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| **World Radiocommunication Conference (WRC-19) Sharm el-Sheikh, Egypt, 28 October – 22 November 2019** |  |
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| PLENARY MEETING | **Addendum 13 to Document 12-E** |
|  | **4 October 2019** |
|  | **Original: Russian** |
|  | |
| Regional Commonwealth in the field of Communications Common Proposals | |
| Proposals for the work of the conference | |
|  | |
| Agenda item 1.13 | |

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 **238 (WRC-15)**;

Introduction

The main purpose of this WRC-19 agenda item is to identify frequency bands within the range 24.25-86 GHz that could be used for the deployment of IMT-2020 networks. This includes finding such frequency bands use of which may be harmonized among multiple States at the regional and global levels.

Proposal

The proposals of the RCC Administrations concerning 12 frequency bands listed in Resolution **238 (WRC-15)** are set out in the annex. The RCC Administrations also consider that frequency bands not covered by Resolution **238 (WRC-15)** must not be considered under WRC-19 agenda item 1.13.

| No. | Frequency bands, GHz | Proposed method of the CPM Report |
| --- | --- | --- |
| A | 24.25-27.5 | Identification for IMT (Method A2, Alternative 1, Condition A2a Option 1, Condition A2b Option 1, Condition A2c Option 2\*, Condition A2d Option 1, Condition A2e Option 1 together with Option 7, Condition A2f Option 1, Condition A2g Option 3). |
| B | 31.8-33.4 | No change (Method B1) |
| C | 37-40.5 | If this frequency band is identified for IMT, apply Condition C2a Option 1 |
| D | 40.5-42.5 | Identification for IMT (Method D2, Alternative 1, Condition D2a Option 1, Condition D2b Option 1, Condition D2c Option 3) |
| E | 42.5-43.5 | No change (Method E1) |
| F | 45.5-47 | No change (Method F1) |
| G | 47-47.2 | No change (Method G1) |
| H | 47.2-50.2 | No change (Method H1) |
| I | 50.4-52.6 | No change (Method I1) |
| J | 66-71 | No change (Method J1) |
| K | 71-76 | No change (Method K1) |
| L | 81-86 | No change (Method L1) |

\*As regards the footnotes Nos. **5.536B** and **5.536C**, the RCC Administrations consider that the deactivated measures under these notes in relation to IMT stations can be implemented with the agreement of the administrations listed therein.

For the purpose of identifying frequency bands, it is proposed that Article **5** of the Radio Regulations (RR) should be modified. To protect existing radio services, it is proposed that two new WRC Resolutions should be adopted, one regarding the frequency band 24.25-27.5 GHz, the other regarding the frequency band 40.5-42.5 GHz, defining the conditions of the use of these frequency bands by IMT stations. Also in order to ensure protection for passive services in the frequency bands 23.6-24.0 GHz, 50.2-50.4 GHz and 52.6-54.25 GHz, it is proposed that amendments should be made to Resolution **750 (Rev.WRC-15)** defining permitted levels of unwanted emissions for IMT stations.

In addition, keeping in mind that permitted levels of unwanted emissions from IMT stations, and emission power limits for IMT stations, are defined in terms of *total radiated power*, which is not currently defined in the Radio Regulations, the RCC Administrations propose making appropriate changes to RR Articles **1** and **21** and Appendix **4**.

All the proposed changes are set out in the annex.

ARTICLE 5

Frequency allocations

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

MOD RCC/12A13/1#49833

22-24.75 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 24.25-24.45  FIXED  MOBILE except aeronautical mobile ADD 5.A113  MOD 5.338A | 24.25-24.45  MOBILE except aeronautical mobile ADD 5.A113  MOD 5.338A  RADIONAVIGATION | 24.25-24.45  FIXED  MOBILE ADD 5.A113  MOD 5.338A  RADIONAVIGATION |
| 24.45-24.65  FIXED  INTER-SATELLITE  MOBILE except aeronautical mobile ADD 5.A113  MOD 5.338A | 24.45-24.65  INTER-SATELLITE  MOBILE except aeronautical mobile ADD 5.A113  MOD 5.338A  RADIONAVIGATION | 24.45-24.65  FIXED  INTER-SATELLITE  MOBILE ADD 5.A113  MOD 5.338A  RADIONAVIGATION |
|  | 5.533 | 5.533 |
| 24.65-24.75  FIXED  FIXED-SATELLITE (Earth-to-space) 5.532B  INTER-SATELLITE  MOBILE except aeronautical mobile ADD 5.A113  MOD 5.338A | 24.65-24.75  INTER-SATELLITE  MOBILE except aeronautical mobile ADD 5.A113  MOD 5.338A  RADIOLOCATION- SATELLITE (Earth-to-space) | 24.65-24.75  FIXED  FIXED-SATELLITE (Earth-to-space) 5.532B  INTER-SATELLITE  MOBILE ADD 5.A113  MOD 5.338A |
|  |  | 5.533 |

**Reasons:** Identification of the frequency band 24.25.27.5 GHz requires the allocation of the frequency band 24.25-25.25 GHz to the mobile (except aeronautical mobile) service.

MOD RCC/12A13/2#49834

24.75-29.9 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 24.75-25.25  FIXED  FIXED-SATELLITE (Earth-to-space) 5.532B  MOBILE except aeronautical mobileADD 5.A113  MOD 5.338A | 24.75-25.25  FIXED-SATELLITE (Earth-to-space) 5.535  MOBILE except aeronautical mobileADD 5.A113  MOD 5.338A | 24.75-25.25  FIXED  FIXED-SATELLITE (Earth-to-space) 5.535  MOBILEADD 5.A113  MOD 5.338A |
| 25.25-25.5 FIXED  INTER-SATELLITE 5.536  MOBILEADD 5.A113 MOD 5.338A  Standard frequency and time signal-satellite (Earth-to-space) | | |
| 25.5-27EARTH EXPLORATION-SATELLITE (space-to Earth) MOD 5.536B  FIXED  INTER-SATELLITE 5.536  MOBILEADD 5.A113 MOD 5.338A  SPACE RESEARCH (space-to-Earth) MOD 5.536C  Standard frequency and time signal-satellite (Earth-to-space)  MOD 5.536A | | |
| 27-27.5  FIXED  INTER-SATELLITE 5.536  MOBILE ADD 5.A113  MOD 5.338A | 27-27.5  FIXED  FIXED-SATELLITE (Earth-to-space)  INTER-SATELLITE 5.536 5.537  MOBILE ADD 5.A113 MOD 5.338A | |

**Reasons:** Identification of the frequency band 24.25-27.5 GHz requires the allocation of the frequency band 24.25-25.25 GHz to the mobile (except aeronautical mobile) service.

ADD RCC/12A13/3

5.A113The frequency band 24.25-27.5 GHz is identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. The use of this frequency band by the mobile service for IMT is limited to the land mobile service. Resolutions **[RCC/A113-IMT 26 GHZ] (WRC‑19)** and **750 (Rev.WRC‑19)** apply.     (WRC‑19)

**Reasons:** Bearing in mind that the technical and operational characteristics, as well as the possible scenarios of using IMT in the frequency band 24.25-27.5 GHz, have been defined and studied by ITU-R only in relation to the land mobile service, the possible use of IMT on board aircraft and maritime vessels should be precluded in order to protect other services with an allocation in the frequency band 24.25-25.25 GHz from possible interference from IMT stations.

MOD RCC/12A13/4#49841

5.338AIn the frequency bands 1 350-1 400 MHz, 1 427-1 452 MHz, 22.55-23.55 GHz, 24.25-27.5 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‑19)** applies.     (WRC‑19)

**Reasons:** The results of studies of compatibility of IMT stations operating in the frequency band 24.25-27.5 GHz with stations in passive services have shown the necessity of limiting levels of unwanted emissions from IMT stations (including emissions at the second harmonic) in order to protect passive services in the frequency bands 23.6-24.0 GHz, 50.2-50.4 GHz and 52.6-54.25 GHz.

MOD RCC/12A13/5#49842

5.536A Administrations operating earth stations in the Earth exploration-satellite service or the space research service shall not claim protection from stations (except IMT stations) in the fixed and mobile services operated by other administrations. In addition, earth stations in the Earth exploration-satellite service or in the space research service should be operated taking into account the most recent version of Recommendation ITU‑R SA.1862.     (WRC‑19)

**Reasons:** Under the terms of Resolution **238 (WRC-15)**, identification of the frequency band 24.25-27.5 GHz for IMT must 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) allocations in the frequency band 25.5-27 GHz.

ADD RCC/12A13/6#49920

DRAFT NEW RESOLUTION [RCC/A113-IMT 26 GHZ] (WRC-19)

International Mobile Telecommunications   
in the frequency band 24.25-27.5 GHz

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

considering

*a)* that International Mobile Telecommunications (IMT), including IMT‑2000, IMT-Advanced and IMT‑2020, is the ITU vision of global mobile access, and is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;

*b)* that the evolution of IMT is being studied within ITU‑R;

*c)* that harmonized worldwide bands for IMT are desirable in order to achieve global roaming and the benefits of economies of scale;

*d)* that IMT systems are now being evolved to provide diverse usage scenarios and applications such as enhanced mobile broadband, massive machine-type communications and ultra-reliable and low-latency communications;

*e)* that ultra-low latency and very high bit-rate applications of IMT will require larger contiguous blocks of spectrum than those available in frequency bands that are currently identified for use by administrations wishing to implement IMT;

*f)* that the properties of higher frequency bands, such as shorter wavelength, would better enable the use of advanced antenna systems including MIMO and beam-forming techniques in supporting enhanced broadband;

*g)* that ITU‑R has studied, in preparation for WRC‑19, sharing and compatibility with services allocated in the frequency band 24.25-27.5 GHz and its adjacent band, based on characteristics available at that time;

*h)* that identification of frequency bands allocated to the mobile service on a co-primary basis 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;

*i)* that the results of ITU‑R compatibility studies of IMT‑2020 systems are probabilistic, and therefore the deployment parameters of IMT‑2020 systems that affect compatibility with satellite receivers may vary during practical implementation and deployment of IMT‑2020 networks;

*j)* that the identification of frequency bands for IMT‑2020 requires technical and regulatory measures to ensure compatibility with and future development of incumbent services having an allocation in identified frequency bands;

*k)* 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

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

recognizing

*a)* that the identification of a frequency band for IMT does not establish priority in the Radio Regulations and does not preclude the use of the frequency band by any application of the services to which it is allocated;

*b)* that Resolution **750 (Rev.WRC‑19)** establishes limits on unwanted emissions in the frequency band 23.6-24 GHz from IMT base stations and IMT mobile stations within the 24.25-27.5 GHz frequency band;

*c)* that Resolution **750 (Rev.WRC‑19)** establishes limits on unwanted emissions in the frequency bands 50.2-50.4 GHz and 52.6-54.25 GHz from IMT base stations and IMT mobile stations within the frequency band 24.25-27.5 GHz,

resolves

1 in order to ensure the coexistence between IMT in the frequency band 24.25-27.5 GHz as identified by WRC‑19 in Article **5** of the Radio Regulations and other services to which the frequency band is allocated including the protection of these other services, administrations shall apply the condition(s);

– that all potential measures shall be taken to keep the electrical tilt of IMT base-station beams to be not higher than 0 degrees relative to the horizontal and the mechanical tilt of IMT base stations be below −10 degrees relative to the horizon;

– that the IMT base stations antenna pattern should be kept within the limits of approximation envelope according to Recommendation ITU‑R M.2101.

In addition, IMT base stations shall comply with the total radiated power (TRP) limits given in Tables 1 and 2:

Table 1

TRP (total radiated power) limits for IMT base stations

|  |  |
| --- | --- |
| Frequency bands | dB(W/200 MHz) |
| 24.25-27.5 GHz | 7 |

Table 2

e.i.r.p. limits for IMT base stations

| Elevation angle | Maximum e.i.r.p. dB(W/200 MHz) |
| --- | --- |
| 5 ≤ Θ ≤ 15 | 17 − 1.3(Θ − 5) |
| 15 < Θ ≤ 25 | 4 |
| 25 < Θ ≤ 55 | 4 − 0.43(Θ − 25) |
| 55 < Θ ≤ 90 | −8.9 |

2 that administrations wishing to implement IMT consider the use of the frequency band 24.25-27.5 GHz identified for IMT in No. **5.A113**, and the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT taking into account the latest relevant ITU‑R Recommendations,

invites administrations

to adopt provisions to limit the maximum density of 4 800 BSs per 40 000 km2 for outdoor hot spots in a channel of 200 MHz bandwidth within its territory. In cases when the area of an administration is less than 40 000 km2 the number of IMT BS should be reduced proportionally,

invites ITU‑R

1 to develop harmonized frequency arrangements to facilitate IMT deployment in the frequency band 24.25-27.5 GHz, taking into account the results of sharing and compatibility studies;

2to develop an ITU‑R Recommendation to assist administrations in protecting existing and future SRS/EESS earth stations operating in the frequency band 25.5-27 GHz;

3to develop an ITU‑R Recommendation to assist administrations in ensuring the coexistence between existing and future FSS earth stations and IMT operating within the frequency band 24.25-27.5 GHz;

4 to update existing ITU‑R Recommendations or develop a new ITU‑R Recommendation, as appropriate, to provide information and assistance to the administrations on possible coordination and protection measures for the radio astronomy service in the frequency band 23.6-24 GHz from the IMT deployment;

5to regularly update characteristics of IMT deployments (including BS density) and to study/assess the impact on sharing and compatibility with other services resulting from these deployments with reporting through the BR Director on the results to WRC,

instructs the Director of the Radiocommunication Bureau

to report to a future competent conference on the results of studies in *invites ITU-R*5 above.

**Reasons:** The new WRC Resolution defines technical limits for IMT stations in order to ensure protection from possible interference to satellite service receiving stations in the band 24.25-27.5 GHz. In addition, bearing in mind that compatibility studies for IMT systems were based on assumptions about possible scenarios for their deployment, the WRC Resolution provides for monitoring of IMT implementation in the frequency band 24.25-27.5 GHz with a view to adopting the measures needed to protect satellite service receiving stations in the event that the parameters of IMT deployment are significantly different.

ARTICLE 21

Terrestrial and space services sharing frequency bands above 1 GHz

Section II − Power limits for terrestrial stations

MOD RCC/12A13/7#49921

TABLE **21-2**     (Rev.WRC‑19)

|  |  |  |
| --- | --- | --- |
| Frequency band | Service | Limit as specified in Nos. |
| … | … | … |
| 17.7-18.4 GHz 18.6-18.8 GHz 19.3-19.7 GHz 22.55-23.55 GHz  24.4-29.5 GHz | Fixed-satellite Earth exploration-satellite Space research Inter-satellite | 21.2,21.3,21.5  and21.5A |
| … | … | … |

**Reasons:** As a result of the allocation of the frequency band 24.25-25.25 GHz to the mobile service, the frequency band 24.4-25.25 GHz falls into the category of bands that are shared on an equal basis by terrestrial and satellite services. The relevant provisions of RR Article **21** concerning compatibility of terrestrial and satellite services must therefore be extended to cover the frequency band 24.4-25.25 GHz.

MOD RCC/12A13/8#49922

21.5 3) The power delivered by a transmitter to the antenna or, where applicable, *total radiated power* of a station in the fixed or mobile services shall not exceed +13 dBW in frequency bands between 1 GHz and 10 GHz, or +10 dBW in frequency bands above 10 GHz, except as cited in No. **21.5A**.    (WRC‑19)

**Reasons:** The use of active antenna arrays by IMT stations in the range 24.25-27.5 GHz.

ARTICLE 1

Terms and definitions

Section VI – Characteristics of emissions and radio equipment

ADD RCC/12A13/9#49923

1.XXX*total radiated power (TRP)*:  Multiplication of maximum power of one active element of antenna array and number of active elements taking into account losses in antenna system.     (WRC‑19)

**Reasons:** IMT stations use active antenna arrays for which, instead of power supplied to the antenna, an equivalent concept, total radiated power, is used. Unwanted emission limits and any other limits linked to emission power for IMT stations with active antenna arrays are expressed in terms of total radiated power.

APPENDIX 4 (REV.WRC‑15)

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]](#footnote-1)1

**...**

Footnotes to Tables 1 and 2

...

MOD RCC/12A13/10#49924

TABLE 1     (Rev.WRC‑19)

Characteristics for terrestrial services

| **Column No.** | **Item identifier** | **Notice related to**  **Description of data items and requirements** |
| --- | --- | --- |
| ... |  | ... |
| **8.X** | **8AX** | total radiated power (in dBW) for stations with active antenna systems |
| **8.Х.1** | **8ВX** | maximum power (dBW) of one active element of an antenna system for stations with active antenna systems |
| **8.X.2** | **8СX** | number of active elements in the antenna system for stations with active antenna systems |
| **8.X.3** | **8DX** | antenna system losses for stations with active antenna systems |
| ... | ... | ... |

**Reasons:** The use of active antenna arrays by IMT stations in the band 24.25-27.5 GHz.

MOD RCC/12A13/11#49932

RESOLUTION 750 (Rev.WRC‑19)

Compatibility between the Earth exploration-satellite service (passive) and relevant active services

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

…

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;

…

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) band1 |
| … | … | … | … |
| 23.6-24.0 GHz | 24.25-27.5 GHz | Mobile | −49 dBW(200 MHz) total radiated power for IMT base stations)  −45 dBW(200 MHz) total radiated power for IMT user equipment |
| … | … | … | … |
| 50.2-50.4 GHz | 24.25-27.5 GHz | Mobile | −42 dBW total radiated power in any 200 MHz within EESS (passive) band for IMT base stations  −38 dBW total radiated power in any 200 MHz within EESS (passive) band for IMT user equipment |
| … | … | … | … |
| 52.6-54.25 GHz | 24.25-27.5 GHz | Mobile | −42 dBW total radiated power in any 200 MHz within EESS (passive) band for IMT base stations  −38 dBW total radiated power in any 200 MHz within EESS (passive) band for IMT user equipment |
| … | … | … | … |
| 1 The unwanted emission power level is to be understood as the level measured at the antenna port, unless specified in terms of total radiated power. | | | |

**Reasons:** The results of studies of the compatibility of IMT stations operating in the frequency band 24.25-27.5 GHz with stations in passive services have shown the necessity of limiting levels of unwanted emissions from IMT stations (including emissions at the second harmonic) in order to protect passive services in the frequency bands 23.6-24.0 GHz, 50.2-50.4 GHz and 52.6-54.25 GHz.

ARTICLE 5

Frequency allocations

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

NOC RCC/12A13/12

29.9-34.2 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| ... | | |
| 31.8-32FIXED 5.547A  RADIONAVIGATION  SPACE RESEARCH (deep space) (space-to-Earth)  5.547 5.547B 5.548 | | |
| 32-32.3FIXED 5.547A  RADIONAVIGATION  SPACE RESEARCH (deep space) (space-to-Earth)  5.547 5.547C 5.548 | | |
| 32.3-33 FIXED 5.547A  INTER-SATELLITE  RADIONAVIGATION  5.547 5.547D 5.548 | | |
| 33-33.4 FIXED 5.547A  RADIONAVIGATION  5.547 5.547E | | |
| ... | | |

**Reasons:** The results of ITU-R studies of IMT systems in the band 31.8-33.4 GHz have shown that there are considerable difficulties in ensuring compatibility with the radiodetermination service, which is widely used in various countries.

RCC/12A13/13

The RCC Administrations do not object to the identification of the band 37-40.5 GHz for IMT systems provided that EESS (passive) systems operating in the adjacent frequency band 36-37 GHz are protected by limits on permitted levels of unwanted emissions from IMT stations. Permitted levels of unwanted emissions for IMT base stations shall be −47 dB(W/100 MHz), and for IMT customer stations −46 dB(W/100MHz), must be indicated in the Radio Regulations, and must be mandatory.

**Reasons**: The use of the frequency band 37-40.5 GHz by IMT stations may, according to ITU-R studies (see CPM Report, Section 2/1.13/3.2.3.3), result in unintended interference to EESS (passive) stations using the frequency band 36-37 GHz. In order to prevent such interference, unwanted emissions from IMT stations must be reduced to an acceptable minimum level.

MOD RCC/12A13/14#49860

40-47.5 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 40.5-41  FIXED  FIXED-SATELLITE  (space-to-Earth)  MOBILE except aeronautical mobile ADD 5.D113A ADD 5.D113B  BROADCASTING  BROADCASTING-SATELLITE  Aeronautical mobile  5.547 | 40.5-41  FIXED  FIXED-SATELLITE  (space-to-Earth) 5.516B  MOBILE except aeronautical mobile ADD 5.D113A ADD 5.D113B  BROADCASTING  BROADCASTING-SATELLITE  Aeronautical mobile Mobile-satellite (space-to-Earth)  5.547 | 40.5-41  FIXED  FIXED-SATELLITE  (space-to-Earth)  MOBILE except aeronautical mobile ADD 5.D113A ADD 5.D113B  BROADCASTING  BROADCASTING-SATELLITE  Aeronautical mobile  5.547 |
| 41-42.5 FIXED  FIXED-SATELLITE (space-to-Earth) 5.516B  MOBILE except aeronautical mobile ADD 5.D113A ADD 5.D113B  BROADCASTING  BROADCASTING-SATELLITE  Aeronautical mobile  5.547 5.551F 5.551H 5.551I | | |

**Reasons:** Identification of the frequency band 40.5-42.5 GHz requires the status of the allocation for the mobile (except aeronautical mobile) service to be upgraded to primary.

ADD RCC/12A13/15#49861

5.D113AThe frequency band 40.5-42.5 GHz is identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. The use of this frequency band by the mobile service for IMT is limited to the land mobile service. Resolution **[RCC/B113-IMT 40 GHZ] (WRC‑19)** applies.     (WRC‑19)

**Reasons:** Identification of the frequency band 40.5-42.5 GHz for IMT requires the definition of conditions for IMT stations that will ensure protection for stations in other services in this frequency band and in the adjacent frequency band.

ADD RCC/12A13/16#49927

DRAFT NEW RESOLUTION [RCC/B113-IMT 40 GHZ] (WRC‑19)

International Mobile Telecommunications in the frequency band 40.5-42.5 GHz

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

considering

*a)* that International Mobile Telecommunications (IMT), including IMT-2000, IMT‑Advanced and IMT-2020, is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;

*b)* that the evolution of IMT is being studied within ITU‑R;

*c)* that adequate and timely availability of spectrum and supporting regulatory provisions is essential to realize the objectives in Recommendation ITU‑R M.2083;

*d)* that there is a need to continually take advantage of technological developments in order to increase the efficient use of spectrum and facilitate spectrum access;

*e)* that IMT systems are now being evolved to provide diverse usage scenarios and applications such as enhanced mobile broadband, massive machine-type communications and ultra-reliable and low-latency communications;

*f)* that ultra-low latency and very high bit-rate applications of IMT will require larger contiguous blocks of spectrum than those available in frequency bands that are currently identified for use by administrations wishing to implement IMT;

*g)* that the properties of higher frequency bands, such as shorter wavelength, would better enable the use of advanced antenna systems including MIMO and beam-forming techniques in supporting enhanced broadband;

*h)* that harmonized worldwide bands for IMT are desirable in order to achieve global roaming and the benefits of economies of scale;

*i)* that ITU‑R has studied, in preparation for WRC‑19, sharing and compatibility with services allocated in the frequency band 40.5-42.5 GHz and its adjacent bands, based on the characteristics available at that time;

*j)* that the results of ITU‑R compatibility studies of IMT‑2020 systems are probabilistic, and therefore the deployment parameters of IMT‑2020 systems that affect compatibility with satellite receivers may vary during practical implementation and deployment of IMT‑2020 networks;

*k)* that identification of frequency bands allocated to the mobile service for IMT may change the sharing situation regarding applications of services to which the frequency band is already allocated, and may require additional regulatory actions;

*l)* that the identification of frequency bands for IMT‑2020 requires technical and regulatory measures to ensure compatibility with and future development of incumbent services having an allocation in identified frequency bands;

*m)* the need to protect existing services and to allow for their continued development when considering frequency bands for possible additional allocations to any service;

*n)* that the frequency band 42.5-43.5 GHz is allocated to the radio astronomy service on a primary basis,

noting

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

recognizing

*a)* that the identification of a frequency band for IMT does not establish priority in the Radio Regulations and does not preclude the use of the frequency band by any application of the services to which it is allocated;

*b)* that the frequency band 40.5-42 GHz has been identified for high-density applications in the fixed-satellite service in the space-to-Earth direction in Region 2 (see No. **5.516B**),

resolves

1 in order to ensure the coexistence between IMT in the frequency band 40.5-42.5 GHz as identified by WRC‑19 in Article **5** of the Radio Regulations and other services to which the frequency band is allocated including the protection of these other services, administrations shall apply the condition(s);

*−* the operation of IMT within the frequency band 40.5-42.5 GHz shall protect the existing and future FSS receiving earth stations;

– the operation of IMT within the frequency band 40.5-42.5 GHz shall protect the existing and future RAS stations in the frequency band 42.5-43.5 GHz;

2 that administrations wishing to implement IMT consider the use of frequency band 40.5-42.5 GHz identified for IMT in No.**5.D113**, and the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT taking into account the latest relevant ITU‑R Recommendations,

invites administrations

1 when considering the spectrum to be used for IMT, to take into account the need for spectrum for earth stations at unspecified points as well as those used for gateways, and further take into account spectrum identified for the HDFSS as per No. **5.516B**;

2to adopt provisions to enable the deployment of future gateway FSS earth stations in the frequency band 40.5-42.5 GHz or portions thereof;

3 to implement, coordination and protection measures for the RAS stations in the frequency band 42.5-43.5 GHz as required,

invites ITU‑R

1 to develop harmonized frequency arrangements to facilitate IMT deployment in the frequency bands 40.5-42.5 GHz taking into account the results of sharing and compatibility studies;

2 to develop generic unwanted emission characteristics for mobile and base stations of the terrestrial radio interfaces of IMT-2020;

3 to develop an ITU‑R Recommendation to assist administrations in ensuring the coexistence between existing and future FSS earth stations and IMT operating in the frequency band 40.5-42.5 GHz from IMT deployments in neighbouring countries.

**Reasons:** Identification of the frequency band 40.5-42.5 GHz for IMT requires the definition of the conditions for IMT stations that will ensure protection for stations in other services in this band and in the adjacent frequency band.

ARTICLE 5

Frequency allocations

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

ADD RCC/12A13/17#49862

5.D113BStations in the maritime mobile service in the frequency band 40.5-42.5 GHz shall not cause interference to or claim protection from stations in other primary services in this frequency band.     (WRC‑19)

**Reasons:** Before WRC-19, stations in the maritime mobile service had a secondary allocation in this frequency band, and ITU-R studies do not permit the status of that allocation to be upgraded to primary.

NOC RCC/12A13/18

40-47.5 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| ... | | |
| 42.5-43.5 FIXED  FIXED-SATELLITE (Earth-to-space) 5.552  MOBILE except aeronautical mobile  RADIO ASTRONOMY  5.149 5.547 | | |
| ... | | |

**Reasons:** The use of the frequency band 42.5-43.5 GHz for IMT, separately from or together with the frequency band 40.5-42.5 GHz, is not appropriate. In the former case, the bandwidth of the band 42.5-43.5 GHz is insufficient to allow effective use by IMT, and ensuring compatibility of IMT with satellite services requires IMT stations to comply with a number of technical conditions. In the latter case, limits in the frequency band 42.5-43.5 GHz (for example, total radiated power limits or limits as regards the elevation angle of the IMT base station antenna) will automatically also apply to the frequency band 40.5-42.5 GHz for which such limits are not necessary.

NOC RCC/12A13/19

40-47.5 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| ... | | |
| 43.5-47 MOBILE 5.553  MOBILE-SATELLITE  RADIONAVIGATION  RADIONAVIGATION-SATELLITE  5.554 | | |
| ... | | |

**Reasons:** ITU-R compatibility studies in the frequency band 45.5-47 GHz have not been carried out and it is not possible to define the conditions for identifying the band for IMT.

NOC RCC/12A13/20

40-47.5 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| ... | | |
| 47-47.2 AMATEUR  AMATEUR-SATELLITE | | |
| ... | | |

**Reasons:** ITU-R compatibility studies in the frequency band 47-47.2 GHz have not been carried out and it is not possible to define the conditions for identifying the band for IMT.

NOC RCC/12A13/21

40-47.5 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| ... | | |
| 47.2-47.5 FIXED  FIXED-SATELLITE (Earth-to-space) 5.552  MOBILE  5.552A | | |

NOC RCC/12A13/22

47.5-51.4 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 47.5-47.9  FIXED  FIXED-SATELLITE (Earth-to-space) 5.552 (space-to-Earth) 5.516B 5.554A  MOBILE | 47.5-47.9  FIXED  FIXED-SATELLITE (Earth-to-space) 5.552  MOBILE | |
| 47.9-48.2 FIXED  FIXED-SATELLITE (Earth-to-space) 5.552  MOBILE  5.552A | | |
| 48.2-48.54  FIXED  FIXED-SATELLITE (Earth-to-space) 5.552 (space-to-Earth) 5.516B 5.554A 5.555B  MOBILE | 48.2-50.2  FIXED  FIXED-SATELLITE (Earth-to-space) 5.516B 5.338A 5.552  MOBILE | |
| 48.54-49.44  FIXED  FIXED-SATELLITE (Earth-to-space) 5.552  MOBILE  5.149 5.340 5.555 |  | |
| 49.44-50.2  FIXED  FIXED-SATELLITE (Earth-to-space) 5.338A 5.552 (space-to-Earth) 5.516B 5.554A 5.555B  MOBILE | 5.149 5.340 5.555 | |
| ... | | |

**Reasons:** The radio frequency band 47.2-50.2 GHz is not suitable for use by IMT systems in view of the need for a wide guardband to ensure compatibility with passive services in the adjacent frequency band 50.2-50.4 GHz. In addition, there is no interest in the RCC countries in using the frequency band 47.2-50.2 GHz to implement IMT, since IMT requirements can be fully met in lower frequency bands with more favourable propagation characteristics than those of the band 47.2-50.2 GHz.

NOC RCC/12A13/23

47.5-51.4 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| ... | | |
| 50.4-51.4 FIXED  FIXED-SATELLITE (Earth-to-space) 5.338A  MOBILE  Mobile-satellite (Earth-to-space) | | |

NOC RCC/12A13/24

51.4-55.78 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 51.4-52.6 FIXED 5.338A  MOBILE  5.547 5.556 | | |
|  | | |

**Reasons:** The radio frequency band 50.4-52.6 GHz is not suitable for use by IMT systems, in view of the need for a wide guardband to ensure compatibility with passive services in the adjacent frequency band 50.2-50.4 GHz. In addition, there is no interest in the RCC countries in using the frequency band 50.4-52.6 GHz to implement IMT as IMT requirements can be fully met in lower frequency bands with more favourable propagation characteristics than those of the band 50.4-52.6 GHz.

NOC RCC/12A13/25

66-81 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| **66-71** INTER-SATELLITE  MOBILE 5.553 5.558  MOBILE-SATELLITE  RADIONAVIGATION  RADIONAVIGATION-SATELLITE  5.554 | | |
| ... | | |

**Reasons:** Identification of thefrequency band 66-71 GHz for IMT systems in the Radio Regulations is not required, given that this frequency band is planned for use by various broadband data transmission technologies (such as MGWS and IMT) preferably without individual authorizations for use of the band, and full territorial coverage is not envisaged. In addition, ITU-R studies on IMT compatibility with systems in other existing primary services have not been completed.

NOC RCC/12A13/26

66-81 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| ... | | |
| 71-74 FIXED  FIXED-SATELLITE (space-to-Earth)  MOBILE  MOBILE-SATELLITE (space-to-Earth) | | |
| 74-76 FIXED  FIXED-SATELLITE (space-to-Earth)  MOBILE  BROADCASTING  BROADCASTING-SATELLITE  Space research (space-to-Earth)  5.561 | | |
| ... | | |

**Reasons:** The results of ITU-R studies of IMT systems in the band 71-76 GHz have shown that there are considerable difficulties in ensuring compatibility with the radiodetermination service (in the adjacent frequency band) and the fixed service (in the baseband), which are widely used in the RCC countries.

NOC RCC/12A13/27

81-86 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 81-84 FIXED 5.338A  FIXED-SATELLITE (Earth-to-space)  MOBILE  MOBILE-SATELLITE (Earth-to-space)  RADIO ASTRONOMY  Space research (space-to-Earth)  5.149 5.561A | | |
| 84-86 FIXED 5.338A  FIXED-SATELLITE (Earth-to-space) 5.561B  MOBILE  RADIO ASTRONOMY  5.149 | | |

**Reasons:** The results of ITU-R studies of IMT systems in the band 81-86 GHz have shown that there are considerable difficulties in ensuring compatibility with the radiodetermination service (in the adjacent frequency band) and the fixed service (in the baseband), which are widely used in the RCC countries.

SUP RCC/12A13/28#49949

RESOLUTION 238 (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

**Reasons:** The identification of the frequency bands 24.25-27.5 GHz and 40.5-42.5 GHz meets the spectrum needs of IMT as determined by ITU-R studies for the band above 24 GHz.

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

1. 1 The Radiocommunication Bureau shall develop and keep up-to-date forms of notice to meet fully the statutory provisions of this Appendix and related decisions of future conferences. Additional information on the items listed in this Annex together with an explanation of the symbols is to be found in the Preface to the BR IFIC (Terrestrial Services). [↑](#footnote-ref-1)