IWG-2/098 (12.02.19)

Redline vs. NTIA (IWG-2/094)

**UNITED STATES OF AMERICA**

**DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE**

**Agenda Item 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)**

**Background Information**: Mobile broadband plays an increasingly crucial role in providing access to businesses and consumers worldwide. According to International Telecommunications Union (ITU) statistics, “Mobile-broadband subscriptions have grown more than 20% annually in the last five years and are expected to reach 4.3 billion globally by end 2017,” while “Mobile-broadband prices as a percentage of GNI per capita halved between 2013 and 2016 worldwide.[[1]](#footnote-1) Incredible technological innovation has enabled the use of higher frequency bands (e.g., millimeterWave) to help meet the ever-increasing demand for mobile broadband.  It is important to note that the properties of higher frequency bands, such as shorter wavelength, would better enable the use of advanced antenna systems, including multiple-input and multiple-output (MIMO) and beam-forming techniques in supporting enhanced mobile broadband.

The frequency range 24.25-27.5 GHz, or parts thereof, is allocated to the Earth Exploration Satellite Service (EESS), Fixed Service (FS), Fixed Satellite Service (FSS), Inter-Satellite Service (ISS), Mobile Service (MS), Radiolocation Satellite Service (RLSS), Radionavigation Service (RNS) and Space Research Service (SRS). The frequency bands adjacent to this frequency range are allocated to the EESS (passive), Radio Astronomy Service (RAS), Radiolocation Service (RLS) and SRS (passive).

As part of the preparations for WRC-19 agenda item 1.13, ITU-R carried out extensive sharing and compatibility studies for this frequency range: these studies show that sharing is feasible between the terrestrial component of IMT and EESS, RAS (adjacent band), SRS, and FS due to small separation distances, while sharing with the FSS and ISS is feasible with large interference margins. Studies which considered sharing with passive services in the adjacent band showed a wide range of results due to various different assumptions. Characteristics were not received for the RLS, RLSS and RNS and therefore, studies were not carried out for these services. Studies are not needed for the SRS (passive), as this service is dealing with sensors around other planets and no interference issue is expected.

This proposal ps7 as neededies Many countries and regions around the world are planning or have made plans to utilize spectrum within the 24.25-27.5 GHz frequency range for IMT. The United States technical rules for the 24.25-24.45 GHz and 24.75-25.25 GHz frequency bands include unwanted emission limits of -20 dBW/200 MHZ.[[2]](#footnote-2) Protection of incumbent services is important. However, it is also important to not adopt overly restrictive measures which would prevent the use of spectrum in an efficient manner: 3GPP stated that an unwanted emission level of -37 dBW/200 MHz for IMT base stations in this band would result in a “guard band” of 1 to 1.5 GHz a cell edge user DL throughput loss of up to 80% would be expected, while this unwanted emission level for user equipment would result up to 20% median throughput degradation and 50% cell edge throughput degradation).[[3]](#footnote-3)**Proposal**:

ARTICLE 5

Frequency allocations

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

**MOD USA/1.13/1**

22-24.75 GHz

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

**Reasons:** These modifications provide allocations on a primary basis to the Mobile Service and identification to to IMT. This facilitates harmonized worldwide bands for IMT, which are highly desirable in order to achieve global roaming and the benefits of economies of scale.

**MOD USA/1.13/2**

|  |  |  |
| --- | --- | --- |
| 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 mobile ADD 5.A113 | 24.75-25.25  FIXED-SATELLITE (Earth-to-space) 5.535  MOBILE except aeronautical mobile ADD 5.A113 | 24.75-25.25  FIXED  FIXED-SATELLITE (Earth-to-space) 5.535  MOBILE ADD 5.A113 |
| 25.25-25.5 FIXED  INTER-SATELLITE 5.536  MOBILE ADD 5.A113  Standard frequency and time signal-satellite (Earth-to-space) | | |
| 25.5-27EARTH EXPLORATION-SATELLITE (space-to Earth) 5.536B  FIXED  INTER-SATELLITE 5.536  MOBILE ADD 5.A113  SPACE RESEARCH (space-to-Earth) 5.536C  Standard frequency and time signal-satellite (Earth-to-space)  5.536A | | |
| 27-27.5  FIXED  INTER-SATELLITE 5.536  MOBILE ADD 5.A113 | 27-27.5  FIXED  FIXED-SATELLITE (Earth-to-space)  INTER-SATELLITE 5.536 5.537  MOBILE ADD 5.A113 | |

**Reasons:** These modifications provide allocations on a primary basis to the Mobile Service as needed and identifications to IMT. This facilitates harmonized worldwide bands for IMT, which are highly desirable in order to achieve global roaming and the benefits of economies of scale.

**ADD USA/1.13/3**

5.A113 The frequency band 24.25-27.5 GHz is identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which they are allocated and does not establish priority in the Radio Regulations.

**Reasons:** To identify harmonized worldwidebands for IMT, which are highly desirable in order to achieve global roaming and the benefits of economies of scale

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

**MOD USA/1.13/4**

5.338A In the frequency bands 1 350-1 400 MHz, 1 427-1 452 MHz, 22.55-23.55 GHz, 24.25-24.4.5 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:** Consequential.



**MOD USA/1.13/4**

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),

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

*a)* 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;

*b)* that, in the frequency band 1 427-1 452 MHz and 24.25-24.45 GHz, 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;

*c)* that, in the frequency band 1 427-1 452 MHz and 24.25-24.45GHz, 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) band1 |
| 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 stations2, 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 |
| 24.25-24.45 | Mobile (see Note 1) | -20 dBW/200 MHz for IMT base stations and mobile stations |
| 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 to be measured at the antenna port, unless it is specified in terms of total radiated power (TRP) in the unwanted domain. TRP is the aggregate of the radiated power from all antenna elements.  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. | | | |

**Reasons:** To identify the limits of unwanted emissions from IMT into the 23.6-24 GHz frequency band to protect the passive service.

1. ICT Facts and Figures 2017, p 4 and 5. See: https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2017.pdf [↑](#footnote-ref-1)
2. 47 CFR § 30.203 <https://www.ecfr.gov/cgi-bin/text-idx?SID=ef79569d056288847f95a6a82a6fbb71&mc=true&node=se47.2.30_1203&rgn=div8>. [↑](#footnote-ref-2)
3. Liaison statement from 3GPP RAN4 on IMT-2020 unwanted emissions ([document TG5.1/212](https://www.itu.int/md/R15-TG5.1-C-0212/en)). [↑](#footnote-ref-3)