHz of the EESS (passive) band

[1] The unwanted emission power level is to be understood here as the level measured at the antenna port.

[2] This limit does not apply to mobile stations in the IMT systems for which the notification information has been received by the Radiocommunication Bureau by 28 November 2015. For those systems, −60 dBW/27 MHz applies as the recommended value.

[3] The unwanted emission power level is to be understood here as the level measured with the mobile station transmitting at an average output power of 15 dBm.

[4] The limits apply under clear-sky conditions. During fading conditions, the limits may be exceeded by earth stations when using uplink power control.

TABLE 1-2

EESS (passive) band	**Active service band**	**Active service**	**Recommended maximum level of unwanted emission power from active service stations in a specified bandwidth within the EESS (passive) band[1]**
1 400-1 427 MHz	1 350- 1 400 MHz	Radiolocation[2]	−29 dBW in the 27 MHz of the EESS (passive) band
		Fixed	−45 dBW in the 27 MHz of the EESS (passive) band for point-to-point
		Mobile	−60 dBW in the 27 MHz of the EESS (passive) band for mobile service stations except transportable radio-relay stations −45 dBW in the 27 MHz of the EESS (passive) band for transportable radio-relay stations
	1 427- 1 429 MHz	Space operation (E-to-s)	−36 dBW in the 27 MHz of the EESS (passive) band
	1 427- 1 429 MHz	Mobile except aeronautical mobile	−60 dBW in the 27 MHz of the EESS (passive) band for mobile service stations except IMT stations and transportable radio-relay stations −45 dBW in the 27 MHz of the EESS (passive) band for transportable radio-relay stations
		Fixed	−45 dBW in the 27 MHz of the EESS (passive) band for point-to-point
	1 429- 1 452 MHz	Mobile	−60 dBW in the 27 MHz of the EESS (passive) band for mobile service stations except IMT stations and transportable radio-relay stations[3] −45 dBW in the 27 MHz of the EESS (passive) band for transportable radio-relay stations and aeronautical telemetry stations −28 dBW in the 27 MHz of the EESS (passive) band for aeronautical telemetry stations[4]
		Fixed	−45 dBW in the 27 MHz of the EESS (passive) band for point-to-point
31.3-31.5 GHz	30.0-31.0 GHz	Fixed-satellite (E-to-s)[4]	−9 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 56 dBi −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 56 dBi

EESS (passive) band	Active service band	Active service	Recommended maximum level of unwanted emission power from active service stations in a specified bandwidth within the EESS (passive) band[1]
86-92 GHz[5]	81-86 GHz	Fixed	$-41 - 14(f - 86)$ dBW/100 MHz for $86.05 \le f \le 87$ GHz −55 dBW/100 MHz for $87 \le f \le 91.95$ GHz where f is the centre frequency of the 100 MHz reference bandwidth expressed in GHz
	92-94 GHz	Fixed	$-41 - 14(92 - f)$ dBW/100 MHz for $91 \le f \le 91.95$ GHz −55 dBW/100 MHz for $86.05 \le f \le 91$ GHz where f is the centre frequency of the 100 MHz reference bandwidth expressed in GHz

[1] The unwanted emission power level is to be understood here as the level measured at the antenna port.

[2] The mean power is to be understood here as the total power measured at the antenna port (or an equivalent thereof) in the frequency band 1 400-1 427 MHz, averaged over a period of the order of 5 s.

[3] The frequency band 1 429-1 435 MHz is also allocated to the aeronautical mobile service in eight Region 1 administrations on a primary basis exclusively for the purposes of aeronautical telemetry within their national territory (No. **5.342**).

[4] The recommended maximum levels apply under clear-sky conditions. During fading conditions, these levels may be exceeded by earth stations when using uplink power control.

[5] Other maximum unwanted emission levels may be developed based on different scenarios provided in Report ITU-R F.2239 for the frequency band 86-92 GHz.

MOD

RESOLUTION 901 (REV.WRC-15)

Determination of the orbital arc separation for which coordination would be required between two satellite networks operating in a space service not subject to a Plan

The World Radiocommunication Conference (Geneva,2015),

considering

a) that WRC-2000 adopted a coordination arc concept in Appendix 5 to simplify the coordination between fixed-satellite service (FSS) networks in certain frequency bands between 3.4 GHz and 30 GHz;

b) that in frequency bands below 3.4 GHz, mobile-satellite service (MSS) satellite networks normally have to coordinate with other networks with overlapping service areas operating anywhere in the visible arc;

c) that the application of such a concept was limited to the frequency ranges where very large numbers of FSS satellite filings had been received by ITU-R;

d) that many satellite networks and systems are now proposing to use higher frequency bands for which the coordination arc does not yet apply;

e) that the Radio Regulations Board (RRB) adopted a Rule of Procedure on No. **9.36** that extended the coordination arc concept to the FSS and broadcasting-satellite service (BSS), not subject to a Plan, and in all frequency bands above 3.4 GHz until a review by WRC-03;

f) that the use of the coordination arc considerably reduces the volume of data that needs to be supplied to the Radiocommunication Bureau under Section D of Annex 2 to Appendix **4**;

g) that application of the coordination arc concept has the potential to reduce the workload of the Bureau in identifying affected administrations;

h) that the coordination arc concept may be valid for all geostationary space stations operating in any space radiocommunication service above 3.4 GHz that is not subject to a Plan, but may require different values for different services and frequency bands;

i) that the ITU-R studies for other services and for frequency bands above 17.3 GHz, except for the 17.7-20.2 GHz and 29.5-30 GHz ranges for the FSS, have not been completed;

j) that application of the coordination arc concept could facilitate the introduction of satellite services above 17.3 GHz after the studies conclude on the appropriate value(s) of the coordination arc,

recognizing

that there have been no difficulties resulting from the application of the coordination arc concept in the frequency bands where it applies,

noting

Recommendation ITU-R S.1780 "Coordination between geostationary-satellite orbit fixed-satellite service networks and broadcasting-satellite service networks in the frequency band 17.3-17.8 GHz",

further noting

that WRC-07 incorporated part of the Rule of Procedure referred to in *considering e)* and extended the coordination arc of ±8° for the FSS in frequency bands above 17.3 GHz on a provisional basis, and has adopted an alternative value of ±16° on a provisional basis for the coordination arc applicable for the BSS in these frequency bands in Table 5-1 of Appendix **5**,

resolves

to recommend that a future competent conference review the results of ITU-R studies on the application of the coordination arc value(s) to other frequency bands and other services, as applicable, and consider their inclusion in Appendix **5**,

invites ITU-R

1 to conduct studies on the applicability of the coordination arc concept for space radiocommunication services not yet covered by these Regulations;

2 to recommend, as appropriate, the orbital separation required for triggering inter-service and intra-service coordination concerning the satellite services in frequency bands above 3.4 GHz for geostationary-satellite (GSO) networks not subject to a Plan and not already covered by the coordination arc concept specified in No. **9.7** (GSO/GSO) of Table 5-1 (Appendix **5**), under items 1) to 8) of the frequency band column, and subject to Section II of Article **9**,

instructs the Director of the Radiocommunication Bureau

to report the results of these studies to the RRB once Recommendations are approved, and to the next competent conference.

MOD

RESOLUTION 903 (REV.WRC-15)

Transitional measures for certain broadcasting-satellite/fixed-satellite service systems in the frequency band 2 500-2 690 MHz

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that WRC-07 revised the limits of power flux-density from space stations in Article **21**, Table **21-4** for the frequency band 2 500-2 690 MHz;

b) that use of the frequency bands 2 500-2 690 MHz in Region 2 and 2 500-2 535 MHz and 2 655-2 690 MHz in Region 3 by the fixed-satellite service (FSS) is limited to national and regional systems, subject to agreement obtained under No. **9.21** (see No. **5.415** and No. **5.2.1**);

c) that in the frequency band 2 520-2 670 MHz, the broadcasting-satellite service (BSS) is limited to national and regional systems, subject to agreement obtained under No. **9.21** (see No. **5.416** and No. **5.2.1**);

d) that, in No. **5.384A**, the frequency band 2 500-2 690 MHz is identified as one of the frequency bands for use by administrations wishing to implement International Mobile Telecommunications (IMT) in accordance with Resolution **223 (Rev.WRC-15)**;

e) that, due to the specific national and regional allocation status applied to the space services mentioned above, and the identification for use by administrations wishing to implement IMT, it is advantageous to apply the revised Article **21**, Table **21-4** limits in the frequency band 2 500-2 690 MHz at an early date;

f) that agenda item 1.9 of WRC-07 mentioned a requirement to not place undue constraints on the services to which the frequency band is allocated,

resolves

1 that in the frequency band 2 500-2 690 MHz space stations of satellite networks listed in Annex 1 to this Resolution shall not exceed the following pfd values:

-152 dB(W/m^2) for $\delta < 5°$

$-152 + 0.75\ (\delta - 5)$ dB(W/m^2) for $5° \leq \delta \leq 25°$

-137 dB(W/m^2) for $\delta > 25°$

in any 4 kHz band, where δ is the angle of arrival above the horizontal plane. The limits in Table **21-4** do not apply;

2 that, for systems other than those addressed in *resolves* 1, No. **5.418** and Resolution **539 (Rev.WRC-15)**, the Bureau shall examine any coordination and notification information with respect to the provisions Nos. **9.35** and **11.31** (respectively) for frequency assignments in the FSS or BSS received by the Bureau after 14 November 2007 using the pfd limits for the frequency band 2 500-2 690 MHz in Table **21-4** of Article **21**,

instructs the Bureau

to implement *resolves* 1 and *resolves* 2.

ANNEX 1 TO RESOLUTION 903 (REV.WRC-15)

Notifying administration	**Name of space station**	**Orbital position**	**Coordination request Special Section**	**Date of receipt of Advance Publication Information**
IND	INSAT-2(74)	74.00 E	CR/C/1311 and CR/C/1311 M1	07.08.85
IND	INSAT-2(83)	83.00 E	CR/C/1312 and CR/C/1312 M1	07.08.85
IND	INSAT-2(93.5)	93.50 E	CR/C/1313 and CR/C/1313 M1	07.08.85

MOD

RESOLUTION 906 (REV.WRC-15)

Electronic submission of notices for terrestrial services to the Radiocommunication Bureau and exchange of data between administrations

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the electronic format for submission of notifications concerning terrestrial services under Article **11** and Plans annexed to Regional Agreements has been used by the Radiocommunication Bureau since September 1994;

b) that, since 8 December 1998, submission of high-frequency broadcasting schedule requirements under Article **12** has been in electronic format only;

c) that, since 3 June 2001 for space services, all notices and related information submitted to the Radiocommunication Bureau pursuant to Articles **9** and **11** have been submitted in electronic format only;

d) that, since January 2009, the submission of notices for terrestrial services is done in electronic format only, using the secured ITU web interface WISFAT (Web Interface for the Submission of Frequency Assignments/Allotments to Terrestrial Services) in accordance with Circular Letter CR/297;

e) that RRC-06 decided that all submissions in the application of Articles 4 and 5 of the GE06 Regional Agreement shall be in electronic format only;

f) that preparation of notices for terrestrial services in electronic format allows administrations to validate the data prior to submission using Radiocommunication Bureau software tools;

g) that submission of notices for terrestrial services in electronic format removes the need for the Radiocommunication Bureau to transcribe the data, avoids the potential for the introduction of errors and reduces the data processing effort required by the Radiocommunication Bureau;

h) that the submission of notices for terrestrial services in electronic format only may require appropriate training on the Radiocommunication Bureau’s software tools, especially in developing and least-developed countries;

i) that, for some administrations, the submission of notices for terrestrial services in electronic format only may require the adaptation of their national procedures and the development of appropriate electronic facilities;

j) that information in electronic format could be used to fulfil administrations' database requirements and facilitate the exchange of information between administrations and with the Radiocommunication Bureau;

k) that administrations have the sovereign right to establish bilateral agreements pertaining to cross-border coordination issues, including the definition of the format for the mutual exchange of information;

l) that administrations recognize the importance and requirement of electronic submission of notices for terrestrial services to the Radiocommunication Bureau,

further considering

a) that the use of an electronic format for the submission of notices for terrestrial services to the Radiocommunication Bureau tends to reduce its costs and allows a better publication of data;

b) that the Radiocommunication Bureau makes available free of charge to administrations terrestrial notification software (TerRaNotices) through the distribution of its BR International Frequency Information Circular (BR IFIC) for terrestrial services;

c) that in its Resolution 9 (Rev. Dubai, 2014), on the participation of countries, particularly developing countries, in spectrum management, the World Telecommunication Development Conference (WTDC-14) recognizes the importance of facilitating access to radiocommunication-related documentation in order to facilitate the task of radio-frequency spectrum managers;

d) that in its Decision 12 (Rev. Busan, 2014), on free online access to ITU publications, the Plenipotentiary Conference instructed the Secretary-General of ITU to prepare a report on an ongoing basis on sales of ITU software and databases, and to present this report to the Council, which will decide on further policies for improving access to ITU publications, software and databases;

e) that an automated spectrum management system would, among other things, facilitate national spectrum management and monitoring, coordination among administrations and notification to the Radiocommunication Bureau;

f) that Recommendation ITU-R SM.1370 provides design guidelines for developing automated spectrum management systems at the national level;

g) that data elements used in national spectrum management for international coordination and notification have been reflected in Appendix **4** of the Radio Regulations and in Recommendation ITU-R SM.1413;

h) that the Radiocommunication Advisory Group has established a task group to review the Radiocommunication Bureau's information systems used for the submission and treatment of notices for terrestrial and space services;

i) the difficulty faced by many countries, particularly developing and least-developed countries, in participating in the activities of ITU-R world radiocommunication seminars and study group meetings dealing with terrestrial services,

resolves

1 that administrations are encouraged to accelerate migration to the use of an electronic format and electronic facilities for the submission of notices to the Bureau and for the exchange of coordination data between administrations;

2 that the format established by ITU-R for electronic notices be considered by administrations for the exchange of information,

instructs the Director of the Radiocommunication Bureau

1 to refine, as required, the specification of the electronic format and related software to be used for the submission of notices for terrestrial services;

2 to provide assistance, as required, to any administration in the use of the electronic format for the submission of notices for terrestrial services;

3 to support developing and least-developed countries while deploying electronic facilities for the submission of electronic notices to the Bureau and for the exchange of coordination data between administrations;

4 to include in radiocommunication seminars and regional workshops appropriate training in the use of the electronic format and related software for the submission of notices for terrestrial services.

MOD

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

The World Radiocommunication Conference (Geneva, 2015),

considering

that the use of electronic means of communication for administrative correspondence related to advance publication, coordination and notification of satellite networks, earth stations and radio astronomy stations would facilitate the tasks of the Radiocommunication Bureau and of administrations and has the potential to improve the coordination and notification process by reducing the amount of duplicated correspondence,

noting

that Decision 5 (Rev. Busan, 2014) of the Plenipotentiary Conference includes, in its Annex 2, paragraph 28, which proposes to "*discontinue to the greatest extent possible communications by fax and traditional postal mail between the Union and Member States and replace it with modern electronic communication methods*",

recognizing

that administrations could use the time freed by a reduction of administrative correspondence to effect coordination,

resolves

1 that modern electronic means of communication shall be used whenever possible in the administrative correspondence between administrations and the Radiocommunication Bureau 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;

2 that, wherever the words "telegram", "telex" or "fax" are inserted in provisions related to the advance publication, coordination, notification and recording processes of satellite networks, earth stations and radio astronomy stations, including the provisions contained in Appendices **30**, **30A** and **30B**, modern electronic means shall be used, to the greatest extent possible;

3 that other traditional means of communication shall continue to be used unless the administration informs the Bureau of its willingness to discontinue such use,

instructs the Radiocommunication Bureau

1 to provide administrations with the necessary technical means to ensure that the modern electronic correspondence between administrations and the Radiocommunication Bureau is secure;

2 to inform administrations of the availability of such means and of the associated schedule of implementation;

3 to automatically acknowledge receipt of all electronic correspondence;

4 to report to the next world radiocommunication conference on the experience gained in the application of this resolution, with a view to making any necessary consequential amendments to the Radio Regulations,

urges administrations

to use, to the extent possible, modern electronic means of communication in the administrative correspondence between themselves related to advance publication, coordination and notification of satellite networks, including that related to Appendices **30**, **30A** and **30B**, and to earth stations and radio astronomy stations, recognizing that other means of communication may still be used if necessary (see also *resolves* 3).

MOD

RESOLUTION 908 (REV.WRC-15)

Electronic submission and publication of satellite network filings

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the volume of advance publication information (API), coordination requests (CR/C), notifications and filings under Appendices **30**, **30A** and **30B** for satellite networks or systems has been steadily increasing in recent years;

b) that a significant amount of effort is required to maintain the relevant databases;

c) that a paperless electronic approach for 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 the Bureau in the processing of these filings,

noting

a) that, through Circular Letters CR/363 and CR/376, the Bureau informed administrations that a web-based application (SpaceWISC) is available as of 1 March 2015 for the submission and publication of API notices for satellite networks or systems subject to coordination and of administrations' associated comments;

b) that, through Circular Letter CR/360, the Bureau informed administrations that web-based online distribution of the International Frequency Information Circular BR IFIC (Space services) on DVD-ROM in ISO format has been developed, allowing the data to be available without delay on the BR IFIC publication date and enabling administrations to obtain a secure local reproduction of the BR IFIC (Space services) DVD-ROM,

resolves

that administrations shall submit all satellite network filings and comments, if required, using a secure paperless electronic approach upon being advised that the means for such electronic submission of a satellite network filing for satellite networks or systems has been implemented and upon receiving assurances that such means are indeed secure,

instructs the Director of the Radiocommunication Bureau

1 to implement a secure paperless electronic approach for the electronic submission and publication of satellite network filings and comments, if required, for satellite networks or systems, taking into account the conditions mentioned in the *resolves* of this resolution;

2 to study and implement, as appropriate, a consolidated approach for the electronic submission of both satellite network filings and their related correspondence.

ADD

RESOLUTION PLEN/1 (WRC-15)

Deployment of earth stations in some Regions 1 and 2 countries in the frequency band 14.5-14.75 GHz in the fixed-satellite service (Earth-to-space) not for feeder links for the broadcasting-satellite service

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that there is a demand for satellite communication services, particularly for the Earth-to-space direction in the frequency range 13-17 GHz;

b) that some of this demand may be met by earth stations operating in the frequency band 14.5-14.8 GHz without requiring this use to be subject to the Appendix **30A** Plan or List;

c) that certain conditions would be required in order to ensure the protection and future use of assignments subject to the Appendix **30A** Plan and List;

d) that, in order to ensure the protection of current and future use of other services to which this frequency band is allocated, earth stations would need to operate under certain technical and operational limitations (see Nos. **5.A16, 5.B16, 5.D16, 5.E16** and **5.F16**);

e) that some administrations may not be in a position to ascertain the potential future use of this frequency band in their territory,

resolves

that earth stations in Regions 1 and 2 in the frequency band 14.5-14.75 GHz in the fixed-satellite service (Earth-to-space) not for feeder links for the broadcasting-satellite service shall be operated only in the following countries: Algeria, Saudi Arabia, Argentina, Armenia, Azerbaijan, Bahrain, Belarus, Brazil, Bulgaria, Cuba, Egypt, El Salvador, the Russian Federation, Iraq, Jordan, Kazakhstan, Kuwait, Mauritania, Mexico, Morocco, Nicaragua, Norway, Oman, Uzbekistan, Qatar, Kyrgyzstan, Sudan, Turkey, Uruguay and Venezuela; such operation is subject to the technical and operational limitations contained in Nos. **5.A16, 5.B16, 5.D16, 5.E16** and **5.F16**.

ADD

RESOLUTION PLEN/2 (WRC-15)

Deployment of earth stations in some Region 3 countries in the frequency band 14.5-14.8 GHz in the fixed-satellite service (Earth-to-space) not for feeder links for the broadcasting-satellite service

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that there is a demand for satellite communication services, particularly for the Earth-to-space direction in the frequency range 13-17 GHz;

b) that some of this demand may be met by earth stations operating in the frequency band 14.5-14.8 GHz without requiring this use to be subject to the Appendix **30A** Plan or List;

c) that certain conditions would be required in order to ensure the protection and future use of assignments subject to the Appendix **30A** Plan and List;

d) that, in order to ensure the protection of current and future use of other services to which this frequency band is allocated, earth stations would need to operate under certain technical and operational limitations (see Nos. **5.A16, 5.B16, 5.D16, 5.E16** and **5.F16**);

e) that some administrations may not be in a position to ascertain the potential future use of this frequency band in their territory,

resolves

that earth stations in Region 3 in the frequency band 14.5-14.8 GHz in the fixed-satellite service (Earth-to-space) not for feeder links for the broadcasting-satellite service shall be operated only in the following countries: Australia, Cambodia, China, Japan, Lao P.D.R., Pakistan, Papua New Guinea, Thailand and Viet Nam; such operation is subject to the technical and operational limitations contained in Nos. **5.A16, 5.B16, 5.D16, 5.E16** and **5.F16**.

ADD

RESOLUTION COM4/1 (WRC-15)

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

The World Radiocommunication Conference (Geneva, 2015),

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 Recommendation ITU-R M.2085 in the course of development of SARPs for WAIC systems.

ADD

RESOLUTION COM4/2 (WRC-15)

Use of the frequency band 1 087.7-1 092.3 MHz by the aeronautical mobile-satellite (R) service (Earth-to-space) to facilitate global flight tracking for civil aviation

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that Resolution 185 (Busan, 2014) of the Plenipotentiary Conference instructed WRC-15, pursuant to No. 119 of the ITU Convention, to include in its agenda, as a matter of urgency, the consideration of global flight tracking, including, if appropriate, and consistent with ITU practices, various aspects of the matter, taking into account ITU-R studies;

b) that the frequency band 960-1 164 MHz is allocated to the aeronautical radionavigation service (ARNS) and the aeronautical mobile (R) service (AM(R)S);

c) that the frequency band 960-1 164 MHz is used by International Civil Aviation Organization (ICAO) standardized and non-ICAO systems, thus creating a complex interference environment;

d) that Automatic Dependent Surveillance-Broadcast (ADS-B) is defined by ICAO, and involves aircraft transmission of data such as identification and position;

e) that the frequency band 1 087.7-1 092.3 MHz is currently utilized for terrestrial transmission and reception of ADS-B signals in accordance with ICAO standards, involving transmissions from aircraft to terrestrial stations on the ground within line-of-sight;

f) that this conference allocated the frequency band 1 087.7-1 092.3 MHz to the aeronautical mobile-satellite (R) service (AMS(R)S) in the Earth-to-space direction, limited to the space station reception of ADS-B emissions from aircraft transmitters that operate in accordance with recognized international aeronautical standards;

g) that the allocation of the frequency band 1 087.7-1 092.3 MHz to AMS(R)S is to extend reception of currently transmitted ADS-B signals beyond terrestrial line-of-sight, to facilitate reporting the position of ADS-B equipped aircraft located anywhere in the world;

h) that, taking into account *considering c)*, use of the frequency band 1 087.7-1 092.3 MHz requires some administrations to control all users to ensure proper operation of all terrestrial systems,

recognizing

a) that ICAO develops Standards and Recommended Practices (SARPs) for systems enabling position determination and tracking of aircraft;

b) that Annex 10 to the Convention on International Civil Aviation contains SARPs for terrestrial ADS-B usage of the frequency band 1 087.7-1 092.3 MHz,

noting

that the development of performance criteria for space station reception of ADS-B operating under the provisions of No. **5.A25**, including whether such criteria would require modifications to ICAO standard ADS-B equipment, is the responsibility of ICAO,

resolves

1 that the use of the frequency band 1 087.7-1 092.3 MHz by AMS(R)S systems shall be in accordance with recognized international aeronautical standards;

2 that AMS(R)S systems (Earth-to-space) in the frequency band 1 087.7-1 092.3 MHz shall be designed so that they can operate in the interference environment as described in *considering c)*;

3 that, taking into account *resolves* 2, AMS(R)S use of the frequency band 1 087.7-1 092.3 MHz shall not constrain administrations which have responsibilities as referred to in *considering h)*,

invites the ITU Radiocommunication Sector

to complete, as a matter of urgency, the studies related to the space station reception of ADS-B in the frequency band 1 087.7-1 092.3 MHz,

further invites the International Civil Aviation Organization

to continue to participate in the studies,

instructs the Secretary-General

to bring this resolution to the attention of ICAO and communicate the results of the studies when available.

ADD

RESOLUTION COM4/3 (WRC-15)

Technical studies on the coexistence of the radiolocation service and the amateur, amateur-satellite and radio astronomy services in the frequency band 76-81 GHz

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the frequency band 77.5-78 GHz is allocated to the amateur and amateur-satellite services on a primary basis;

b) that the frequency band 77.5-78 GHz is allocated to the radio astronomy service (RAS) on a secondary basis;

c) that this conference has allocated the frequency band 77.5-78 GHz to the radiolocation service on a primary basis;

d) that under No. **5.149**, administrations, in making assignments to stations of services other than radio astronomy to which the frequency band 76-86 GHz is allocated, are urged to take all practicable steps to protect the RAS from harmful interference,

noting

a) that the allocation of the frequency band 76-81 GHz to the radiolocation service is used by radar applications and that a radar station may use the entire frequency band 76-81 GHz;

b) that technical parameters of radars for automotive applications are contained in Recommendation ITU-R M.2057;

c) that sharing studies between the amateur, amateur-satellite and radio astronomy services and the radiolocation service are limited to automotive radars as described in Report ITU-R M.2322,

recognizing

a) that administrations may benefit from the availability of studies and guidelines about the protection of the RAS in the frequency band 76-81 GHz;

b) that the protection of the RAS, in accordance with *considering d)*, may require additional measures in some countries, such as the definition of specific exclusion zones around RAS sites,

resolves to invite the ITU Radiocommunication Sector

to perform studies to assist administrations in ensuring compatibility between applications of the amateur, amateur-satellite and radio astronomy services and radiolocation service applications in the frequency band 76-81 GHz, taking into account those already completed in Report ITU-R M.2322, and develop ITU-R Recommendations and Reports, as appropriate.

ADD

RESOLUTION COM4/4 (WRC-15)

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 (Geneva, 2015),

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)**, the 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 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** of the Radio Regulations, the frequency band 694-790 MHz, or parts of that 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 Iran (Islamic Republic of) in the frequency bands 174-230/470-862 MHz;

c) that, in the frequency band 694-790 MHz, Resolution **224 (Rev.WRC-15)** applies;

d) that WRC-12, through Resolution **232 (WRC-12)**, 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 this conference 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)** 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 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;

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)[1] 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 Iran (Islamic Republic of):

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 Recommendations ITU-R BT.1368 and ITU R BT.2033;

2.2 to invite administrations to take into account, *inter alia*, the results of the sharing studies conducted by ITU-R in response to Resolution **232 (WRC-12)**;

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,

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;

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[1] 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.

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 COM4/4 (WRC-15)

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 (MS) 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 MS 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 base stations of MS from ARNS stations.

ADD

RESOLUTION COM4/5 (WRC-15)

Regulatory provisions related to earth stations on board unmanned aircraft which operate with geostationary-satellite networks in the fixed-satellite service in certain frequency bands not subject to a Plan of Appendices 30, 30A and 30B for the control and non-payload communications of unmanned aircraft systems in non-segregated airspaces*

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the operation of unmanned aircraft systems (UAS) requires reliable control and non-payload communication (CNPC) links, in particular to relay air traffic control communications and for the remote pilot to control the flight;

b) that satellite networks may be used to provide CNPC links of UAS beyond the line-of-sight, as shown in Annex 1;

c) that CNPC links between space stations and stations on board unmanned aircraft (UA) are proposed to be operated under this resolution in the primary fixed-satellite service (FSS) in frequency bands shared with other primary services, including terrestrial services, however that would not preclude the use of other available allocations to accommodate this application,

considering further

a) that UAS CNPC links relate to the safe operation of UAS and have to comply with certain technical, operational and regulatory requirements,

noting

a) that this conference has adopted Resolution **COM5/2** on the use of earth stations in motion communicating with geostationary FSS space stations in the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz;

b) that Report ITU-R M.2171 provides information on characteristics of UAS and spectrum requirements to support their safe operation in non-segregated airspace,

* May also be used consistent with international standards and practices approved by the responsible civil aviation authority.

recognizing

a) that the UAS CNPC links will operate in accordance with international standards and recommended practices and procedures established in accordance with the Convention on International Civil Aviation;

b) that, in this resolution, conditions are provided for operations of CNPC links without prejudging whether the International Civil Aviation Organization (ICAO) would be able to develop standards and recommended practices to ensure safe operation of UAS under these conditions,

resolves

1 that assignments to stations of geostationary FSS satellite networks operating in 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, 12.2-12.5 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Regions 1 and 3 and 19.7-20.2 GHz (space-to-Earth), and in the frequency bands 14-14.47 GHz (Earth-to-space) and 29.5-30.0 GHz (Earth-to-space), may be used for UAS CNPC links in non-segregated airspace[*], provided that the conditions specified in *resolves* below are met;

2 that earth stations in motion on board UA may communicate with the space station of a geostationary FSS satellite network operating in the frequency bands listed in *resolves* 1 above, provided that the class of the earth station in motion on board UA is matched with the class of the space station and that other conditions of this resolution are met (see also *instructs the Director of the Radiocommunication Bureau* 3 below);

3 that the frequency bands specified in *resolves* 1 shall not be used for the UAS CNPC links before the adoption of the relevant international aeronautical standards and recommended practices (SARPs) consistent with Article 37 of the Convention on International Civil Aviation, taking into account *instructs the Director of the Radiocommunication Bureau* 4;

4 that administrations responsible for an FSS network providing UA CNPC links shall apply the relevant provisions of Articles **9** (necessary provisions need to be identified or developed) and **11** for the relevant assignments, including, as appropriate, assignments to the corresponding space station, specific and typical earth station and earth station in motion on board UA, including the request for publication in BR IFIC of items referred to in *resolves* 2 and the course of actions identified in that *resolves* in order to obtain international rights and recognition as specified in Article **8**;

[*] May also be used consistent with international standards and practices approved by the responsible civil aviation authority.

5 that earth stations of UAS CNPC links shall operate within the notified and recorded technical parameters of the associated satellite network, including specific or typical earth stations of the geostationary FSS satellite network(s) as published by the Radiocommunication Bureau;

6 that earth stations of UAS CNPC links shall not cause more interference to, or claim more protection from, other satellite networks and systems than specific or typical earth stations as indicated in *resolves* 5 as published by the Bureau;

7 that, in order to apply *resolves* 6 above, administrations responsible for the FSS network to be used for UAS CNPC links shall provide the level of interference for the reference assignments of the network used for CNPC links upon request by an administration authorizing the use of UAS CNPC links within its territory;

8 that earth stations of UAS CNPC links of a particular FSS network shall not cause more interference to, or claim more protection from, stations of terrestrial services than specific or typical earth stations of that FSS network as indicated in *resolves* 5 that have been previously coordinated and/or notified under relevant provisions of Articles **9** and **11**;

9 that the use of assignments of a FSS satellite network for UAS CNPC links shall not constrain other FSS satellite networks during the application of the provisions of Articles **9** and **11**;

10 that the introduction of UAS CNPC links shall not result in additional coordination constraints on terrestrial services under Articles **9** and **11**;

11 that earth stations on board UA shall be designed and operated so as to be able to accept the interference caused by terrestrial services operating in conformity with the Radio Regulations in the frequency bands listed in *resolves* 1 without complaints under Article **15**;

12 that earth stations on board UA shall be designed and operated so as to be able to operate with interference caused by other satellite networks resulting from application of Articles **9** and **11**;

13 that, in order to ensure safety-of-flight operation of UAS, administrations responsible for operating UAS CNPC links shall:

– ensure that the use of UAS CNPC links be in accordance with the international standards and recommended practices (SARPs) consistent with Article 37 of the Convention on International Civil Aviation;

– take the required measures, consistent with No. **4.10**, to ensure freedom from harmful interference to earth stations on board UA operated in accordance with this resolution;

– act immediately when their attention is drawn to any such harmful interference, as freedom from harmful interference to UAS CNPC links is imperative to ensure their safe operation, taking into account *resolves* 11;

– use assignments associated with the FSS networks for UAS CNPC links (see Figure 1 in Annex 1), including assignments to space stations, specific or typical earth stations and earth stations on board UA (see *resolves* 2), that have been successfully coordinated under Article **9** (including provisions identified in *resolves* 4) and recorded in the Master International Frequency Register (MIFR) with a favourable finding under Article **11**, including Nos. **11.31**, **11.32** or **11.32A** where applicable, and except those assignments that have not successfully completed coordination procedures under No. **11.32** by applying Appendix **5** § 6.d.i;

– ensure that real-time interference monitoring, estimation and prediction of interference risks and planning solutions for potential interference scenarios are addressed by FSS operators and UAS operators with guidance from aviation authorities;

14 that, unless otherwise agreed between the administrations concerned, UA CNPC earth stations shall not cause harmful interference to terrestrial services of other administrations (see also Annex 2);

15 that, in order to implement *resolves* 14 above, power flux-density hard limits need to be developed for UAS CNPC links; one possible example of such provisional limits to protect the fixed service is provided in Annex 2; subject to agreement between the administrations concerned, that annex may be used for the implementation of this resolution;

16 that the power flux-density hard limits provided in Annex 2 shall be reviewed and, if necessary, revised by the next conference;

17 that, in order to protect the radio astronomy service in the frequency band 14.47-14.5 GHz, administrations operating UAS in accordance with this resolution in the frequency band 14-14.47 GHz within line-of-sight of radio astronomy stations are urged to take all practicable steps to ensure that the emissions from the UA in the frequency band 14.47-14.5 GHz do not exceed the levels and percentage of data loss given in the most recent versions of Recommendations ITU-R RA.769 and ITU-R RA.1513;

18 to consider the progress obtained by ICAO in the process of preparation of SARPs for UAS CNPC links, to review this resolution at WRC-23, taking into account the results of the implementation of Resolution **COM5/2 (WRC-15)**, and to take necessary actions as appropriate;

19 that ITU Radiocommunication Sector (ITU-R) studies on technical, operational and regulatory aspects in relation to the implementation of this resolution shall be completed, together with the adoption of relevant ITU-R Recommendations defining the technical characteristics of CNPC links and conditions of sharing with other services,

resolves to encourage administrations

1 to provide the relevant information where available in order to facilitate the application of *resolves* 6;

2 to participate actively in the studies referred to in *invites ITU-R* by submitting contributions to ITU-R,

resolves further to invite the 2023 World Radiocommunication Conference

to consider the results of the above studies referred to in this resolution with a view to reviewing and, if necessary, revising this resolution, and take necessary actions, as appropriate,

invites ITU-R

to conduct, as a matter of urgency, relevant studies of technical, operational and regulatory aspects in relation to the implementation of this resolution,

instructs the Director of the Radiocommunication Bureau

1 to examine the relevant part of this resolution requiring actions to be taken by administrations to implement this resolution, with a view to sending it to administrations and posting it on the ITU website;

2 to present to subsequent WRCs a progress report relating to the implementation of this resolution;

3 to define a new class of station in order to be able to process satellite network filings submitted by administrations for earth stations providing UA CNPC links, after the resolution is implemented, in accordance with this resolution, and publish the information as referred in *resolves* 4;

4 not to process satellite network filing submissions by administrations with a new class of a station for earth stations providing UA CNPC links before *resolves* 1-12 and 14-19 of this resolution are implemented;

5 to report to subsequent WRCs on the progress made by ICAO on the development of SARPs for UAS CNPC links,

instructs the Secretary-General

to bring this resolution to the attention of the Secretary-General of ICAO,

invites the International Civil Aviation Organization

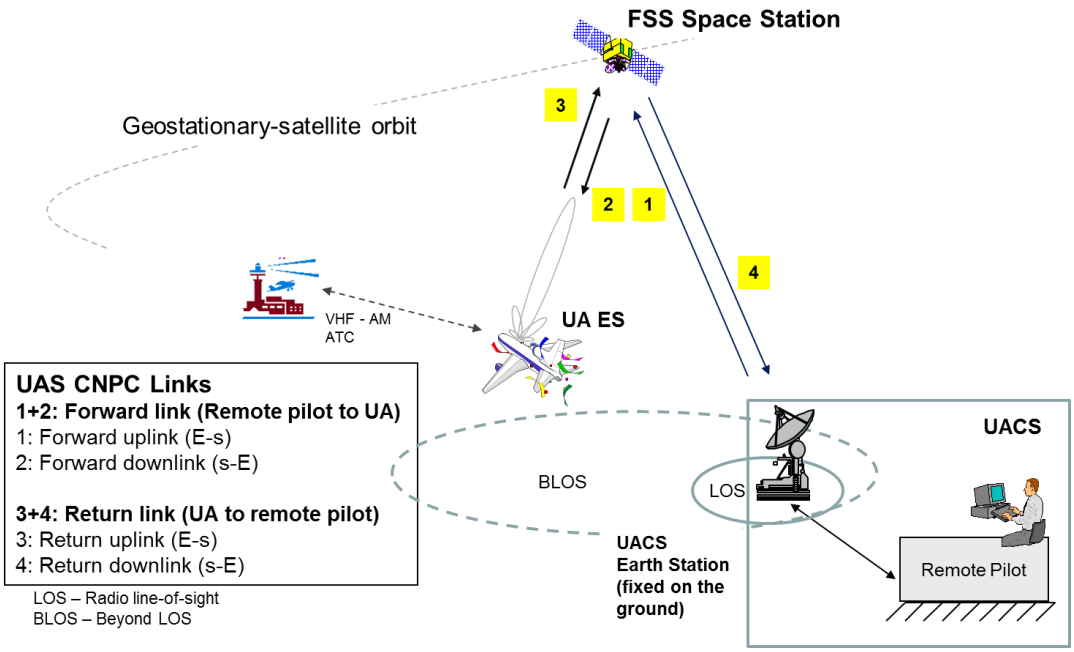
to provide to the Director of the Radiocommunication Bureau, in time for WRC-19 and WRC-23, information on ICAO efforts regarding implementation of UAS CNPC links, including the information related to the development of SARPs for UAS CNPC links.

ANNEX 1 TO RESOLUTION COM4/5 (WRC-15)

UAS CNPC links

FIGURE 1

Elements of UAS architecture using the FSS



ANNEX 2 TO RESOLUTION COM4/5 (WRC-15)

Protection of the fixed service from UAS CNPC emissions

The fixed service is allocated by table entries and footnotes in several countries with co-primary status with FSS. Conditions of UA using CNPC shall be such that the fixed service is protected from any harmful interference as follows:

An earth station on board UA in the frequency band 14.0-14.47 GHz shall comply with provisional power flux-density (pfd) limits described below:

$-132 + 0.5 \cdot \theta$	dB(W/(m^2 · MHz))	for	$\theta \leq 40°$
-112	dB(W/(m^2 · MHz))	for	$40 < \theta \leq 90°$

where θ is the angle of arrival of the radio-frequency wave (degrees above the horizontal).

NOTE – The aforementioned limits relate to the pfd and angles of arrival that would be obtained under free-space propagation conditions.

ADD

RESOLUTION COM4/6 (WRC-15)

Review of the spectrum use of the frequency band 470-960 MHz in Region 1

The World Radiocommunication Conference (Geneva, 2015),

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 470-862 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 obligation to provide 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, in many countries, there is a need for investment in the next decade for the migration of broadcasting into the frequency band below 694 MHz and for the implementation of new-generation broadcasting technologies, in order to take advantage of technological developments to increase the efficient use of the spectrum;

g) that in many developing countries terrestrial broadcasting is the only viable means of delivery of broadcast services;

h) that the technology trend in digital terrestrial television (DTT) is towards high-definition television which requires a higher bit rate than standard-definition television;

i) that it is necessary to adequately protect all primary services in the frequency band 470-694 MHz and in adjacent frequency bands;

j) that International Mobile Telecommunications (IMT) systems, utilizing some parts of the frequency band 694/698-960 MHz, are intended to provide telecommunication services on a worldwide scale, regardless of location, network or terminal used;

k) that, for countries listed in No. **5.296**, an additional allocation to the land-mobile service on a secondary basis is in place, intended for applications ancillary to broadcasting and programme-making;

l) 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**;

m) 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**), and also to the radio astronomy service on a secondary basis (No. **5.306**), and, according to No. **5.149**, administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference when making assignments to stations of other services,

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 and the provisions of No. **4.4** of the Radio Regulations;

d) that information on implementation of the digital dividend and on the transition to digital television and its technological evolution is needed and may not be available before 2019,

noting

the ongoing development of new applications and technologies of both the broadcasting and mobile services,

resolves to invite ITU-R, after the 2019 World Radiocommunication Conference and in time for the 2023 World Radiocommunication Conference

1 to review the spectrum use and study the 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, taking into account the relevant ITU Radiocommunication Sector (ITU-R) studies, Recommendations and Reports;

2 to carry out sharing and compatibility studies, as appropriate, in the frequency band 470-694 MHz in Region 1 between the broadcasting and mobile, except aeronautical mobile, services, taking into account relevant ITU-R studies, Recommendations and Reports;

3 to conduct sharing and compatibility studies, as appropriate, in order to provide relevant protection of systems of other existing services,

invites administrations

to participate actively in the studies by submitting contributions to ITU-R,

resolves to invite the 2023 World Radiocommunication Conference

to consider, based on the results of studies above, provided that these studies are completed and approved by ITU-R, possible regulatory actions in the frequency band 470-694 MHz in Region 1, as appropriate,

further invites ITU-R

to ensure intersectoral collaboration with the ITU Telecommunication Development Sector (ITU-D) in the implementation of this resolution.

ADD

RESOLUTION COM4/7 (WRC-15)

Compatibility of International Mobile Telecommunications and broadcasting-satellite service (sound) in the frequency band 1 452-1 492 MHz in Regions 1 and 3

The World Radiocommunication Conference (Geneva, 2015),

noting

a) Recommendation ITU-R M.1459, "Protection criteria for telemetry systems in the aeronautical mobile service and mitigation techniques to facilitate sharing with geostationary broadcasting-satellite and mobile-satellite services in the frequency bands 1 452-1 525 MHz and 2 310-2 360 MHz";

b) that ITU Radiocommunication Bureau (ITU-R) studies provides useful information on the power flux-density (pfd) level to protect broadcasting-satellite service (BSS) earth stations that could be used for coordination purposes,

recognizing

a) that the frequency band 1 452-1 492 MHz is allocated to BSS (sound) and the mobile service (MS) on a primary basis;

b) that the sharing conditions between BSS (sound) and MS are currently governed by No. **9.11**;

c) that the application of No. **9.11** does not provide long-term stability for the operation of International Mobile Telecommunications (IMT) due to the fact that only the IMT systems that would come into operation within the next three years would be protected if their coordination is agreed, and only for those three years;

d) that coordination requests for BSS (sound) in the frequency band 1 467-1 492 MHz have been submitted to the ITU Radiocommunication Bureau, moreover some BSS (sound) satellite systems are planned to be launched before WRC-19,

taking into account

a) that currently there is no power flux-density (pfd) limit for the frequency band 1 452-1 492 MHz in Article **21** to protect MS (service area protection);

b) that agreement was not reached at this conference on the results of technical and regulatory studies so far carried out on sharing of the frequency band 1 452-1 492 MHz by IMT and BSS;

c) that there is no pfd limit at the border for IMT systems, and IMT systems which will be deployed in this frequency band will have to apply the coordination procedure under No. **9.19** in order to protect BSS (sound) systems deployed in neighbouring countries,

further recognizing

a) that this conference has identified the frequency band 1 452-1 492 MHz for IMT on a worldwide basis;

b) that compatibility studies need to be completed in order to establish appropriate sharing criteria between BSS (sound) and MS in the frequency band 1 452-1 492 MHz,

resolves to invite ITU-R

1 to conduct, in time for WRC-19, the appropriate regulatory and technical studies, with a view to ensuring the compatibility of IMT and BSS (sound) in the frequency band 1 452-1 492 MHz in Regions 1 and 3, taking into account IMT and BSS (sound) operational requirements;

2 to prepare, *inter alia*, the regulatory action that could be taken, based on the studies carried out under *resolves to invite ITU-R* 1 above, in order to facilitate the long-term stability of IMT and BSS (sound) in the frequency band 1 452-1 492 MHz,

invites the 2019 World Radiocommunication Conference

to consider the above-mentioned results and to take necessary actions, as appropriate,

invites Member States

1 to actively participate in the ITU-R activities with regard to the studies referred to above;

2 in Region 1, to use guidance from the ITU-R studies to determine the need for bilateral coordination between IMT systems and BSS earth stations, taking into account *noting b)*, until WRC-19 defines regulatory and technical conditions for this bilateral coordination;

3 in Region 3, to use guidance from ITU-R studies to determine the need for bilateral coordination to protect BSS earth stations, taking into account *noting b)*, until WRC-19 defines regulatory and technical conditions for this bilateral coordination,

instructs the Director of the Radiocommunication Bureau

to report to WRC-19, under agenda item 9.1, the results of the studies referred to in *resolves to invite ITU-R* 1.

ADD

RESOLUTION COM5/1 (WRC-15)

Definition of time scale and dissemination of time signals via radiocommunication systems

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the ITU Radiocommunication Sector (ITU-R) is responsible for defining the standard frequency and time signal service and the standard frequency and time signal-satellite service for the dissemination of time signals via radiocommunication;

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 its dissemination through the reference time scale;

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 is an organization member of 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 is the legal basis for time-keeping for many countries, and *de facto* 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,

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 current 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 the ITU World Administrative Radio Conference 1979 (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,

resolves to invite the ITU Radiocommunication Sector

1 to strengthen the cooperation between ITU-R and BIPM, the International Committee for Weights and Measures (CIPM), CGPM, as well as other relevant organizations, and to carry out a dialogue concerning the expertise of each organization;

2 to further and more widely study in cooperation with the relevant international organizations, concerned industries and user groups, through the participation of the membership, the various aspects of current and potential future reference time scales, including their impacts and applications;

3 to provide advice on the content and structure of time signals to be disseminated by radiocommunication systems, using the combined expertise of the relevant organizations;

4 to prepare one or more reports containing the results of studies that should include one or more proposals to determine the reference time scale and address other issues mentioned in 1, 2 and 3 above,

resolves

that until WRC-23, UTC as described in Recommendation ITU-R TF.460-6 shall continue to apply, and for most practical purposes associated with the Radio Regulations, UTC is equivalent to mean solar time at the prime meridian (0° longitude), formerly expressed in GMT,

instructs the Director of the Radiocommunication Bureau

1 to invite the relevant international organizations such as the International Maritime Organization (IMO), the International Civil Aviation Organization (ICAO), CGPM, CIPM, BIPM, the International Earth Rotation and Reference Systems Service (IERS), the International Union of Geodesy and Geophysics (IUGG), the International Union of Radio Science (URSI), the International Organization for Standardization (ISO), the World Meteorological Organization (WMO) and the International Astronomical Union (IAU) to participate in the work mentioned in *resolves to invite the ITU Radiocommunication Sector*;

2 to report on the progress of this resolution to WRC-23,

invites the Director of the Telecommunication Development Bureau

to assist the participation of developing countries in meetings, within approved budgetary resources,

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 IMO, ICAO, CGPM, CIPM, BIPM, IERS, IUGG, URSI, ISO, WMO and IAU.

ADD

RESOLUTION COM5/2 (WRC-15)

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 (Geneva, 2015),

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 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 earth stations in motion 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 earth stations in motion;

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 earth stations in motion 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**);

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[1] As referred to in the Table of Frequency Allocations.

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 earth stations in motion with regard to terrestrial services;

e) that the UC class of station is used for earth stations in motion communicating with the FSS when using the provisions of No. **5.526** for satellite network filings under Articles **9** and **11**;

f) that this conference has adopted No. **5.5X** to clarify that earth stations in motion 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 the *resolves* 1-4 below;

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-03)**),

resolves

1 that earth stations in motion 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 Annex 1;

1.2 with respect to terrestrial services of other administrations mentioned in No. **5.524**, the earth station in motion 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 earth stations in motion operating in international waters and aeronautical earth stations in motion 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 earth stations in motion 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 earth stations in motion 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 earth stations in motion shall require the operators to provide a point of contact for the purpose of tracing any suspected cases of interference from earth stations in motion.

ANNEX 1

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 operating in the frequency band 29.5-30.0 GHz.

Earth stations in motion 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 earth station in motion 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***
$2° \leq \theta \leq 7°$	$(19 - 25 \log \theta)$ dB(W/40 kHz)
$7° < \theta \leq 9.2°$	−2 dB(W/40 kHz)
$9.2° < \theta \leq 48°$	$(22 - 25 \log \theta)$ dB(W/40 kHz)
$48° < \theta \leq 180°$	−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.

[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 earth stations in motion 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 earth stations in motion 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.

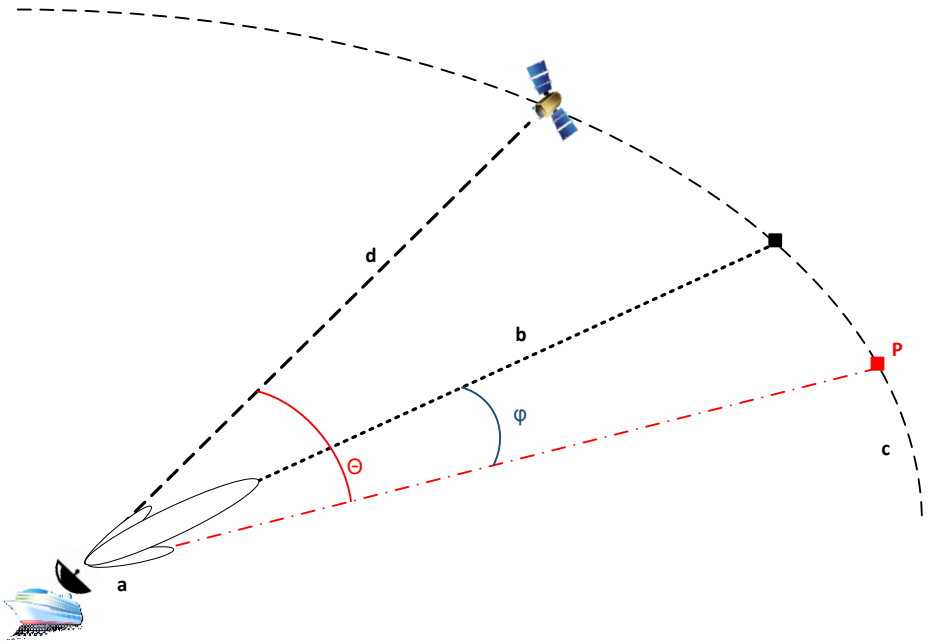
NOTE 4 – Potential aggregate interference from earth stations in motion operating within the fixed-satellite service using multi-spot frequency reuse technologies should be taken into account in coordination with respect to other GSO satellite networks.

NOTE 5 – Earth stations in motion 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



where:

a represents the earth station in motion

b represents the boresight of the earth station antenna

c represents the geostationary-satellite orbit (GSO)

d represents the vector from the earth station in motion 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.

[3] In Figure 1 proportions are illustrative and not to scale.

ADD

RESOLUTION COM5/3 (WRC-15)

Transitional measures for the elimination of advance publication filings by administrations for frequency assignments to satellite networks and systems subject to Section II of Article 9

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that this conference has modified the advance publication procedure for satellite networks or systems subject to the coordination procedures in Section II of Article **9**;

b) that there are a number of changes to Articles **9** and **11** of the Radio Regulations that are consequential to the decisions of this conference referred to in *considering a)*;

c) that pursuant to Article **59**, as modified by this conference, the date of entry into force of the regulatory provisions referenced in *considering b)* above is 1 January 2017;

d) that a transitional arrangement is needed to address the treatment of advance publication information for a satellite network or system subject to the coordination procedures in Section II of Article **9** that is not associated with a coordination request on the date the regulatory provisions referenced in *considering b)* above enter into force,

resolves

1 that from 1 July 2016, No. **9.1** shall cease to be applied to satellite networks or systems subject to the coordination procedures in Section II of Article **9**;

2 that any advance publication information for a satellite network or system subject to the coordination procedures in Section II of Article **9** for which a coordination request has not been received by the Bureau under No. **9.30** up to 31 December 2016 shall be suppressed by the Bureau and no longer taken into account,

instructs the Radiocommunication Bureau

to take the necessary actions to implement *resolves* 1 and 2 above.

ADD

RESOLUTION COM5/4 (WRC-15)

Use of one space station to bring frequency assignments to geostationary-satellite networks at different orbital locations into use within a short period of time

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the use of the same space station to bring frequency assignments to geostationary-satellite networks located at different orbital locations into use within a short period of time could lead to inefficient use of spectrum/orbit resources;

b) that there are legitimate reasons why a notifying administration may need to move a space station from one orbital position to a new orbital position, and this should not be constrained,

noting

a) that WRC-12 recognized that the issue of using one space station to bring frequency assignments at different orbital locations into use within a short period of time was not the intent for its adoption of Nos. **11.44**, **11.44.1**, **11.44B** and **11.49**;

b) that, with respect to cases where an administration brings into use frequency assignments at a given orbital location using an already in-orbit satellite, and pending completion of ITU Radiocommunication Sector studies, WRC-12 requested the Radiocommunication Bureau to make an enquiry to that administration as to the last previous orbital location/frequency assignments brought into use with that satellite and make such information available;

c) that the procedures of Article **14** are available to administrations in cases where information required under *resolves* below may not be available to the notifying administration,

recognizing

a) that administrations may bring into use or bring back into use a frequency assignment to a geostationary-satellite network using one of its own space stations or a space station under the responsibility of another administration;

b) that the absence of a geostationary space station capable of transmitting and receiving the frequency assignments at a notified orbital position, due to the relocation of an in-orbit satellite to a new orbital position, can lead to either the suspension or the cancellation of those frequency assignments in some cases,

resolves

1 that, when informing the Bureau of the bringing into use, or bringing back into use after suspension, of a frequency assignment to a space station in a geostationary-satellite network, the notifying administration shall indicate to the Bureau whether or not this action has been accomplished with a space station that has previously been used to bring into use, or resume the use of, frequency assignments at a different orbital location within the three years prior to the date of submission of this information;

2 that, in cases where a notifying administration informs the Bureau, pursuant to *resolves* 1 above, that it has brought into use, or resumed the use after suspension of, a frequency assignment to a space station in a geostationary-satellite network with a space station that has previously been used to bring into use, or resume the use of, frequency assignments at a different orbital location within three years prior to the date of submission of this information, the notifying administration shall also indicate, for that same three-year period:

a) the last orbital location where the space station was used to bring into use, or resume the use of, frequency assignments;

b) the satellite network(s) with which the frequency assignments in 2a) above were associated;

c) the date on which the space station was no longer maintained at the orbital location in 2a) above;

3 that, if the information is not provided by the notifying administration under *resolves* 1 and 2 above, as appropriate, the Bureau shall consult the notifying administration requesting the missing information;

4 that, if the notifying administration fails to provide the missing information within 30 days from the Bureau's request under *resolves* 3 above, the Bureau shall immediately send a reminder requesting the missing information;

5 that, as of 1 January 2018, if the notifying administration fails to provide the missing information within 15 days after the Bureau's reminder under *resolves* 4 above, the Bureau shall consider that the frequency assignments to the geostationary-satellite network have not been brought into use, or brought back into use, and shall so inform the notifying administration,

instructs the Radiocommunication Bureau

to make available the information provided in *resolves* 1 and 2 on the ITU website within 30 days of its receipt.

ADD

RESOLUTION COM5/5 (WRC-15)

Application of power flux-density criteria to assess the potential for harmful interference under No. 11.32A for fixed-satellite and broadcasting-satellite service networks in the 6 GHz and 10/11/12/14 GHz bands not subject to a Plan

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the 6 GHz and 10/11/12/14 GHz bands, not subject to a Plan, are extensively used with operational satellites about every 2-3° around the geostationary-satellite orbit;

b) that there are currently a very large number of satellite networks submitted to the ITU Radiocommunication Sector for these bands;

c) that the above factors have led to significant difficulties for administrations to introduce new satellite networks;

d) that more precise criteria to assess the probability of harmful interference under No. **11.32A** have the potential to reduce undue protection requirements for assignments in respect of incoming assignments;

e) that due to the congestion in these bands as well as advances in technology and applications in these bands, practical satellite implementations are seen in practice to use relatively homogeneous technical parameters;

f) that use of more homogeneous technical parameters will facilitate efficient spectrum usage and support the introduction of new networks;

g) that the use of power flux-density (pfd) thresholds will encourage use of more homogeneous technical parameters and support efficient spectrum usage,

resolves

1 that, for satellite networks operating in the frequency bands 5 725-5 850 MHz (Region 1), 5 850-6 725 MHz and 7 025-7 075 MHz (Earth-to-space) having a nominal orbital separation in the geostationary-satellite orbit of more than 7°, assignments for a fixed-satellite service (FSS) satellite network with respect to other FSS networks do not have the potential to cause harmful interference if the pfd produced at the location in the geostationary-satellite orbit of the other FSS network under assumed free-space propagation conditions does not exceed −204.0 dB(W/(m^2 · Hz))*;

2 that, in the frequency bands 10.95-11.2 GHz, 11.45-11.7 GHz, 11.7-12.2 GHz (Region 2), 12.2-12.5 GHz (Region 3), 12.5-12.7 GHz (Regions 1 and 3) and 12.7-12.75 GHz (space-to-Earth), assignments for an FSS or broadcasting-satellite service (BSS) satellite network not subject to a Plan with respect to other FSS or BSS networks not subject to a Plan having a nominal orbital separation in the geostationary-satellite orbit of more than 6° do not have the potential to cause harmful interference 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:

5.8°	<	θ	≤	20.9°	−187.2 + 25log(θ/5) dB(W/(m^2 · Hz))
20.9°	<	θ			−171. 67 dB(W/(m^2 · Hz))

where θ is the minimum orbital separation in the geostationary-satellite orbit, in degrees, between the wanted and interfering space stations, taking into account the longitudinal station-keeping tolerance;

* NOTE – The pfd thresholds were derived from the parameters shown below.

Downlink		**10/11/12 GHz**
Earth station antenna diameter	N/A	0.45-11 m
Earth station antenna diagram	N/A	Main lobe: According to Appendix **8**, Section III Sidelobes: 29–25logθ dBi (Recommendation ITU-R BO.1213, which implements these main and sidelobe characteristics, was used in deriving the pfd threshold)
Earth station noise temperature	N/A	125 K
Earth station antenna efficiency	N/A	70%
Equivalent Δ*T*/*T*	N/A	6%
Uplink	**6 GHz**	**14 GHz**
Maximum satellite G/T	0 dB/K	11 dB/K
Equivalent Δ*T*/*T*	6%	6%

3 that, for satellite networks operating in the frequency band 13.75-14.5 GHz (Earth-to-space) having a nominal orbital separation in the geostationary-satellite orbit of more than 6°, assignments for an FSS satellite network with respect to other FSS satellite networks do not have the potential to cause harmful interference if the pfd produced at the location in the geostationary-satellite orbit of the other FSS satellite network under assumed free-space propagation conditions does not exceed −208 dB(W/(m^2 · Hz))*,

4 that as of 1 January 2017 the Bureau and administrations shall apply this resolution,

instructs the Director of the Radiocommunication Bureau

to include in his report, for consideration by WRC-19, the results and any potential difficulties relating to the implementation of this resolution.

ADD

RESOLUTION COM5/6 (WRC-15)

Study of technical and operational issues and regulatory provisions for new non-geostationary-satellite orbit systems in the 3 700-4 200 MHz, 4 500-4 800 MHz, 5 925-6 425 MHz and 6 725-7 025 MHz frequency bands allocated to the fixed-satellite service

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that systems based on the use of new technologies associated with both geostationary-satellite orbit (GSO) and non-geostationary-satellite orbit (non-GSO) constellations are capable of providing high-capacity and low-cost means of communication even to the most isolated regions of the world;

b) that GSO and non-GSO satellite orbits and associated spectrum are valuable resources and equitable access to these resources should be protected for the benefit of all countries in the world;

c) that facilitating the use of new non-GSO systems has the potential to augment substantially the capacity, spectrum efficiency and benefits derived from GSO and non-GSO systems operating in the frequency bands: 3 700-4 200 MHz, 4 500-4 800 MHz, 5 925-6 425 MHz and 6 725-7 025 MHz,

noting

a) that the Article **21** power flux-density (pfd) limits and Article **22** equivalent power flux-density (epfd↓) limits in the frequency band 3 700-4 200 MHz (space-to-Earth) and the Article **22** epfd↑ limits in the frequency band 5 925-6 725 MHz (Earth-to-space) were developed under agenda item 1.37 at WRC-03 based on a particular highly-elliptical orbit (HEO) configuration, while new non-GSO systems that seek to operate in these frequency bands may utilize different types of orbits;

b) that Article **22** does not contain epfd↓ and epfd↑ limits for non-GSO systems in the frequency bands 4 500-4 800 MHz (space-to-Earth) and 6 725-7 025 MHz (Earth-to-space) allocated to the fixed-satellite service (FSS), the use of which is subject to the provisions of Appendix **30B**;

c) that the Report of the Director of the Radiocommunication Bureau to this conference acknowledges that there may be a need for "reviewing or confirming" assumptions that led to the current values of the Article **21** and Article **22** power limits, taking into account the characteristics of systems recently submitted "and the overall trend for a growing interest in operating non-GSO FSS systems, with the view to ensure that all existing services are adequately protected";

d) that specifically identified studies taking into account current technical and operational characteristics will help to determine appropriate Article **21** pfd limits and Article **22** epfd limits for the frequency bands 3 700-4 200 MHz, 4 500-4 800 MHz and 5 925-7 025 MHz for non-GSO systems,

recognizing

a) that enabling GSO networks and non-GSO systems to make the most efficient use of satellite orbits and frequency bands allocated to the FSS shall take into consideration the other services to which those frequency bands are also allocated on a primary basis;

b) that the frequency bands 3 700-4 200 MHz, 4 500-4 800 MHz and 5 925-7 025 MHz are also allocated in one or more Regions to the fixed and mobile services on a primary basis;

c) that in the frequency bands 3 700-4 200 MHz, 4 500-4 800 MHz and 5 925-7 025 MHz, non-GSO FSS systems are obligated by No. **22.2** not to cause unacceptable interference to or claim protection from GSO FSS networks;

d) that under No. **5.458B** the frequency band 6 700-7 025 MHz allocated to the FSS on a primary basis in the space-to-Earth direction is limited to feeder links for non-GSO systems of the mobile-satellite service (MSS);

e) that Nos. **5.440A** and **5.457C** were adopted to address the operation of aeronautical mobile telemetry (AMT) for flight testing by aircraft stations (see No. **1.83**) in the frequency bands 4 400-4 940 MHz and 5 925-6 700 MHz with respect to the FSS only using GSO networks;

f) that there are specific protection criteria, and protection levels defined in those criteria, for the FSS, the mobile service and the fixed service;

g) that new non-GSO systems with circular orbits shall ensure that existing non-GSO systems with highly-elliptical orbits should be protected,

resolves to invite the ITU Radiocommunication Sector

to study the following issues relating to non-GSO systems in the following frequency bands allocated to the FSS:

a) in the frequency band 3 700-4 200 MHz (space-to-Earth), identification of possible revision of Article **21**, Table 21-4 for non-GSO FSS satellites, with a view to enabling new non-GSO systems to operate in these FSS frequency bands, while ensuring that existing primary services, i.e. the mobile service and fixed service, are protected and maintaining the existing Article **21** pfd limits for GSO networks;

b) in the frequency bands 3 700-4 200 MHz (space-to-Earth) and 5 925-6 425 MHz (Earth-to-space), the Article **22** epfd↓ limits and epfd↑ limits applicable to non-GSO systems with a view to enabling additional non-GSO systems to operate in these frequency bands, while ensuring that GSO networks are protected from unacceptable interference pursuant to No. **22.2** and existing protection criteria;

c) in the frequency bands 4 500-4 800 MHz (space-to-Earth) and 6 725-7 025 MHz (Earth-to-space), the possible development of Article **22** epfd↓ and epfd↑ limits similar to those in other FSS frequency bands with a view to enabling non-GSO systems to operate in these frequency bands, while ensuring that GSO networks are protected from unacceptable interference pursuant to No. **22.2** and existing protection criteria;

d) in the frequency band 6 700-7 025 MHz, the protection of feeder links for MSS systems operating in the space-to-Earth direction from unacceptable interference, pursuant to existing criteria, from non-GSO FSS system earth stations operating in the Earth-to-space direction;

e) in the frequency band 4 500-4 800 MHz (space-to-Earth), the development of appropriate regulatory provisions for non-GSO FSS systems to protect terrestrial services;

f) in the frequency bands 4 500-4 800 MHz (space-to-Earth) and 5 925-6 425 MHz (Earth-to-space), the development of regulatory provisions to clarify that Nos. **5.440A** and **5.457C** would apply in a manner to ensure that non-GSO FSS systems do not cause harmful interference to, or claim protection from, AMT for flight testing by aircraft stations,

further resolves

1 that the results of studies referred to in the *resolves* above shall:

– in no way change the protection criteria and protection levels defined in those criteria for the GSO FSS, the fixed service and the mobile service;

– ensure protection of the existing non-GSO FSS systems with highly-elliptical orbits,

2 that new non-GSO systems that operate in FSS bands subject to the provisions of Appendix **30B** shall ensure that the allotments appearing in the Plan and the assignments of the List of Appendix **30B** will be fully protected,

invites administrations

to participate in the studies by submitting contributions to the ITU Radiocommunication Sector,

instructs the Director of the Radiocommunication Bureau

to include in his report, for consideration by WRC-19, the results of the ITU-R studies referred to in *resolves to invite the ITU Radiocommunication Sector* above.

ADD

RESOLUTION COM5/7 (WRC-15)

Stations on board sub-orbital vehicles

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the radio spectrum is a limited resource;

b) that the boundary between the Earth's atmosphere and space is usually assumed to be 100 kilometres above the Earth's surface;

c) that some vehicles, including aircraft, are being developed which can fly at altitudes of over 100 km into sub-orbital trajectories;

d) that other vehicles may also operate at altitudes over 100 km and use non-orbital trajectories;

e) that some of these vehicles reach space and after releasing the spacecraft, accelerate away and land on Earth as a sub-orbital space flight;

f) that stations onboard sub-orbital vehicles may be using frequencies allocated to space and terrestrial services for the purpose of telemetry, trading and command (TT&C) and voice communications,

recognizing

that the current regulatory provisions and procedures for terrestrial and space services may not be adequate for international recognition of the use of relevant frequency assignments by stations on board sub-orbital vehicles,

recognizing further

that the spectrum requirements for TT&C and voice communications on stations on board sub-orbital vehicles have not been studied,

noting

a) Question ITU-R 259/5, on Operational and radio regulatory aspects for planes operating in the upper level of the atmosphere;

b) that provisions of No. **4.10** may apply for certain aspects of these operations,

resolves to invite the ITU Radiocommunication Sector

1 to conduct studies to identify any required technical and operational measures, in relation to stations on board sub-orbital vehicles, that could assist in avoiding harmful interference between radiocommunication services;

2 to conduct studies to determine spectrum requirements and, based on the outcome of those studies, to consider a possible future agenda item for WRC-23;

3 to complete the studies within the next ITU Radiocommunication Sector (ITU-R) study cycle,

instructs the Director of the Radiocommunication Bureau

1 to bring this resolution to the attention of the ITU-R study groups;

2 to include in his report, for consideration by WRC-19, the results of the ITU-R studies referred to in *resolves to invite the ITU Radiocommunication Sector* above,

invites administrations

to participate actively in the studies by submitting contributions to ITU-R,

instructs the Secretary-General

to bring this resolution to the attention of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) and International Civil Aviation Organization (ICAO) and other international and regional organizations concerned.

ADD

RESOLUTION COM5/8 (WRC-15)

Conversion of all analogue assignments in the Appendices 30 and 30A Regions 1 and 3 Plan and List into digital assignments

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that this conference suppressed footnote 26 to Annex 1 of Appendix **30**, which expired on 1 January 2015 and contained power flux-density limits to be applied for the protection of analogue assignments brought in service before 17 October 1997;

b) that the analogue emissions concerned are obsolete and have not been in use in the broadcasting-satellite service (BSS) and in feeder links for the BSS in the bands subject to Appendix **30** and Appendix **30A**,

recognizing

a) that the integrity of the Region 2 Plan and its associated provisions must be preserved;

b) that compatibility between the BSS in Regions 1 and 3 and the other services in all three Regions must be ensured,

resolves

1 that, as from 1 January 2017:

1.1 all analogue (e.g. “27M0F8W”) assignments included in Article **9A** of Appendix **30A** and Article **11** of Appendix **30** and in the Regions 1 and 3 Lists shall be converted to digital assignments (e.g. “27M0G7W”);

1.2 the Bureau shall update the reference situation (EPM) of the Regions 1 and 3 Plans and Lists and of other Article **4** submissions, which are still at the stage of application of that Article, as contained in the Appendices **30** and **30A** master database of 1 January 2017 without reviewing the past technical examination results;

2 that the Bureau shall continue to apply the current calculation method in regard of analogue assignments in the Region 2 Plan.

ADD

RESOLUTION COM6/1 (WRC-15)

Consideration of the technical and regulatory impacts of referencing Recommendations ITU-R M.1638-1 and ITU-R M.1849-1 in Nos. 5.447F and 5.450A of the Radio Regulations

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the frequency bands 5 250-5 350 MHz and 5 470-5 725 MHz are allocated worldwide on a primary basis to the radiolocation service;

b) 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);

c) that Resolution **229 (Rev.WRC-12)** defines the conditions for the 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 WAS including RLANs while protecting existing primary services;

d) that No **5.447F** states that 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) and that these services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in Recommendations ITU-R M.1638-0 and ITU-R RS.1632-0;

e) that No **5.450A** states that in the frequency band 5 470-5 725 MHz, stations in the mobile service shall not claim protection from radiodetermination services and that radiodetermination services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in Recommendation ITU-R M.1638-0,

noting

a) that Recommendation ITU-R M.1638-0 identifies the characteristics of, and protection criteria for sharing studies for, radiolocation, aeronautical radionavigation and meteorological radars operating in the frequency range 5 250-5 850 MHz;

b) that Recommendation ITU-R M.1638-1 identifies the characteristics of, and protection criteria for sharing studies for, radiolocation (except ground-based meteorological radars) and aeronautical radionavigation radars operating in the frequency bands between 5 250 and 5 850 MHz and that Recommendation ITU-R M.1849-1 identifies the technical and operational aspects of ground-based meteorological radars;

c) that Recommendation ITU-R M.1638-1 includes additional new radar characteristics not included in Recommendation ITU-R M.1638-0,

further noting

that, according to Annex 1 to Resolution **27 (Rev.WRC-12)**, the reference of material which is incorporated by reference on a mandatory basis must be explicit, specifying the specific part of the text, if appropriate,

resolves to invite the ITU Radiocommunication Sector

1 to investigate the technical and regulatory impacts on the services referred to in Nos. **5.447F** and **5.450A** that would result from referencing Recommendation ITU-R M.1638-1 in place of Recommendation ITU-R M.1638-0 in those footnotes, while ensuring that no undue constraints are imposed on the services referenced in these footnotes;

2 to investigate the technical and regulatory impacts on the services referred to in Nos **5.447F** and **5.450A** that would result from adding a new reference to Recommendation ITU-R M.1849-1 to these footnotes**,** while ensuring that no undue constraints are imposed on the services referenced in these footnotes,

instructs the Director of the Radiocommunication Bureau

to include the results of these studies in the Director’s Report to WRC-19 for consideration of any regulatory action in response to *resolves to invite the ITU Radiocommunication Sector* above.

ADD

RESOLUTION COM6/2 (WRC-15)

Preliminary agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for WRC-23 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 and Article 7 of the Convention relating to their agendas;

c) the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

resolves to give the view

that the following items should be included in the preliminary agenda for WRC-23:

1 to take appropriate action in respect of those urgent issues that were specifically requested by WRC-19;

2 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, and taking account of the results of WRC-19, to consider and take appropriate action in respect of the following items:

2.1 to consider possible spectrum needs and regulatory actions to support Global Maritime Distress and Safety System (GMDSS) modernization and the implementation of e-navigation, in accordance with Resolution **COM6/3 (WRC-15)**;

2.2 to conduct, and complete in time for WRC-23, studies for a possible new allocation to the Earth exploration-satellite (active) service for spaceborne radar sounders within the range of frequencies around 45 MHz, taking into account the protection of incumbent services, in accordance with Resolution **COM6/4 (WRC-15)**;

2.3 in accordance with Resolution **COM6/5 (WRC-15)**, to review the results of studies relating to the technical and operational characteristics, spectrum requirements and appropriate radio service designations for space weather sensors, with a view to providing appropriate recognition and protection in the Radio Regulations without placing additional constraints on incumbent services;

2.4 study of spectrum needs and possible new allocations to the fixed-satellite service in the frequency band 37.5-39.5 GHz (Earth-to-space), in accordance with Resolution **COM6/23 (WRC-15)**;

2.5 to review the spectrum use and spectrum needs of existing services in the frequency band 470-960 MHz in Region 1 and consider possible regulatory actions in the frequency band 470-694 MHz in Region 1 on the basis of the review in accordance with Resolution **COM4/6 (WRC-15)**;

3 to examine the revised ITU Radiocommunication Sector (ITU-R) Recommendations incorporated by reference in the Radio Regulations communicated by the Radiocommunication Assembly, in accordance with Resolution **28 (Rev.WRC-15)**, and to decide whether or not to update the corresponding references in the Radio Regulations, in accordance with the principles contained in Annex 1 to Resolution **27 (Rev.WRC-12)**;

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-07)**, 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 Convention;

7 to identify those items requiring urgent action by the radiocommunication study groups;

8 to consider possible changes, and other options, 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-07)**;

10 to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention:

10.1 on the activities of ITU-R since WRC-19;

10.2 on any difficulties or inconsistencies encountered in the application of the Radio Regulations; 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 following WRC, in accordance with Article 7 of the Convention,

invites the Council

to consider the views given in this resolution,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-23,

instructs the Secretary-General

to communicate this resolution to international and regional organizations concerned.

ADD

RESOLUTION COM6/3 (WRC-15)

Consideration of regulatory provisions for modernization of the Global Maritime Distress and Safety System and related to the implementation of e-navigation

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that there is a continuing need in the Global Maritime Distress and Safety System (GMDSS), on a global basis, for improved communications to enhance maritime capabilities;

b) that the International Maritime Organization (IMO) is considering GMDSS modernization;

c) that advanced maritime MF/HF/VHF data systems and satellite communication systems may be used to deliver Maritime Safety Information (MSI) and other GMDSS communications;

d) that IMO is considering additional global and regional GMDSS satellite service providers;

e) that WRC-19 will have commenced regulatory actions in regard to modernization of the GMDSS;

f) that IMO is in the process of implementing e-navigation, defined as the harmonized collection, integration, exchange, presentation and analysis of marine information on board and ashore by electronic means to enhance berth-to-berth navigation and related services for safety and security at sea and protection of the marine environment;

g) that GMDSS modernization may be influenced by the development of e-navigation,

noting

a) that WRC-12 reviewed Appendix **17** and Appendix **18** to improve efficiency and introduce frequency bands for new digital technology;

b) that WRC-12 has reviewed the regulatory provisions and spectrum allocations for use by maritime safety systems for ships and ports,

further noting

that WRC-12 and this conference have reviewed Appendix **18** to improve efficiency and introduce frequency bands for new digital technology,

recognizing

a) that advanced maritime communication systems may support the implementation of GMDSS modernization and e-navigation;

b) that IMO efforts to implement GMDSS modernization and e-navigation may require a review of the Radio Regulations to accommodate advanced maritime communication systems;

c) that, due to the importance of these radio links in ensuring the safe operation of shipping and commerce and security at sea, they must be resilient to interference,

resolves to invite the 2023 World Radiocommunication Conference

1 to take into consideration the activities of IMO, as well as information and requirements provided by IMO, in order to determine the regulatory actions to support GMDSS modernization;

2 to consider possible regulatory actions, including spectrum allocations based on the ITU Radiocommunication Sector (ITU-R) studies, for the maritime mobile service, supporting e-navigation,

invites ITU-R

to conduct studies taking into consideration the activities of IMO, in order to determine spectrum needs and regulatory actions to support GMDSS modernization and the implementation of e-navigation,

invites

1 IMO to actively participate in the studies by providing requirements and information that should be taken into account in ITU-R studies;

2 the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), the International Civil Aviation Organization (ICAO), the International Electrotechnical Commission (IEC), the International Hydrographic Organization (IHO), the International Organization for Standardization (ISO) and the World Meteorological Organization (WMO) to contribute to these studies,

instructs the Secretary-General

to bring this resolution to the attention of IMO and other international and regional organizations concerned.

ADD

RESOLUTION COM6/4 (WRC-15)

Possible allocation to the Earth exploration-satellite service (active) for spaceborne radar sounders in the range of frequencies around 45 MHz

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the 40-50 MHz range is allocated to the fixed, mobile and broadcasting services on a primary basis;

b) that the uses of the 40.98 to 41.015 MHz frequency range by the space research service are on a secondary basis;

c) that country footnotes in the Table of Frequency Allocations for the 40-50 MHz frequency range provide primary allocations for the aeronautical radionavigation and radiolocation services in certain parts of the world;

d) that spaceborne radars are intended to be operated only in either uninhabited or sparsely populated areas of the globe, with particular focus on deserts and polar ice fields, and only at night-time from 3 a.m. to 6 a.m. locally;

e) that Recommendation ITU-R RS.2042-0 provides typical technical and operating characteristics for spaceborne radar sounder systems using the 40-50 MHz frequency range that should be used for interference and compatibility studies,

recognizing

a) that spaceborne active radio-frequency sensors can provide unique information on physical properties of the Earth and other planets;

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 vicinity of the 40-50 MHz frequency range for measurements of the Earth’s subsurface to provide radar maps of subsurface scattering layers with the intent to locate water/ice/deposits;

d) that worldwide, periodic measurements of subsurface water deposits require the use of spaceborne active sensors;

e) that the 40-50 MHz frequency range is preferable to satisfy all requirements for spaceborne radar sounders,

resolves to invite the 2023 World Radiocommunication Conference

to consider the results of studies on spectrum needs for a possible new allocation to the Earth exploration-satellite (active) service for spaceborne radar sounders within the range of frequencies around 45 MHz, taking into account the protection of incumbent services, and take appropriate action,

invites ITU-R

1 to conduct studies on spectrum needs and sharing studies between the Earth exploration-satellite (active) service and the radiolocation, fixed, mobile, broadcasting and space research services in the 40-50 MHz frequency range;

2 to complete the studies, taking into account the present use of the allocated band, with a view to presenting, at the appropriate time, the technical basis for the work of WRC-23,

invites administrations

to participate actively in the studies by submitting contributions to the ITU Radiocommunication Sector,

instructs the Secretary-General

to bring this resolution to the attention of international and regional organizations concerned.

ADD

RESOLUTION COM6/5 (WRC-15)

Spectrum needs and protection of space weather sensors

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that space weather observations are becoming increasingly important in detecting solar activity events that could impact on services critical to the economy, safety and security of administrations;

b) that these observations are also made from platforms that may be ground-based, airborne or space-based;

c) that some of the sensors operate by receiving low-level natural emissions of the Sun or the Earth's atmosphere, and therefore may suffer harmful interference at levels which could be tolerated by other radio systems;

d) that 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,

recognizing

a) that no frequency bands have been documented in any manner in the Radio Regulations for space weather sensor applications;

b) that the ITU Radiocommunication Sector (ITU-R) has a Study Question ITU-R 256/7 to study the technical and operational characteristics, frequency requirements and appropriate radio service designation for space weather sensors;

c) that any regulatory action associated with space weather sensor applications should take into account incumbent services that are already operating in the frequency bands of interest,

resolves to invite the 2023 World Radiocommunication Conference

while taking into account the results of ITU-R studies and without placing additional constraints on incumbent services, to consider regulatory provisions necessary to provide protection to space weather sensors operating in the appropriately designated radio service that is to be determined during ITU-R studies,

invites ITU-R

1 to document, in time for WRC-19, the technical and operational characteristics of space weather sensors;

2 to determine, in time for WRC-19, the appropriate radio service designations for space weather sensors;

3 to conduct, in time for WRC-23, any necessary sharing studies for incumbent systems operating in frequency bands used by space weather sensors, with the objective of determining regulatory protection that can be provided while not placing additional constraints on incumbent services,

invites administrations

to participate actively in the 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 World Meteorological Organization (WMO) and other international and regional organizations concerned.

ADD

RESOLUTION COM6/6 (WRC-15)

Allocation of the frequency band 50-54 MHz to the amateur service in Region 1

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that fully or partially harmonized worldwide frequency bands for radiocommunication services are desirable in order to achieve international operability;

b) that there is a need to establish sharing conditions when considering frequency bands for possible additional allocations to any service,

noting

a) that the frequency band 50-54 MHz is allocated to the amateur service on a primary basis in Region 2 and Region 3;

b) that No. **5.169** of the Radio Regulations provides for an alternative allocation to the amateur service on a primary basis in a number of countries in Region 1;

c) that No. **5.162A** of the Radio Regulations provides for an additional allocation to the radiolocation service on a secondary basis in a number of countries, limited to the operation of wind profiler radars in accordance with Resolution **217 (WRC-97)**;

d) that the frequency band 47-68 MHz is allocated to the broadcasting service on a primary basis in Region 1, and this band, or part of it, is allocated to the mobile service on a primary basis in a number of countries in Region 1;

e) that No. **5.167** of the Radio Regulations and other relevant footnotes in this frequency band provide for alternative and additional allocations to the fixed, mobile and broadcasting services on a primary basis,

resolves to invite the 2019 World Radiocommunication Conference

to consider the results of the studies below and take appropriate actions, including spectrum allocation,

invites ITU-R

1 to study spectrum needs in Region 1 for the amateur service in the frequency band 50-54 MHz;

2 taking into account the results of the above studies, to study sharing between the amateur service and the mobile, fixed, radiolocation and broadcasting services, in order to ensure protection of these services.

ADD

RESOLUTION COM6/7 (WRC-15)

Establishment of in-band power limits for earth stations operating in mobile-satellite service, the meteorological-satellite service and the Earth exploration-satellite service in the frequency bands 401-403 MHz and 399.9-400.05 MHz

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the Earth exploration-satellite service (EESS) (Earth-to-space) and meteorological-satellite service (MetSat) (Earth-to-space) systems deployed in the frequency band 401-403 MHz and mobile-satellite service (MSS) (Earth-to-space) systems in the frequency band 399.9-400.05 MHz are currently used for data collection;

b) that these systems usually operate using moderate/low power levels;

c) that Recommendation ITU-R SA.2045 provides information on the performance and interference criteria for relevant geostationary-satellite orbit (GSO) and non-geostationary satellite (non-GSO) data collection systems (DCS) in the frequency band 401-403 MHz;

d) that Recommendation ITU-R SA.2044 provides information on the current and future usage of non-GSO DCS in the frequency band 401-403 MHz, and the portioning of the frequency band to allow all DCS equal access to the spectrum;

e) that Recommendation ITU-R M.2046 provides a description, and the corresponding protection criteria for broadband noise and narrowband interference, of one MSS system that uses the frequency band 399.9-400.05 MHz (Earth-to-space);

f) that these EESS, MetSat and MSS systems are essential for monitoring and predicting climate change, monitoring oceans, weather and water resources, weather forecasting and assisting in protecting biodiversity, improving maritime security;

g) that a growing number of satellites are planned to use these frequency bands mainly for telecommand (see No. **1.135**) (Earth-to-space) purposes under the EESS, MetSat or MSS allocations,

considering further

a) that the output power levels of the earth stations referred to in *considering g)*, at the antenna port of these telecommand links (Earth-to-space), can be much higher than the moderate/low power levels traditionally used for the operation of EESS, MetSat or MSS system, service links in the frequency bands 401-403 MHz and 399.9-400.05 MHz referred to in *considering a)*;

b) that, according to the ITU Radiocommunication Sector (ITU-R) Recommendations referred to in *considering c)*, *d)*, and *e)*, the frequency bands 401-403 MHz and 399.9-400.05 MHz are mainly currently dedicated to data collection platforms;

c) that the operation of the telecommand links referred to in *considering g)* would cause harmful interference to the satellite receivers on board the satellites referred to in *considering a)*,

recognizing

a) that it is necessary to have stable regulatory certainty in order to be able to provide long-term continuity for the operation of DCS;

b) that these DCS represent a long-term effort and investment;

c) that it is necessary to ensure the operations of existing and future systems that usually implement low or moderate output power levels for EESS, MetSat and MSS systems referred to in *considering a)*;

d) that the establishment of in-band power limits for earth stations within the Radio Regulations applicable to the EESS, MetSat and MSS will bring confidence for DCS using these frequency bands,

resolves to invite the 2019 World Radiocommunication Conference

to take into account the results of ITU-R studies, and consider the possibility of establishing in-band power limits for earth stations in the EESS and MetSat in the frequency bands 401-403 MHz and in the MSS frequency band 399.9-400.05 MHz,

invites ITU-R

to conduct and complete, in time for WRC-19, the necessary technical, operational and regulatory studies on the possibility of establishing in-band power limits for earth stations in the EESS and MetSat in the frequency band 401-403 MHz and the MSS in the frequency band 399.9-400.05 MHz,

invites administrations

to participate actively in the 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 World Meteorological Organization (WMO) and other international and regional organizations concerned.

ADD

RESOLUTION COM6/8 (WRC-15)

Consideration of possible upgrading of the secondary allocation to the meteorological-satellite service (space-to-Earth) to primary status and a primary allocation to the Earth exploration-satellite service (space-to-Earth) in the frequency band 460-470 MHz

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that data collection systems (DCS) operate on geostationary and non-geostationary orbits in the meteorological-satellite (MetSat) service and the Earth exploration-satellite service (EESS) (Earth-to-space) systems in the frequency band 401-403 MHz;

b) that DCS are essential for monitoring and predicting climate change, monitoring oceans, and water resources, weather forecasting and assisting in protecting biodiversity, improving maritime security;

c) that most of these DCS have implemented satellite downlinks (space-to-Earth) in the frequency band 460-470 MHz which bring significant improvements to the operation of satellite DCS, such as the transmission of information to optimize the usage of the terrestrial data collection platforms;

d) that the frequency band 460-470 MHz is currently allocated to MetSat (space-to-Earth) on a secondary basis;

e) that No. **5.290** identifies some administrations that already have a primary MetSat allocation, subject to agreement obtained under No. **9.21**;

f) that the frequency band 460-470 MHz is currently allocated to the fixed and mobile services on a primary basis and is widely used by these services;

g) that there is a need to protect the fixed and mobile services in the frequency band 460-470 MHz and not to constrain their future development;

h) that, according to No. **5.289**, EESS applications, other than MetSat, may also be used in the frequency bands 460-470 MHz and 1 690-1 710 MHz for space-to-Earth transmissions, subject to not causing harmful interference to stations operating in accordance with the Table of Frequency Allocations;

i) that No. **5.286AA** identifies the frequency band 450-470 MHz for use by administrations wishing to implement International Mobile Telecommunications (IMT),

considering further

a) that at least one administration has adopted national regulatory provisions providing a power flux-density (pfd) limit of −152 dBW/m^2/4 kHz for protecting systems of the terrestrial services;

b) that, in order to meet this limit, space agencies have designed and are implementing a spread spectrum solution, making the operation of at least one satellite DCS downlink operating in the frequency band 460-470 MHz compliant with the pfd limit mentioned in *considering further a)*,

recognizing

a) that it is necessary for MetSat and EESS operators to have stable regulatory certainty in order to be able to provide long-term continuity for this service of public interest, and that operating under a secondary allocation status is conflicting with this objective;

b) that these space programmes represent long-term effort and investment that span across decades from the time when the programme is officially decided, through the development period and the launch phase to the time when the corresponding satellites are in operation;

c) that space and meteorological agencies are investing in the continuity of these programmes providing subsequent satellites and payloads;

d) that an upgrade to a primary status of the allocation of the frequency band 460-470 MHz to MetSat and EEES (space-to-Earth), alongside appropriate measures to ensure adequate protection of existing primary allocated services in that frequency band, will bring confidence for administrations and space agencies involved in satellite data collection programmes and for the public sectors funding the development and operation of such systems;

e) that it is necessary to keep the priority of MetSat over EESS in the frequency band 460-470 MHz;

f) that MetSat and EESS earth stations will not claim protection from stations in the fixed and mobile services;

g) that the agreements obtained under No. **5.290** remain in force,

resolves to invite the 2019 World Radiocommunication Conference

to consider, based on the results of ITU Radiocommunication Sector (ITU-R) studies, the possibility of upgrading the secondary MetSat (space-to-Earth) allocation to primary status and adding a primary EESS (space-to-Earth) allocation in the frequency band 460-470 MHz, while providing protection and not imposing any additional constraints on existing primary services to which the frequency band is already allocated and in the adjacent frequency bands,

invites ITU-R

1 to conduct and complete, in time for WRC-19, sharing and compatibility studies to determine the feasibility of upgrading the MetSat (space-to-Earth) allocation to primary status, and the addition of a primary EESS (space-to-Earth) allocation in the frequency band 460-470 MHz, while protecting the primary fixed and mobile services to which the frequency band is already allocated and maintaining the conditions contained in No. **5.289**;

2 to complete the studies, taking into account the present usage of the frequency band 460-470 MHz by incumbent services, to determine the appropriate pfd limit to be placed on MetSat (space-to-Earth) and EESS (space-to-Earth) to protect the existing primary services to which this frequency band is already allocated, provided that, if the studies conclude that a less restrictive pfd limit than that contained in *considering further a)* can protect incumbent services, then the pfd limit contained in *considering further a)* shall apply,

invites administrations

to participate actively in the 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 World Meteorological Organization (WMO) and other international and regional organizations concerned.

ADD

RESOLUTION COM6/9 (WRC-15)

Consideration of possible revision of Annex 7 to Appendix 30 of the Radio Regulations

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the provisions applying to the broadcasting-satellite service (BSS) in the frequency bands 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 are contained in Appendix **30**;

b) that fixed-satellite service (FSS) networks operate in the frequency bands 12.5-12.75 GHz in Region 1, 11.7-12.2 GHz in Region 2 and 12.2-12.75 GHz in Region 3;

c) that Annex 7 to Appendix **30 (Rev.WRC-12)** specifies limitations, including orbital position limitations,

noting

a) that the ITU Radiocommunication Sector (ITU-R) has carried out a significant amount of studies in preparation for conferences on BSS planning, and has developed a number of Reports and Recommendations;

b) that BSS and FSS networks from different Regions may coexist, operate simultaneously and share orbit resource in their respective Regions;

c) that special consideration needs to be given to operational networks implemented under the current Annex 7 to Appendix **30** regime;

d) that BSS is subject to orbital position limitations while FSS in the same frequency bands is not,

recognizing

a) that WRC-2000 developed new Plans for Regions 1 and 3 assuming digital BSS and feeder-link assignments;

b) that existing FSS networks operating in the frequency bands mentioned in *considering b)* and BSS networks implemented in accordance with the current provisions of Annex 7 to Appendix **30** shall continue to be protected;

c) that 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 are widely used by BSS networks, subject to the current provisions of Annex 7 to Appendix **30 (Rev.WRC-12)**;

d) that the frequency bands 12.5-12.75 GHz in Region 1, 11.7-12.2 GHz in Region 2 and 12.2-12.75 GHz in Region 3 are widely used by FSS networks,

resolves to invite the 2019 World Radiocommunication Conference

to consider the results of the ITU-R studies and take necessary actions, as appropriate,

invites ITU-R

to conduct studies on, review, and identify possible revisions to, if necessary, the limitations mentioned in Annex 7 to Appendix **30 (Rev.WRC-12)**, while ensuring the protection of, and without imposing additional constraints on, assignments in the Plan and in the List and the future of BSS networks mentioned in *recognizing c)* and existing and planned FSS networks mentioned in *recognizing d).*

ADD

RESOLUTION COM6/10 (WRC-15)

Autonomous maritime radio devices operating in the frequency band 156-162.05 MHz

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that, in order to enhance safety of navigation, there is a need to identify and categorize maritime radio devices which operate autonomously in the maritime environment, including but not limited to: devices on towed unpowered ships and barges, derelict ships, floating ice and wave-gliders, "man overboard" devices, diver locating, alerting and radiotelephony devices, fishing net marker buoys, oil spill tracking buoys, oceanographic and other drifting buoys;

b) that such autonomous maritime radio devices are operating with automatic identification system (AIS) technology or digital selective calling (DSC) technology, or transmitting synthetic voice messages, or with a combination of those technologies, and have been developed for safety-related purposes, and their number is expected to increase;

c) that AIS is a proven technology for maritime safety applications, providing identification functions, safety of navigation functions, aids to navigation, locating signals and data communications;

d) that some of these autonomous maritime radio devices may need different maritime identifiers from those used for personal or shipborne equipment,

recognizing

a) that the integrity of AIS and the Global Maritime Distress and Safety System (GMDSS) should be protected;

b) that ships complying with the International Convention for the Safety of Life at Sea (SOLAS) 1974 (as amended) and other ships equipped with automated radiocommunication systems, including AIS, DSC and/or other GMDSS alerting devices should be assigned maritime mobile service identities (MMSIs) in accordance with Recommendation ITU-R M.585;

c) that the usage of frequencies of Appendix **18** to the Radio Regulations and maritime identities described in Recommendation ITU-R M.585 should be limited to devices which are identified as part of the maritime mobile service;

d) that these autonomous maritime radio devices, which do not fall under the definition of No. **1.28** and the ITU Radiocommunication Sector (ITU-R) Recommendations, require a new categorization,

further recognizing

a) that the majority of autonomous maritime radio devices using AIS technology are operating in AIS 1 and AIS 2 frequency bands, and, to some extent, occupying the resources of MMSIs for ship stations or aids to navigation;

b) that Recommendations ITU-R M.493, ITU-R M.1371 and ITU-R M.541 describe technical and operational characteristics for some relevant maritime radio devices;

c) that Report ITU-R M.2285 provides an overview of systems and their mode of operation for some maritime devices used as maritime survivor locating systems and devices (man overboard systems);

d) that an evaluation of the effects on the functioning of AIS used for the safety of navigation, and especially search and rescue activities implemented by AIS-search and rescue transmitters (AIS-SARTs), is required,

noting

a) that WRC-12 designated channels in Appendix **18** of the Radio Regulations for experiments and testing for the future new AIS applications or systems;

b) that ITU-R has been requested to study a future new maritime identification scheme,

resolves to invite the 2019 World Radiocommunication Conference

to consider the results of ITU-R studies and take appropriate actions,

invites ITU-R

1 to conduct the necessary studies in time for WRC-19 to determine the spectrum needs and technical and operational characteristics of autonomous maritime radio devices operating in the frequency band 156-162.05 MHz;

2 to conduct the necessary studies to categorize the various autonomous maritime radio devices;

3 to conduct sharing and compatibility studies, based on the results of *invites ITU-R* 1 and 2, to ensure that no undue constraints are placed on the GMDSS and AIS;

4 to conduct studies, taking into account the results of *invites ITU-R* 1 to 3, and existing maritime technology, to determine potential regulatory actions and appropriate frequencies for autonomous maritime radio devices within the frequency band 156-162.05 MHz,

further invites

the International Maritime Organization (IMO), the International Civil Aviation Organization (ICAO), the World Meteorological Organization (WMO), the International Hydrographic Organization (IHO), the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), the International Electrotechnical Commission (IEC) and the International Radio Maritime Committee (CIRM) to contribute to these studies,

instructs the Secretary-General

to bring this resolution to the attention of IMO, ICAO, WMO, IEC, IALA, IHO, CIRM and other international and regional organizations concerned.

ADD

RESOLUTION COM6/11 (WRC-15)

Studies on spectrum needs and regulatory provisions for the introduction and use of the Global Aeronautical Distress and Safety System

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the International Civil Aviation Organization (ICAO) has developed the initial version of the concept of operations for the Global Aeronautical Distress and Safety System (GADSS);

b) that GADSS is intended to address the timely identification and location of an aircraft during all phases of flight as well as distress and emergency situations;

c) that GADSS is intended to use existing and new applications to support search and rescue (SAR) and flight data retrieval;

d) that GADSS is intended to include terrestrial and satellite components supporting different terrestrial and space applications;

e) that not all requirements in the concept of operation for GADSS are currently fulfilled by existing technologies;

f) that future systems based on new technologies are being developed to contribute to fully meeting the GADSS requirements;

g) that, as stated by ICAO, "the full GADSS concept can be realized in an evolutional manner", and some applications may be developed after 2019;

h) that the performance-based elements of the GADSS are still being defined by ICAO, and should be provided by ICAO in time to use them in ITU Radiocommunication Sector (ITU-R) studies;

i) that the introduction of the GADSS needs to ensure the protection of, and impose no additional constraints on, all existing services,

recognizing

a) that there are provisions in the Radio Regulations, including frequency band allocations, related to aeronautical services that support distress and safety systems;

b) that Annex 10 to the Convention on International Civil Aviation is a part of International Standards and Recommended Practices (SARPs) for aeronautical telecommunication systems used by international civil aviation,

noting

that the concept of operations and requirements for GADSS is general, its components and applications currently provide only scenarios, and it is being developed in an evolutionary manner in ICAO,

resolves to invite the 2019 World Radiocommunication Conference

1 to take appropriate actions, taking into account the results of ITU-R studies;

2 to analyse the necessity for further studies, and consider whether this matter should be brought to the attention of a future competent conference,

invites ITU-R

1 to conduct the relevant studies, taking into account information and requirements provided by ICAO for both the terrestrial and satellite components, including:

a) quantification and characterization of radiocommunication requirements related to GADSS, such as:

– data traffic requirements for different system components of GADSS (such as the aircraft tracking, autonomous distress and flight data recovery systems) and their terrestrial and satellite components at each phase of the operation;

– information on the radiocommunication requirement related to safety-of-life applications;

– performance criteria for terrestrial and satellite systems;

b) analysis of the existing allocations to the relevant aeronautical services and determining whether any additional spectrum is required;

c) studies on sharing and/or compatibility with the existing services;

2 to undertake studies of the existing regulatory provisions to determine whether it might be necessary to apply additional regulatory measures,

invites the International Civil Aviation Organization

to participate actively in the studies by providing requirements and information that should be taken into account in ITU-R studies, in particular those mentioned in *invites ITU-R* 1*a)*,

instructs the Secretary-General

to bring this resolution to the attention of the ICAO, the International Air Transport Association (IATA) and the International Maritime Organization (IMO).

ADD

RESOLUTION COM6/12 (WRC-15)

Railway radiocommunication systems between train and trackside

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that railway transportation systems are evolving;

b) that there is a need to integrate different technologies in order to facilitate various functions, for instance dispatching commands, operating control and data transmission, into railway train and trackside systems to meet the needs of a high-speed railway environment;

c) that the current railway radiocommunication systems supporting railway train and trackside are narrowband systems;

d) that the deployment of railway radiocommunication systems between train and trackside requires infrastructure investment,

recognizing

a) that information and radiocommunication technologies in railway radiocommunication systems between train and trackside provide improved railway traffic control, passenger safety and improved security for train operations;

b) that timely studies are required on technologies providing for railway radiocommunication;

c) that international standards and harmonized spectrum would facilitate worldwide deployment of railway radiocommunication systems between train and trackside and provide for economies of scale in railway transportation for the public;

d) that there is a need to benefit from the experiences in achieving compatibility between current railway radiocommunication systems between train and trackside and other radiocommunication systems,

noting

a) that railway transportation contributes to global economic and social development, especially for developing countries;

b) that some national and international railway organizations have begun investigations on new technologies for railway radiocommunication systems;

c) that ITU Radiocommunication Sector (ITU-R) Study Group 5 is studying relevant technical and operational characteristics for railway radiocommunication systems;

d) that, in some countries, railway radiocommunication systems may assist in providing passenger services,

emphasizing

a) that, in the frequency bands in which these current and future systems operate, railway radiocommunication systems between train and trackside should be compatible with a variety of other systems;

b) that the provisions of Nos. **1.59** and **4.10** do not apply for railway radiocommunication systems,

resolves to invite the 2019 World Radiocommunication Conference

based on the results of ITU-R studies, to take necessary actions, as appropriate, to facilitate global or regional harmonized frequency bands, to the extent possible, for the implementation of railway radiocommunication systems between train and trackside, within existing mobile-service allocations,

invites ITU-R

to study the spectrum needs, technical and operational characteristics and implementation of railway radiocommunication systems between train and trackside,

invites Member States, Sector Members, Associates and Academia

to participate actively in the study by submitting contributions to ITU-R,

instructs the Secretary-General

to bring this resolution to the attention of International Union of Railways (UIC) and other relevant international and regional organizations.

ADD

RESOLUTION COM6/13 (WRC-15)

Intelligent Transport Systems applications

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that information and communication technologies are integrated in a vehicle system to provide Intelligent Transport Systems (ITS) communication applications for the purpose of improving traffic management and assisting safe driving;

b) that there is a need for consideration of spectrum harmonization for ITS applications, which are being used globally or regionally;

c) that there is a need to integrate various technologies, including radiocommunications, into land transportation systems;

d) that many new connected vehicles use intelligent technologies in the vehicles' combined advanced traffic management, advanced traveller information, advanced public transportation management systems and/or advanced fleet management systems to improve traffic management;

e) that the International Organization for Standardization (ISO) is standardizing ITS (non-radio aspects) in ISO/TC204, including applications for "cooperative systems" which require vehicle-to-vehicle and vehicle-to-infrastructure radiocommunications;

f) that the 3rd Generation Partnership Project (3GPP) is standardizing radio interface, system architecture and service requirements of "LTE-based V2X Services" for ITS application;

g) that future vehicular radiocommunication technologies and ITS broadcast systems are emerging;

h) that some administrations have harmonized frequency bands for ITS radiocommunication applications,

recognizing

that harmonized spectrum and international standards would facilitate worldwide deployment of ITS radiocommunications and provide for economies of scale in bringing ITS equipment and services to the public,

noting

a) that the guidelines for radio interface requirements of ITS are described in Recommendation ITU-R M.1890;

b) that outlines of technologies and characteristics for dedicated short-range communications at 5.8 GHz are described in Recommendation ITU-R M.1453-2;

c) that some administrations in each of the three Regions have deployed radiocommunication local area networks in the frequency band 5 725-5 825 MHz, which is also identified for industrial, scientific and medical (ISM) applications;

d) that studies and feasibility tests on advanced ITS radiocommunications have been actively conducted towards the realization of traffic safety and a reduction of environmental impact as described in Report ITU-R M.2228;

e) that radio interface standards of vehicle-to-vehicle and vehicle-to-infrastructure communications for ITS applications are described in Recommendation ITU-R M.2084,

emphasizing

a) that ITS applications currently operate within frequency bands allocated to a number of radiocommunication services in accordance with the relevant provisions of the Radio Regulations;

b) that the provisions of Nos. **1.59** and **4.10** do not apply to ITS applications,

resolves to invite the 2019 World Radiocommunication Conference

taking into account the results of ITU Radiocommunication Sector (ITU-R) studies, to consider possible global or regional harmonized frequency bands for the implementation of evolving ITS under existing mobile-service allocations,

invites ITU-R

to carry out studies on technical and operational aspects of evolving ITS implementation using existing mobile-service allocations,

invites administrations

to contribute actively to the ITU-R studies on this issue.

ADD

RESOLUTION COM6/14 (WRC-15)

Studies towards an identification for use by administrations for land-mobile and fixed services applications operating in the frequency range 275-450 GHz

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that a number of bands in the frequency range 275-1 000 GHz are identified for use by administrations for passive services, such as the radio astronomy service, the Earth exploration-satellite service (passive) and the space research service (passive);

b) that No. **5.565** states that the use of the range above 275 GHz by the passive services does not preclude use of this range by active services;

c) that administrations wishing to make available frequencies in the 275-1 000 GHz range for active service applications are urged to take all practicable steps to protect these passive services from harmful interference until the date when the Table of Frequency Allocations is established for the relevant frequencies;

d) that active devices which can operate at frequencies above 275 GHz are available due to technology developments;

e) that studies on technical and operational characteristics of some active services operating in the range 275-1 000 GHz have been carried out by the ITU Radiocommunication Sector (ITU-R);

f) that the technical and operational characteristics of land-mobile and fixed services operating in the bands above 275 GHz have not been specified, and further studies are required;

g) that propagation characteristics of the frequencies above 275 GHz are being studied by ITU-R Study Group 3;

h) that propagation models for the land-mobile and fixed services operating in the band above 275 GHz are required;

i) that sharing and compatibility studies between land-mobile, fixed and passive services identified by No. **5.565** operating in the band above 275 GHz are required,

noting

a) that Question ITU-R 228-1/3 addresses the study of which propagation models best describe the relationship between atmospheric parameters and electromagnetic wave characteristics on terrestrial links operating at frequencies above 275 GHz;

b) that Question ITU-R 235-1/7 addresses the study of the technical and operational characteristics of systems operating at frequencies above 275 GHz within the science services;

c) that Question ITU-R 237/1 addresses the study of the technical and operational characteristics of active services in the frequency range 275-1 000 GHz;

d) that Question ITU-R 256-0/5 addresses studies on the technical and operational characteristics of the land-mobile service in the frequency range 275-1 000 GHz;

e) that Question ITU-R 257-0/5 addresses studies on the technical and operational characteristics of the fixed service in the frequency range 275-1 000 GHz;

f) that other international organizations are developing standards for the suitable frequency ranges for ultra-high-speed (100 Gbps) data communication systems for Wireless Personal Area Network (WPAN);

g) that several ultra-high-speed data communication systems are identified by other international standards bodies,

recognizing

that other active services, including the radiolocation service and the amateur service, are also developing and demonstrating applications above 275 GHz,

resolves to invite the 2019 World Radiocommunication Conference

taking into account the results of ITU-R studies on sharing and compatibility between passive and active services as well as spectrum needs for those services, to consider identification for use by administrations for the land-mobile and fixed service applications operating in the frequency range 275-450 GHz, while maintaining protection of the passive services identified in No. **5.565**, and take appropriate action,

invites ITU-R

1 to identify technical and operational characteristics of systems in the land-mobile and fixed services operating at frequencies above 275 GHz;

2 to study spectrum needs of systems in the land-mobile and fixed services, taking into account the results of the above studies;

3 to develop propagation models within the frequency range 275-450 GHz so as to enable sharing and compatibility studies between the land-mobile, fixed and passive services in this frequency range;

4 to conduct sharing and compatibility studies between the land-mobile, fixed and passive services operating in the frequency range 275-450 GHz, while maintaining protection of the passive services identified in No. **5.565**;

5 to identify candidate frequency bands for use by systems in the land-mobile and fixed services, taking into account the results of the studies under *invites ITU-R* 1, 2 and 4, and the protection of passive services identified in No. **5.565**,

encourages Member States, Sector Members, Associates and Academia

to submit contributions during the study period on their assessment of the impact on the identified services, based on the studies carried out under this resolution.

ADD

RESOLUTION COM6/15 (WRC-15)

Urgent studies required in preparation for the 2019 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the agenda of this conference included consideration of items for the agenda for the 2019 World Radiocommunication Conference (WRC-19);

b) that the agenda of this conference included consideration of items for the preliminary agenda for the 2023 World Radiocommunication Conference (WRC-23);

c) that items for the agenda for WRC-19 have been identified in Resolution **COM6/2 (WRC-15)**;

d) that items for the preliminary agenda for WRC-23 have been identified in Resolution **COM6/2 (WRC-15)**,

resolves

to complete studies on the topics identified in this resolution and its annex,

invites ITU-R

as a matter of urgency, to complete the studies called for in this resolution,

instructs the Director of the Radiocommunication Bureau

to report on these studies under agenda item 9.1 of WRC-19, as appropriate, based on the results of studies.

ANNEX TO RESOLUTION COM6/15 (WRC-15)

Urgent studies required in preparation for the 2019 World Radiocommunication Conference

1) Studies concerning Wireless Power Transmission (WPT) for electric vehicles:

a) to assess the impact of WPT for electric vehicles on radiocommunication services;

b) to study suitable harmonized frequency ranges which would minimize the impact on radiocommunication services from WPT for electrical vehicles.

These studies should take into account that the International Electrotechnical Commission (IEC), the International Organization for Standardization (ISO) and the Society of Automotive Engineers (SAE) are in the process of approving standards intended for global and regional harmonization of WPT technologies for electric vehicles.

2) Studies to examine:

a) whether there is a need for possible additional measures in order to limit uplink transmissions of terminals to those authorized terminals in accordance with No. **18.1**;

b) the possible methods that will assist administrations in managing the unauthorized operation of earth station terminals deployed within its territory, as a tool to guide their national spectrum management programme, in accordance with Resolution ITU-R 64 (RA-15).

3) Studies on the technical and operational aspects of radio networks and systems, as well as spectrum needed, including possible harmonized use of spectrum to support the implementation of narrowband and broadband machine-type communication infrastructures, in order to develop Recommendations, Reports and/or Handbooks, as appropriate, and to take appropriate actions within the ITU Radiocommunication Sector (ITU-R) scope of work.

ADD

RESOLUTION COM6/16 (WRC-15)

Agenda for the 2019 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for a world radiocommunication conference 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 world radiocommunication conferences and Article 7 of the Convention relating to their agendas;

c) the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

recognizing

a) that this conference has identified a number of urgent issues requiring further examination by WRC-19;

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 world radiocommunication conference be held in 2019 for a maximum period of four weeks, with the following agenda:

1 on the basis of proposals from administrations, taking account of the results of WRC-15 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 an allocation of the frequency band 50-54 MHz to the amateur service in Region 1, in accordance with Resolution **COM6/6 (WRC-15)**;

1.2 to consider in-band power limits for earth stations operating in the mobile-satellite service, meteorological-satellite service and Earth exploration-satellite service in the frequency bands 401-403 MHz and 399.9-400.05 MHz, in accordance with Resolution **COM6/7 (WRC-15)**;

1.3 to consider possible upgrading of the secondary allocation to the meteorological-satellite service (space-to-Earth) to primary status and a possible primary allocation to the Earth exploration-satellite service (space-to-Earth) in the frequency band 460-470 MHz, in accordance with Resolution **COM6/8 (WRC-15)**;

1.4 to consider the results of studies in accordance with Resolution **COM6/9 (WRC-15)**, and review, and revise if necessary, the limitations mentioned in Annex 7 to Appendix **30 (Rev.WRC-12)**, while ensuring the protection of, and without imposing additional constraints on, assignments in the Plan and the List and the future development of the broadcasting-satellite service within the Plan, and existing and planned fixed-satellite service networks;

1.5 to consider the use of the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion communicating with geostationary space stations in the fixed-satellite service and take appropriate action, in accordance with Resolution **COM6/17 (WRC-15)**;

1.6 to consider the development of a regulatory framework for non-GSO FSS satellite systems that 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), in accordance with Resolution **COM6/18 (WRC-15)**;

1.7 to study the spectrum needs for telemetry, tracking and command in the space operation service for non-GSO satellites with short duration missions, to assess the suitability of existing allocations to the space operation service and, if necessary, to consider new allocations, in accordance with Resolution **COM6/19 (WRC-15)**;

1.8 to consider possible regulatory actions to support Global Maritime Distress Safety Systems (GMDSS) modernization and to support the introduction of additional satellite systems into the GMDSS, in accordance with Resolution **359** (**Rev.WRC-15**);

1.9 to consider, based on the results of ITU-R studies:

1.9.1 regulatory actions within the frequency band 156-162.05 MHz for autonomous maritime radio devices to protect the GMDSS and automatic identifications system (AIS), in accordance with Resolution **COM6/10 (WRC-15)**;

1.9.2 modifications of the Radio Regulations, including new spectrum allocations to the maritime mobile-satellite service (Earth-to-space and space-to-Earth), preferably within the frequency bands 156.0125-157.4375 MHz and 160.6125-162.0375 MHz of Appendix **18**, to enable a new VHF data exchange system (VDES) satellite component, while ensuring that this component will not degrade the current terrestrial VDES components, applications specific messages (ASM) and AIS operations and not impose any additional constraints on existing services in these and adjacent frequency bands as stated in *recognizing d)* and *e)* of Resolution **360** (**Rev.WRC-15**);

1.10 to consider spectrum needs and regulatory provisions for the introduction and use of the Global Aeronautical Distress and Safety System (GADSS), in accordance with Resolution **COM6/11 (WRC-15)**;

1.11 to take necessary actions, as appropriate, to facilitate global or regional harmonized frequency bands to support railway radiocommunication systems between train and trackside within existing mobile service allocations, in accordance with Resolution **COM6/12 (WRC-15)**;

1.12 to consider possible global or regional harmonized frequency bands, to the maximum extent possible, for the implementation of evolving Intelligent Transport Systems (ITS) under existing mobile-service allocations, in accordance with Resolution **COM6/13 (WRC-15)**;

1.13 to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution **COM6/20 (WRC-15)**;

1.14 to consider, on the basis of ITU-R studies in accordance with Resolution **COM6/21 (WRC-15)**, appropriate regulatory actions for high-altitude platform stations (HAPS), within existing fixed-service allocations;

1.15 to consider identification of frequency bands for use by administrations for the land-mobile and fixed services applications operating in the frequency range 275-450 GHz, in accordance with Resolution **COM6/14 (WRC-15)**;

1.16 to consider issues related to wireless access systems, including radio local area networks (WAS/RLAN), in the frequency bands between 5 150 MHz and 5 925 MHz, and take the appropriate regulatory actions, including additional spectrum allocations to the mobile service, in accordance with Resolution **COM6/22 (WRC-15)**;

2 to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations communicated by the Radiocommunication Assembly, in accordance with Resolution **28 (Rev.WRC-15)**, and to decide whether or not to update the corresponding references in the Radio Regulations, in accordance with the principles contained in Annex 1 to Resolution **27 (Rev.WRC-12)**;

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-07)**, 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 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, and other options, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, an 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 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-07)**;

9 to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention:

9.1 on the activities of the Radiocommunication Sector since WRC-15;

9.2 on any difficulties or inconsistencies encountered in the application of the Radio Regulations*; and

9.3 on action in response to Resolution **80 (Rev.WRC-07)**;

10 to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention,

resolves further

to activate the Conference Preparatory Meeting,

invites the Council

to finalize the agenda and arrange for the convening of WRC-19, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-19,

instructs the Secretary-General

to communicate this resolution to international and regional organizations concerned.

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* This agenda 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.

ADD

RESOLUTION COM6/17 (WRC-15)

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

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) are globally allocated on a primary basis to the fixed-satellite service (FSS) and that there are a large number of geostationary FSS satellite networks operating in these frequency bands, as well as non-geostationary FSS systems;

b) that in these frequency bands there are a large number of fixed-service stations, as well as mobile-service stations;

c) that regulatory and technical procedures exist in these frequency bands between geostationary FSS networks and non-geostationary FSS systems;

d) that there is an need for mobile communications, including global broadband satellite services, and that some of this need can be met by allowing earth stations in motion to communicate with space stations of the FSS operating in the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space);

e) that some administrations have already deployed, and plan to expand their use of, earth stations in motion with operational and future geostationary FSS networks;

f) that geostationary FSS networks in the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) are required to be coordinated and notified in accordance with the provisions of Articles **9** and **11** of the Radio Regulations;

g) 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 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;

h) that currently there is no specific regulatory procedure for the coordination of the earth stations in motion with regard to stations of terrestrial services,

considering further

a) that a consistent approach to deployment of these earth stations in motion will support these important and growing global communication requirements;

b) that the ITU Radiocommunication Sector (ITU-R) has adopted Reports ITU-R S.2223 and ITU-R S.2357;

c) that the technical characteristics of the earth stations in motion operating within a given geostationary-satellite network should be within the envelope of the coordination agreements reached between administrations,

recognizing

a) that Article **21** contains power flux-density (pfd) limits for geostationary fixed-satellite services;

b) that earth stations in motion addressed by this resolution are not to be used for safety-of-life applications;

c) that this conference has adopted footnote No. **5.5X** and Resolution **COM5/2 (WRC-15)** related to earth stations in motion;

d) that advances in technology, including the use of tracking techniques, allow earth stations in motion to operate within the characteristics of fixed earth stations of the FSS;

e) that No. **1.21** defines the fixed-satellite service and No. **1.25** defines the mobile-satellite service (MSS);

f) that the use of earth stations in motion under the FSS regime is not much different from MSS applications, taking into account the definition of mobile-satellite service in No. **1.25**;

g) that the main difference between earth stations in motion and mobile earth stations is that earth stations in motion comply with the technical requirements of fixed-satellite earth stations,

recognizing further

a) that parts of the frequency band 17.7-18.1 GHz are used by feeder links for the broadcasting-satellite service, subject to Appendix **30A** (No. **5.516**);

b) that the frequency bands 18.3-19.3 GHz (Region 2), 27.5-27.82 GHz (Region 1), 28.35-28.45 GHz (Region 2), 28.45-28.94 GHz (all Regions), 28.94-29.1 GHz (Regions 2 and 3), 29.25-29.46 GHz (Region 2) and 29.46-29.5 GHz (all Regions) are identified for use by high-density applications in the fixed-satellite service (No. **5.516B**);

c) that use of the frequency band 18.1-18.4 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links of geostationary-satellite systems in the broadcasting-satellite service (No. **5.520**);

d) that use of the frequency band 18.6-18.8 GHz by the fixed-satellite service is limited to geostationary systems and systems with an orbit of apogee greater than 20 000 km (No. **5.522B**);

e) that the use of the frequency bands 17.8-18.6 GHz and 27.5-28.6 GHz by non-geostationary fixed-satellite service systems is subject to the application of the provisions of Nos. **5.484A**, **22.5C** and **22.5I**;

f) that use of the frequency bands 18.8-19.3 GHz and 28.6-29.1 GHz by geostationary and non-geostationary fixed-satellite service networks is subject to the application of the provisions of No. **9.11A**, and No. **22.2** does not apply (No. **5.523A**);

g) that use of the frequency band 19.3-19.7 GHz by geostationary fixed-satellite service systems and by feeder links for non-geostationary satellite systems in the mobile-satellite service is subject to the application of the provisions of No. **9.11A**, but not subject to the provisions of No. **22.2**, and that the use of this frequency band for other non-geostationary fixed-satellite service systems, or for the cases indicated in Nos. **5.523C** and **5.523E**, is not subject to the provisions of No. **9.11A** and shall continue to be subject to Articles **9** (except No. **9.11A**) and **11** procedures, and to the provisions of No. **22.2** (No. **5.523D**);

h) that use of the frequency band 29.1-29.5 GHz (Earth-to-space) by the fixed-satellite service is limited to geostationary-satellite systems and feeder links to non-geostationary satellite systems in the mobile-satellite service, and that such use is subject to the application of the provisions of No. **9.11A**, but not subject to the provisions of No. **22.2**, except as indicated in Nos. **5.523C** and **5.523E**, where such use is not subject to the provisions of No. **9.11A** and shall continue to be subject to Articles **9** (except No. **9.11A**) and **11** procedures, and to the provisions of No. **22.2** (No. **5.535A**);

i) that the frequency band 27.5-30 GHz may be used by the fixed-satellite service (Earth-to-space) for the provision of feeder links for the broadcasting-satellite service (No. **5.539**);

j) that feeder links of non-geostationary networks in the mobile-satellite service and geostationary networks in the fixed-satellite service operating in the frequency band 29.1-29.5 GHz (Earth-to-space) shall employ uplink adaptive power control or other methods of fade compensation, such that the earth station transmissions shall be conducted at the power level required to meet the desired link performance while reducing the level of mutual interference between both networks (No. **5.541A**);

k) that the fixed and mobile services are allocated on a primary basis in the frequency bands 27.5-29.5 GHz on a global basis;

l) that the frequency band 18.6-18.8 GHz is used by the Earth exploration-satellite service (EESS) (passive) in remote sensing by Earth exploration and meteorological satellites, and protection from interference is essential for passive sensing measurements and applications, especially for measurements of known spectral lines, which are of particular importance;

m) that the frequency bands 28.5-29.5 GHz (Earth-to-space) are also allocated to the Earth exploration-satellite service on a secondary basis, and no additional constraints should be imposed on the EESS;

n) that all allocated services in these frequency bands should be taken into account,

resolves to invite ITU-R

1 to study the technical and operational characteristics and user requirements of different types of earth stations in motion that operate or plan to operate within geostationary FSS allocations in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz, including the use of spectrum to provide the envisioned services to various types of earth station in motion and the degree to which flexible access to spectrum can facilitate sharing with services identified in *recognizing further a)* to *n)*;

2 to study sharing and compatibility between earth stations in motion operating with geostationary FSS networks and current and planned stations of existing services allocated in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz to ensure protection of, and not impose undue constraints on, services allocated in those frequency bands, and taking into account *recognizing further a)* to *n)*;

3 to develop, for different types of earth stations in motion and different portions of the frequency bands studied, technical conditions and regulatory provisions for their operation, taking into account the results of the studies above,

resolves

that these earth stations not be used or relied upon for safety-of-life applications,

resolves to further invite the 2019 World Radiocommunication Conference

to consider the results of the above studies and take necessary actions, as appropriate, provided that the results of the studies referred to in *resolves to invite ITU-R* are complete and agreed by ITU-R study groups.

ADD

RESOLUTION COM6/18 (WRC-15)

Studies of technical, operational issues and regulatory provisions for non-geostationary fixed-satellite services satellite 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)

The World Radiocommunication Conference (Geneva, 2015),

considering

a) the need to encourage the development and implementation of new technologies in the fixed-satellite service (FSS) at frequencies above 30 GHz;

b) that FSS systems based on the use of new technologies above 30 GHz and associated with both geostationary (GSO) and non-geostationary (non-GSO) satellite constellations are capable of providing high-capacity and low-cost means of communication even to the most isolated regions of the world;

c) 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;

d) that, in accordance with No. **22.2**, non-GSO systems shall not cause unacceptable interference to GSO FSS and broadcasting-satellite service (BSS) networks and, unless otherwise specified in the Radio Regulations, shall not claim protection from GSO FSS and BSS satellite networks;

e) that non-GSO FSS systems would benefit from the certainty that would result from the specification of measures required to protect GSO FSS and BSS satellite networks under No. **22.2**;

f) that in the FSS, there are GSO satellite networks and non-GSO satellite systems operating and/or planned for near-term operation in the frequency band allocated to the FSS in the range 37.5-51.4 GHz;

g) that technical studies are required in order to ascertain the feasibility of, and conditions for, non-GSO FSS satellite systems sharing the frequency bands 37.5-42.5 GHz (space-to-Earth) and 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space): 1) with GSO satellite networks (FSS, MSS and BSS, as appropriate to the band), and 2) with other non-GSO FSS satellite systems;

h) that review of Resolution **750 (Rev.WRC-15)** may be required to take into account new development of non-GSO satellites,

considering further

that Recommendations ITU-R S.1323, ITU-R S.1325, ITU-R S.1328, ITU-R S.1529 and ITU-R S.1557 provide information on system characteristics, operational requirements and protection criteria that may be used in sharing studies,

noting

a) that filing information for GSO FSS satellite networks in the frequency bands 37.5-42.5 GHz (space-to-Earth), 49.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) has been communicated to the Radiocommunication Bureau;

b) that some of these GSO satellite networks are in operation and others will be operated in the near future;

c) that the frequency band 37.5-38 GHz is allocated to the space research service (deep space) in the space-to-Earth direction and the frequency band 40.0-40.5 GHz is allocated to the space research service and the Earth exploration-satellite service in the Earth-to-space direction on a primary basis;

d) that the frequency band 37.5-40.5 GHz is allocated to the Earth exploration-satellite service in the space-to-Earth direction on a secondary basis,

recognizing

a) that WRC-2000 adopted provisions, including epfd limits in Nos. **22.5C**, **D** and **F** to quantify No. **22.2**, in order to protect GSO FSS and BSS satellite networks from non-GSO FSS satellite systems in the 10-30 GHz frequency range;

b) that Resolution **76 (Rev.WRC-15)** contains aggregate power levels not to be exceeded by non-GSO FSS systems in order to protect against interference GSO FSS and GSO BSS networks in the 10-30 GHz frequency range;

c) that No. **5.552** urges administrations to take all practicable steps to reserve the frequency band 47.2-49.2 GHz for feeder links for the broadcasting-satellite service operating in the frequency band 40.5-42.5 GHz;

d) that No. **5.554A** limits the use of the frequency bands 47.5-47.9 GHz, 48.2-48.54 GHz and 49.44-50.2 GHz by the fixed-satellite service (space-to-Earth) to geostationary satellites;

e) that No. **21.16** contains power flux-density limits applicable to non-GSO satellite systems to protect fixed and mobile services with allocations in the frequency band 37.5-42.5 GHz;

f) that the frequency band 50.2-50.4 GHz is allocated on a primary basis to the EESS (passive) and space research (passive) services, which must be adequately protected;

g) that WRC-03, having considered the outcome of preliminary ITU-R studies, decided that further studies would be needed to determine the conditions for non-GSO FSS satellite systems to share the 37.5-50.2 GHz frequency range with GSO FSS satellite networks;

h) that No. **5.556** indicates that radio astronomy observations are carried out in the frequency band 51.4-54.25 GHz and that mitigation measures may have to be defined in this regard;

i) that any potential revisions to limitations for the protection of passive services or radio astronomy observations will necessarily be forward-looking, and will be impractical to apply to FSS networks and systems described in *considering f)* and *noting a)* and *b)*,

resolves to invite ITU-R

to conduct, and complete in time for WRC-19:

1 studies of technical and operational issues and regulatory provisions for the operation of non-GSO FSS satellite systems in the frequency bands 37.5-42.5 GHz (space-to-Earth) and 47.2-48.9 GHz (limited to feeder links only), 48.9-50.2 GHz and 50.4-51.4 GHz (all Earth-to-space), while ensuring protection of GSO satellite networks in the FSS, MSS and BSS, without limiting or unduly constraining the future development of GSO networks across those bands, and without modifying the provisions of Article **21**;

2 studies carried out under *resolves to invite ITU-R* 1 shall focus exclusively on the development of equivalent power flux-density limits produced at any point in the GSO by emissions from all the earth stations of a non-GSO system in the fixed-satellite service or into any geostationary FSS earth station, as appropriate;

3 studies and development of sharing conditions between non-GSO FSS systems operating in the frequency bands listed in *resolves to invite ITU-R* 1 above;

4 studies of possible necessary revisions to Resolution **750 (Rev.WRC-15)** to ensure protection of the EESS (passive) in the frequency bands 36-37 GHz and 50.2-50.4 GHz from non-GSO FSS transmission, taking into account *recognizing i)* above, including study of aggregate FSS interference effects from networks and systems operating or planned to operate in the frequency bands described in *resolves to invite ITU-R* 1 above;

5 studies towards ensuring protection of the radio astronomy frequency bands 42.5-43.5 GHz, 48.94-49.04 GHz and 51.4-54.25 GHz from non-GSO FSS transmissions, taking into account *recognizing i)* above, including study of aggregate FSS interference effects from networks and systems operating or planned to operate in the frequency bands described in *resolves to invite ITU-R* 1 above,

further resolves

to invite WRC-19 to consider the results of the above studies and take appropriate action,

invites administrations

to participate in the studies by submitting contributions to ITU-R.

ADD

RESOLUTION COM6/19 (WRC-15)

Studies to accommodate requirements in the space operation service for non-geostationary satellites with short duration missions

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the term "short duration mission" used in this resolution refers to a mission having a limited period of validity of not more than typically three years;

b) that examples of such satellites are given in Report ITU-R SA.2312, which provides technical characteristics;

c) that Report ITU-R SA.2348 provides an overview of the current practice and procedures for notifying space networks currently applicable to these satellites;

d) that, since the number of these satellites is growing, the demand for suitable allocations to the space operation service may increase;

e) that it is important to ensure that any satellite radio-frequency operation avoids harmful interference to other systems and services;

f) that the frequency bands below 1 GHz are used for a wide variety of terrestrial and space applications, that some of these frequency bands are heavily used and new allocations to the space operation service in these frequency bands should not put undue constraints on incumbent services;

g) that some non-amateur satellites have used frequencies for telemetry, tracking and command in the frequency bands 144-146 MHz and 435-438 MHz which are allocated to the amateur-satellite service, and that such use is not in accordance with Nos. **1.56** and **1.57**;

h) that, according to No. **1.23**, telemetry, tracking and command functions for satellites will normally be provided within the service in which the space station is operating;

i) that these satellites are constrained in terms of low on-board power and low antenna gain as described in Report ITU-R SA.2312;

j) that the bandwidth currently used by these satellites for telemetry, tracking and command in frequency bands below 1 GHz, as described in Report ITU-R SA.2312, is generally 0.1 MHz or less,

further considering

a) that these satellites may provide an affordable means to access orbital resources (spectrum and orbit) for new entrants in space;

b) that the mass and dimensions of these satellites have been some of the major contributing factors to their success among new spacefaring nations;

c) that the reliable control and tracking of satellites is important for the management of space debris,

recognizing

a) that the existing allocations to the space operation service below 1 GHz, where No. **9.21** applies, are not suitable for the satellites referred to in *considering a)* and *b)*;

b) that there are other frequency bands already allocated to the space operation service below 1 GHz where No. **9.21** does not apply;

c) the provisions contained in No. **5.266** and No. **5.267** and Resolution **205 (Rev.WRC-15)**,

resolves to invite the 2019 World Radiocommunication Conference

to consider the results of ITU-R studies and take necessary action, as appropriate, provided that the results of the studies referred to in *invites ITU-R* below are complete and agreed by ITU-R study groups,

invites ITU-R

1 to study the spectrum requirements for telemetry, tracking and command in the space operation service for the growing number of non-GSO satellites with short duration missions, taking into account No. **1.23;**

2 to assess the suitability of existing allocations to the space operation service in the frequency range below 1 GHz, taking into account *recognizing a)* and current use;

3 if studies of the current allocations to the space operations service indicate that requirements cannot be met under *invites ITU-R* 1 and 2, to conduct sharing and compatibility studies, and study mitigation techniques to protect the incumbent services, both in-band as well as in adjacent bands, in order to consider possible new allocations or an upgrade of the existing allocations to the space operation service within the frequency ranges 150.05-174 MHz and 400.15-420 MHz,

invites Member States and ITU-R Sector Members, Associates and Academia

to participate in studies by submitting contributions to ITU-R.

ADD

RESOLUTION COM6/20 (WRC-15)

Studies on frequency-related matters for International Mobile Telecommunications identification including possible additional allocations to the mobile services on a primary basis in portion(s) of the frequency range between 24.25 and 86 GHz for the future development of International Mobile Telecommunications for 2020 and beyond

The World Radiocommunication Conference (Geneva, 2015),

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 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;

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 MIMO and beam-forming techniques in supporting enhanced broadband;

h) that ITU-T has initiated the study of network standardization for IMT for 2020 and beyond;

i) that adequate and timely availability of spectrum and supporting regulatory provisions is essential to realize the objectives in Recommendation ITU-R M.2083;

j) 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;

k) that identification of frequency bands allocated to 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;

l) the need to protect existing services and to allow for their continued development when considering frequency bands for possible additional allocations to any service,

noting

a) that Resolution ITU-R 65 addresses the principles for the process of development of IMT for 2020 and beyond, and that Question ITU-R 77-7/5 considers the needs of developing countries in the development and implementation of IMT;

b) that Question ITU-R 229/5 seeks to address the further development of IMT;

c) that IMT encompasses both IMT-2000, IMT-Advanced, and IMT-2020 collectively, as described in Resolution ITU-R 56-2;

d) Recommendation ITU-R M.2083, on the framework and objectives of the future development of IMT for 2020 and beyond;

e) that Report ITU-R M.2320 addresses future technology trends of terrestrial IMT systems;

f) Report ITU-R M.2376, on technical feasibility of IMT in the frequency bands above 6 GHz;

g) that Report ITU-R M.2370 analyses trends impacting future IMT traffic growth beyond the year 2020 and estimates global traffic demands for the period 2020 to 2030;

h) that there are ongoing studies within ITU-R on the propagation characteristics for mobile systems in higher frequency bands;

i) the relevance of provisions in Nos. **5.340**, **5.516B**, **5.547** and **5.553**, which may need to be taken into account in studies;

j) that the FSS allocation in the frequency band 24.65-25.25 GHz was made by WRC-12,

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 frequency bands allocated to passive services on an exclusive basis are not suitable for an allocation to the mobile service;

c) 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;

d) that there should be no additional regulatory or technical constraints imposed to services to which the band is currently allocated on a primary basis,

resolves to invite ITU-R

1 to conduct and complete in time for WRC-19 the appropriate studies to determine the spectrum needs for the terrestrial component of IMT in the frequency range between 24.25 GHz and 86 GHz, taking into account:

– technical and operational characteristics of terrestrial IMT systems that would operate in this frequency range, including the evolution of IMT through advances in technology and spectrally efficient techniques;

– the deployment scenarios envisaged for IMT-2020 systems and the related requirements of high data traffic such as in dense urban areas and/or in peak times;

– the needs of developing countries;

– the time-frame in which spectrum would be needed;

2 to conduct and complete in time for WRC-19 the appropriate sharing and compatibility studies[1], taking into account the protection of services to which the band is allocated on a primary basis, for the frequency bands:

– 24.25-27.5 GHz[2], 37-40.5 GHz, 42.5-43.5 GHz, 45.5-47 GHz, 47.2-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz, which have allocations to the mobile service on a primary basis; and

– 31.8-33.4 GHz, 40.5-42.5 GHz and 47-47.2 GHz, which may require additional allocations to the mobile service on a primary basis,

further resolves

1 to invite CPM19-1 to define the date by which technical and operational characteristics needed for sharing and compatibility studies are to be available, to ensure that studies referred to in *resolves to invite ITU-R* can be completed in time for consideration at WRC-19;

2 to invite WRC-19 to consider, based on the results of the above studies, additional spectrum allocations to the mobile service on a primary basis and to consider 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 ITU-R* 2,

invites administrations

to participate actively in these studies by submitting contributions to ITU-R.

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1 Including studies with respect to services in adjacent bands, as appropriate.

2 When conducting studies in the band 24.5-27.5 GHz, to take into account the need to ensure the protection of existing earth stations and the deployment of future receiving earth stations under the EESS (space-to-Earth) and SRS (space-to-Earth) allocation in the frequency band 25.5-27 GHz.

ADD

RESOLUTION COM6/21 (WRC-15)

Facilitating access to broadband applications delivered by high-altitude platform stations

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that there is a need for greater broadband connectivity and telecommunication services in underserved communities and in rural and remote areas;

b) that current technologies can be used for broadband applications delivered by base stations operating at high altitudes;

c) that high-altitude platform stations (HAPS) are one possible means for providing fixed broadband connectivity that would enable wireless broadband deployment in remote areas, including mountainous, coastal and sandy desert areas;

d) that HAPS using inter-HAPS links can provide broadband connectivity with minimal ground network infrastructure;

e) that HAPS may also be used for disaster recovery communications;

f) that some new entities are currently testing the delivery of broadband over lightweight, solar-powered aircraft and airships at an altitude of 20-50 kilometres for several months at a nominal fixed point relative to the ground below,

recognizing

a) that existing services and their applications shall be protected from HAPS applications, and no undue constraints shall be imposed on the future development of existing services by HAPS;

b) that HAPS is defined in No. **1.66A** of the Radio Regulations as a station located on an object at an altitude of 20-50 km and at a specified, nominal, fixed point relative to the Earth, and is subject to No. **4.23**;

c) that WRC-97 added a global identification for HAPS in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz, that WRC-2000 agreed, because of concerns with rain fade in that frequency range, on a HAPS identification for the frequency band 27.9-28.2 GHz (fixed downlink), paired with the frequency band 31.0-31.3 GHz (fixed uplink), outside Region 2, and that at WRC-12 five countries joined footnote **5.457** for a HAPS designation in the fixed service for frequency bands 6 440-6 520 MHz (HAPS-to-ground) and 6 560-6 640 MHz (ground-to-HAPS);

d) that WRC-2000 decided on additional spectrum identifications for HAPS links under No. **5.388A** and No. **5.388B** in some countries;

e) that the existing HAPS identifications were established without reference to today's broadband capabilities;

f) that Recommendation **34 (Rev.WRC-12)** noted that the development of common worldwide allocations is desirable in order to improve and harmonize utilization of the radio-frequency spectrum;

g) that, since WRC-12, the evolution of technology through advances in solar panel efficiency, battery energy density, lightweight composite materials, autonomous avionics and antenna technology may improve HAPS viability;

h) that the allotments of the Appendix **30B** Plan, assignments in the Plans and the List subject to Appendix **30** and **30A** and assignments in the Appendix **30B** List shall be protected,

resolves to invite ITU-R

1 to study additional spectrum needs for gateway and fixed terminal links for HAPS to provide broadband connectivity in the fixed service taking into account:

– the existing identifications and deployments of HAPS systems;

– the deployment scenarios envisioned for HAPS broadband systems and related requirements such as in remote areas;

– the technical and operational characteristics of HAPS systems, including the evolution of HAPS through advances in technology and spectrally-efficient techniques, and their deployment;

2 to study the suitability of using the existing identifications in *recognizing c)*, on a global or regional level, taking into account the regulatory provisions, such as geographical and technical restrictions associated with existing HAPS identifications based on the study performed in *resolves to invite ITU-R* 1;

3 to study appropriate modifications to the existing footnotes and associated resolutions in the identifications in *recognizing c)* in order to facilitate the use of HAPS links on a global or regional level, limited to the currently identified frequency bands and, where the use of an identification is not technically feasible for HAPS use, the possible removal of the unsuitable identification;

4 to study, in order to meet any spectrum needs which could not be satisfied under *resolves to invite ITU-R* 1 and 2, for the use of gateway and fixed terminal links for HAPS, the following frequency bands already allocated to the fixed service on a primary basis, not subject to Appendices **30**, **30A**, and **30B** in any region:

– on a global level: 38-39.5 GHz, and

– on a regional level: in Region 2, 21.4-22 GHz and 24.25-27.5 GHz,

further resolves

1 that the studies referred to in *resolves to invite ITU-R* 3 and 4 include sharing and compatibility studies to ensure protection of existing services allocated in the frequency ranges identified and, as appropriate, adjacent band studies, taking into account studies already performed in ITU-R;

2 that modifications studied under *resolves to invite ITU-R* 3 shall not consider the use of HAPS links in the frequency bands subject to Appendix **30B**;

3 to develop ITU-R Recommendations and Reports, as appropriate, on the basis of the studies called for in *resolves to invite ITU-R* 1, 2, 3, and 4 above,

invites administrations

to participate in the studies and to provide input contributions,

resolves to invite the 2019 World Radiocommunication Conference

to consider the results of the above studies and take necessary regulatory actions, as appropriate, provided that the results referred to in *resolves to invite ITU-R* are complete and agreed by ITU-R study groups.

ADD

RESOLUTION COM6/22 (WRC-15)

Studies concerning Wireless Access Systems including radio local area networks in the frequency bands between 5 150 MHz and 5 925 MHz

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that there has been considerable growth in the demand for Wireless Access Systems including radio local area networks (WAS/RLAN) applications with multimedia capabilities;

b) that WAS/RLAN applications contribute to global economic and social development by providing a wide range of multimedia applications;

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 as technology evolves to meet increasing performance demands and traffic on broadband WAS increases, the use of wider bandwidth channels in order to support high data rates creates a need for additional spectrum;

e) that the frequency band 5 350-5 460 MHz is allocated worldwide on a primary basis to the aeronautical radionavigation service (No. **5.449**);

f) that the frequency band 5 460-5 470 MHz is allocated worldwide on a primary basis to the radionavigation service (No. **5.449**);

g) that the frequency band 5 350 to 5 470 MHz is allocated worldwide on a co-primary basis to the Earth exploration-satellite service (active) (No. **5.448B**), the space research service (active) (No. **5.448C**) and the radiolocation service (No. **5.448D**);

h) that the frequency bands between 5 725 and 5 850 MHz are allocated worldwide on a primary basis to the radiolocation service and, in Region 1, to the fixed-satellite service;

i) that the frequency band 5 850-5 925 MHz is allocated worldwide on a primary basis to the mobile service, the fixed service and the fixed-satellite service;

j) that there is a need to protect the incumbent primary services including their current and planned use;

k) that there may be a need to specify potential technical and operational restrictions for WAS/RLAN operating in the mobile service within the 5 GHz frequency range to facilitate sharing with systems of incumbent services,

considering further

a) that adequate and timely availability of spectrum and supporting regulatory provisions are essential to support future growth of WAS/RLAN applications;

b) that harmonized worldwide bands that support future growth of WAS/RLAN applications are highly desirable in order to achieve the benefits of economies of scale,

noting

a) that the frequency bands 5 150- 5 250 MHz, 5 250- 5 350 MHz and 5 470- 5 725 MHz are allocated to the mobile service on a primary basis for the implementation of WAS/RLAN applications in accordance with Resolution **229 (Rev.WRC-12)**;

b) that the frequency band 5 250-5 850 MHz is allocated worldwide on a primary basis to the radiolocation service;

c) that in the frequency bands 5 350 -5 470 MHz there are no primary mobile allocations;

d) that in the frequency band 5 725-5 850 MHz there is no primary mobile allocation, however, the band is allocated by footnote to the fixed and mobile service in some countries, and additionally WAS/RLAN use is already authorized in some countries situated in each of the ITU-R regions;

e) that the Earth exploration-satellite service (active) allocations in the frequency bands 5 350-5 460 MHz and 5 460-5 470 MHz are essential for Earth-observation programmes such as Copernicus (Sentinel-1 and Sentinel-3), Jason, Sentinel-6 and RADARSAT (RADARSAT-2 and RADARSAT-3) and that the data these provide is vital for reliable and up-to-date information on how our planet and its climate are changing;

ebis) that future Earth exploration-satellite service (active) systems are being planned to utilize up to 300 MHz of bandwidth within the 5 GHz EESS allocated frequency band to improve image resolution and provide improved applications to users;

f) that the frequency band 5 150-5 250 MHz is also allocated worldwide on a primary basis to the aeronautical radionavigation service and to the fixed-satellite service (No. **5.447A**);

g) that the frequency bands between 5 250 and 5 350 MHz are also allocated worldwide on a primary basis to the Earth exploration-satellite service (active), the space research service and the space research (active) service;

h) that protection and performance criteria for systems of incumbent services are available in ITU-R,

recognizing

a) that the compatibility studies performed by ITU-R in preparation for this conference indicate that when assuming the use of WAS/RLAN mitigation measures limited to the regulatory provisions of Resolution **229 (Rev.WRC-12)**, sharing between WAS/RLAN and the EESS (active) systems in the frequency bands 5 350 to 5 470 MHz would not be feasible, as well as being insufficient to ensure protection of certain radar types in this frequency band; for these cases, sharing may only be feasible if additional WAS/RLAN mitigation measures are implemented, however, no agreement was reached on the applicability of any additional WAS/RLAN mitigation techniques;

b) that the results of ITU-R studies indicate that the minimum spectrum need for WAS/RLAN in the 5 GHz frequency range in the year 2018 is estimated at 880 MHz; this figure includes 455-580 MHz already utilized by non-IMT mobile broadband applications operating within the 5 GHz range resulting in 300-425 MHz additional spectrum being required;

c) that WAS/RLAN devices utilize the following frequency bands in the 5 GHz frequency range: 5 150-5 250 MHz, 5 250-5 350 MHz, 5 470-5 725 MHz and, in some countries 5 725-5 850 MHz;

d) that the frequency band 5 850-5 925 MHz is extensively used in some countries by the fixed-satellite service;

e) that additional global allocations to the mobile service in the frequency bands 5 350-5 470 MHz and 5 725-5 850 MHz would facilitate contiguous spectrum for WAS/RLAN, thereby enabling the use of wider channel bandwidths to support higher data throughput;

f) that sharing studies should consider additional mitigation techniques to ensure that WAS/RLAN devices would not result in degradation of the performance for existing systems;

g) that the application of possible additional WAS/RLAN mitigation measures referred to in *recognizing a)* may also be relevant to enable WAS/RLAN outdoor operation in other frequency bands;

h) that the frequency band 5 725-5 875 MHz is also designated for industrial, scientific and medical (ISM) applications and that radiocommunication services operating within this frequency band must accept harmful interference which may be caused by these applications in accordance with No. **5.150**,

resolves to invite the 2019 World Radiocommunication Conference

to consider the results of the ITU-R studies and take appropriate actions,

invites ITU-R

to conduct and complete the following in time for WRC-19:

a) to study WAS/RLAN technical characteristics and operational requirements in the 5 GHz frequency range;

b) to conduct studies with a view to identify potential WAS/RLAN mitigation techniques to facilitate sharing with incumbent systems in the frequency bands 5 150-5 350 MHz, 5 350-5 470 MHz, 5 725-5 850 MHz and 5 850-5 925 MHz, while ensuring the protection of incumbent services including their current and planned use;

c) to perform sharing and compatibility studies between WAS/RLAN applications and incumbent services in the frequency band 5 150-5 350 MHz with the possibility of enabling outdoor WAS/RLAN operations including possible associated conditions;

d) to conduct further sharing and compatibility studies between WAS/RLAN applications and incumbent services addressing:

i) whether any additional mitigation techniques in the frequency band 5 350-5 470 MHz beyond those analysed in the studies referred to in *recognizing a)* would provide coexistence between WAS/RLAN systems and EESS (active) and SRS (active) systems;

ii) whether any mitigation techniques in the frequency band 5 350-5 470 MHz would provide compatibility between WAS/RLAN systems and radio determination systems;

iii) whether the results of studies under points i) and ii) would enable an allocation of the frequency band 5 350-5 470 MHz to the mobile service with a view to accommodating WAS/RLAN use;

e) to also conduct detailed sharing and compatibility studies, including mitigation techniques, between WAS/RLAN and incumbent services in the frequency band 5 725- 5 850 MHz with a view to enabling a mobile service allocation to accommodate WAS/RLAN use;

f) to also conduct detailed sharing and compatibility studies, including mitigation techniques, between WAS/RLAN and incumbent services in the frequency band 5 850-5 925 MHz with a view to accommodating WAS/RLAN use under the existing primary mobile service allocation while not imposing any additional constraints on the existing services,

invites administrations

to participate in the studies by submitting contributions to ITU-R.

ADD

RESOLUTION COM6/23 (WRC-15)

Studies relating to spectrum needs and possible allocation of the frequency band 37.5-39.5 GHz to the fixed-satellite service

The World Radiocommunication Conference (Geneva, 2015),

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 technologies for broadband will increase speeds (45 Mbps is already available), with faster rates expected in the near future;

c) that technological developments such as advances in spot-beam technologies and frequency re-use are used by the fixed-satellite service (FSS) in spectrum above 30 GHz to increase the efficient use of spectrum;

d) that fixed-satellite applications in spectrum above 30 GHz, such as gateways, should be easier to share with other radiocommunication services than high-density fixed-satellite service (HDFSS) applications;

e) that FSS systems based on the use of new technologies above 30 GHz and associated with both geostationary (GSO) and non-geostationary (non-GSO) satellite constellations are capable of providing high-capacity and economically feasible communications even to the most isolated regions of the world;

f) that the frequency band 36-37 GHz is allocated on a primary basis to the Earth exploration-satellite service (EESS) (passive) and the space research service (SRS) (passive), which must be adequately protected,

considering further

a) that Recommendations ITU-R S.1323, S.1325, S.1328, S.1529 and S.1557 provide information on system characteristics, operational requirements and protection criteria to be used in sharing studies;

b) that it may be technically feasible to have a new FSS allocation in the frequency band 37.5-39.5 GHz (Earth-to-space) for operations of gateway earth stations, depending on the results of technical studies,

noting

a) that filing information for GSO satellite networks in the frequency band 37.5-42.5 GHz (space-to-Earth) has been communicated to the Radiocommunication Bureau;

b) that some of these GSO satellite networks are in operation and others will be operated in the near future;

c) that the frequency band 37.5-38 GHz is allocated to SRS on a primary basis in both directions;

d) that the frequency band 37.5-39.5 GHz is allocated to EESS on a secondary basis in the space-to-Earth direction,

recognizing

the need to protect existing services when considering frequency bands for possible additional allocations to any service,

resolves to invite ITU-R

to conduct, and complete in time for WRC-23:

1 studies considering additional spectrum needs for development of the fixed-satellite service, taking into account the frequency bands currently allocated to FSS, the technical conditions of their use and the possibility of optimizing the use of these frequency bands with a view to increasing spectrum efficiency;

2 sharing and compatibility studies with existing services, on primary and secondary basis, including in adjacent bands as appropriate, to determine the suitability of new primary allocations to the FSS in the frequency band 37.5-39.5 GHz (Earth-to-space, limited to FSS feeder links only) for both GSO and non-GSO orbit use;

3 studies towards possible revision of Resolution **750 (Rev.WRC-15)** so that systems operating in the passive frequency band 36-37 GHz are protected,

further resolves

to invite WRC-23 to consider the results of the above studies and take appropriate actions,

invites administrations

to participate actively in these studies by submitting contributions to ITU-R.

ADD

RESOLUTION COM6/24 (WRC-15)

Studies relating to spectrum needs and possible allocation of the frequency band 51.4-52.4 GHz to the fixed-satellite service (Earth-to-space)

The World Radiocommunication Conference (Geneva, 2015),

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 technologies for broadband will increase speeds (45 Mbps is already available), 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 fixed-satellite service in spectrum above 30 GHz to increase the efficient use of spectrum;

d) that fixed-satellite applications in spectrum above 30 GHz, such as feeder links, should be easier to share with other radiocommunication services than high-density fixed-satellite service (HDFSS) applications,

recognizing

a) the need to protect existing services when considering frequency bands for possible additional allocations to any service;

b) that the frequency band 51.4-52.4 GHz is allocated to 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**;

c) that No. **5.556** indicates that radio astronomy observations are carried out in the frequency band 51.4-54.25 GHz and that appropriate measures may have to be defined to protect radio astronomy service,

resolves to invite ITU-R

to conduct, and complete in time for WRC-19:

1 studies considering additional spectrum needs for development of the fixed-satellite service, taking into account the frequency bands currently allocated to the fixed-satellite service, the technical conditions of their use, and the possibility of optimizing the use of these frequency bands with a view to increasing spectrum efficiency;

2 subject to justification resulting from studies conducted under *resolves to invite ITU-R* 1, sharing and compatibility studies with existing services, on a primary and secondary basis, including in adjacent bands as appropriate, to determine the suitability, including protection of fixed and mobile services, of new primary allocations to the FSS in the frequency band 51.4-52.4 GHz (Earth-to-space) limited to FSS feeder links for geostationary orbit use, and the possible associated regulatory actions;

3 studies towards possible revision of Resolution **750 (Rev.WRC-12)** so that systems operating in the passive frequency band 52.6-54.25 GHz are protected;

4 studies regarding the protection of radio astronomy, as described in *recognizing c)*, including regulatory measures, as appropriate,

instructs the Director of the Radiocommunication Bureau

to report on the results of the ITU-R studies to WRC-19,

invites administrations

to participate actively in these studies by submitting contributions to ITU-R.

ADD

RESOLUTION COM6/25 (WRC-15)

Provisional application of certain provisions of the Radio Regulations as revised by the 2015 World Radiocommunication Conference and abrogation of certain Resolutions and Recommendations

The World Radiocommunication Conference (Geneva, 2015),

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 2017;

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

that, as of 28 November 2015, the following provisions of the RR, as revised or established by this conference, shall provisionally apply: Table of Frequency Allocations 5 091-5 150 MHz, Nos. **5.444**, **5.444A**, **5.444B** and Table 10 of Annex 7 to Appendix **7**,

further resolves

to abrogate the following resolutions as of 28 November 2015:

Resolution **11 (WRC-12)**
Resolution **51 (Rev.WRC-2000)**
Resolution **58 (WRC-2000)**
Resolution **67 (WRC-12)**
Resolution **73 (Rev.WRC-2000)**
Resolution **98 (WRC-12)**
Resolution **142 (WRC-03)**
Resolution **232 (WRC-12)**
Resolution **233 (WRC-12)**
Resolution **234 (WRC-12)**
Resolution **358 (WRC-12)**
Resolution **423 (WRC-12)**
Resolution **547 (Rev.WRC-07)**
Resolution **644 (Rev.WRC-12)**
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Resolution **806 (WRC-07)**
Resolution **807 (WRC-12)**
Resolution **808 (WRC-12)**
Resolution **900 (WRC-03)**
Resolution **909 (WRC-12)**
Resolution **957 (WRC-12)**
…

MOD

RECOMMENDATION 75 (REV.WRC-15)

Study of the boundary between the out-of-band and spurious domains of primary radars using magnetrons

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the principal objective of Appendix **3** is to specify the maximum permitted level of unwanted emissions in the spurious domain;

b) that the out-of-band and spurious domains of an emission are defined in Article **1**;

c) that Recommendation ITU-R SM.1541 specifies the boundary between the out-of-band and spurious domains for primary radars, and that the boundary is related to the emission mask based on the −40 dB bandwidth;

d) that Appendix **3** refers to Recommendation ITU-R SM.1541;

e) that Recommendation ITU-R M.1177 describes the techniques for measurement of unwanted emissions of radars,

recognizing

that there is a possibility that calculated values for the −40 dB bandwidth related to unwanted emissions of primary radars using magnetrons underestimate the actual bandwidth,

recommends

that ITU-R study calculation methods for the −40 dB bandwidth necessary for the determination of the boundary between the spurious and out-of-band domains of primary radars using magnetrons,

invites administrations

to participate actively in the above studies by submitting contributions to ITU-R.

MOD

RECOMMENDATION 207 (REV.WRC-15)

Future IMT systems

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the future development of IMT is being studied by ITU-R in accordance with Recommendations ITU-R M.1645 and ITU-R M.2083, and further Recommendations are to be developed for IMT;

b) that the future development of IMT for 2020 and beyond is foreseen to address the need for higher data rates, corresponding to user needs, as appropriate, than those of currently deployed IMT systems;

c) the need to define the requirements associated with ongoing enhancement of future IMT systems,

noting

a) the ongoing relevant studies by ITU-R on IMT-Advanced, in particular the outputs from Question ITU-R 229/5;

b) the need to take into consideration requirements of applications of other services,

recommends

to invite ITU-R to study as necessary technical, operational and spectrum related issues to meet the objectives of future development of IMT systems.

SUP

RESOLUTION 11 (WRC-12)

Use of satellite orbital positions and associated frequency spectrum to deliver international public telecommunication services in developing countries

SUP

RESOLUTION 51 (REV.WRC-2000)

Transitional arrangements relating to the advance publication and coordination of satellite networks[1]

SUP

RESOLUTION 58 (WRC-2000)

Transitional measures for coordination between certain specific geostationary fixed-satellite service receive earth stations and non-geostationary fixed-satellite service transmit space stations in the frequency bands 10.7-12.75 GHz, 17.8-18.6 GHz, and 19.7-20.2 GHz where epfd↓ limits apply

SUP

RESOLUTION 67 (WRC-12)

Updating and rearrangement of the Radio Regulations

SUP

RESOLUTION 73 (REV.WRC-2000)

Measures to solve the incompatibility between the broadcasting-satellite service in Region 1 and the fixed-satellite service in Region 3 in the frequency band 12.2-12.5 GHz

SUP

RESOLUTION 98 (WRC-12)

Provisional application of certain provisions of the Radio Regulations as revised by WRC-12 and abrogation of certain Resolutions and Recommendations

SUP

RESOLUTION 142 (WRC-03)

Transitional arrangements relating to use of the frequency band 11.7-12.2 GHz by geostationary-satellite networks in the fixed-satellite service in Region 2

SUP

RESOLUTION 151 (WRC-12)

Additional primary allocations to the fixed-satellite service in frequency bands between 10 and 17 GHz in Region 1

SUP

RESOLUTION 152 (WRC-12)

Additional primary allocations to the fixed-satellite service in the Earth-to-space direction in frequency bands between 13-17 GHz in Region 2 and Region 3

SUP

RESOLUTION 153 (WRC-12)

The use of frequency bands allocated to the fixed-satellite service not subject to Appendices 30, 30A and 30B for the control and non-payload communications of unmanned aircraft systems in non-segregated airspaces

SUP

RESOLUTION 232 (WRC-12)

Use of the frequency band 694-790 MHz by the mobile, except aeronautical mobile, service in Region 1 and related studies

SUP

RESOLUTION 234 (WRC-12)

Additional primary allocations to the mobile-satellite service within the bands from 22 GHz to 26 GHz

SUP

RESOLUTION 358 (WRC-12)

Consideration of improvement and expansion of on-board communication stations in the maritime mobile service in the UHF bands

SUP

RESOLUTION 423 (WRC-12)

Consideration of regulatory actions, including allocations, to support Wireless Avionics Intra-Communications

SUP

RESOLUTION 547 (REV.WRC-07)

Updating of the "Remarks" columns in the Tables of Article 9A of Appendix 30A and Article 11 of Appendix 30 of the Radio Regulations

SUP

RESOLUTION 644 (REV.WRC-12)

Radiocommunication resources for early warning, disaster mitigation and relief operations

SUP

RESOLUTION 648 (WRC-12)

Studies to support broadband public protection and disaster relief

SUP

RESOLUTION 649 (WRC-12)

Possible allocation to the amateur service on a secondary basis at around 5 300 kHz

SUP

RESOLUTION 650 (WRC-12)

Allocation for the Earth exploration-satellite service (Earth-to-space) in the 7-8 GHz range

SUP

RESOLUTION 651 (WRC-12)

Possible extension of the current worldwide allocation to the Earth exploration-satellite (active) service in the frequency band 9 300-9 900 MHz by up to 600 MHz within the frequency bands 8 700-9 300 MHz and/or 9 900-10 500 MHz

SUP

RESOLUTION 652 (WRC-12)

Use of the band 410-420 MHz by the space research service (space-to-space)

SUP

RESOLUTION 653 (WRC-12)

Future of the Coordinated Universal Time time-scale

SUP

RESOLUTION 654 (WRC-12)

Allocation of the band 77.5-78 GHz to the radiolocation service to support automotive short-range high-resolution radar operations

SUP

RESOLUTION 755 (WRC-12)

Power flux-density limits for transmitting stations in the 21.4-22 GHz band

SUP

RESOLUTION 756 (WRC-12)

Studies on possible reduction of the coordination arc and technical criteria used in application of No. 9.41 in respect of coordination under No. 9.7

SUP

RESOLUTION 757 (WRC-12)

Regulatory aspects for nanosatellites and picosatellites

SUP

RESOLUTION 758 (WRC-12)

Allocation to the fixed-satellite service and the maritime-mobile satellite service in the 7/8 GHz range

SUP

RESOLUTION 806 (WRC-07)

Preliminary agenda for the 2015 World Radiocommunication Conference

SUP

RESOLUTION 807 (WRC-12)

Agenda for the 2015 World Radiocommunication Conference

SUP

RESOLUTION 808 (WRC-12)

Preliminary agenda for the 2018 World Radiocommunication Conference

SUP

RESOLUTION 900 (WRC-03)

Review of the Rule of Procedure for No. 9.35 of the Radio Regulations

SUP

RESOLUTION 909 (WRC-12)

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

SUP

RESOLUTION 957 (WRC-12)

Studies towards review of the definitions of *fixed service*, *fixed station* and *mobile station*

Printed in Switzerland
Geneva, 2015
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