

PLENARY MEETING

**Addendum 1 to
Document 6153(Add.13)-
E
29 August 2019
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Member States of the Inter-American Telecommunication Commission (CITEL)

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)**;

Part 1 – Frequency band 24.25-27.5 GHz

INTRODUCTION

The aim of 5G is to create a more ‘hyper connected’ society by more comprehensively, and intelligently, integrating LTE, Wi-Fi and cellular IoT technologies, together with at least one new 5G radio interface. This will allow mobile networks to dynamically allocate resources to support the varying needs of a hugely diverse set of connections – ranging from industrial machinery in factories, to automated vehicles as well as smartphones. The significant extra capacity of the 5G radio network will need to be supported with higher bandwidth backhaul, including fibre and microwave networks. Satellite networks should also be considered for 5G backhaul while noting their limited ability to satisfy 5G’s expected latency and bandwidth requirements

A central component in the evolution of all mobile technology generations has been the use of increasingly wide frequency bands to support higher speeds and larger amounts of traffic. 5G is no different, ultra-fast 5G services will require large amounts of spectrum including above 24 GHz where wide bandwidths are more readily available. Without making these higher frequency bands available for 5G, it may not be possible to deliver a step-change in mobile broadband speeds and support rapidly growing mobile data traffic, especially in busy urban areas.

Spectrum above 24 GHz is well recognized worldwide as being the key component for the fastest 5G services. Without them, 5G won’t be able to deliver significantly faster data speeds or support projected extensive mobile traffic growth.

In light of the ITU-R sharing studies showing feasibility of sharing with other services operating in the 24.25-27.25 GHz band and the benefits of international harmonization, this proposal supports an identification for IMT across the 24.25-27.5 GHz frequency range as well as upgrading the secondary allocation for the Mobile Service to a co-primary allocation in 24.25-25.25 GHz.

Protection of passive services operating in the adjacent band is addressed through a proposed revision to Resolution **750 (Rev. WRC-15)**. Based on the analysis and comparison input parameters of ITU-R studies (assuming no apportionment, no antenna normalization, baseline IMT deployment parameters as provided by the expert Working Party, use of the beamforming antenna, no multi-channel aggregation factor), and taking into account the measured power reduction across the guard band between the passive service band 23.6-24 GHz and IMT above 24.25 GHz, CITEL Member States support a mandatory limit of -28 dBW/200 MHz of unwanted emission power applied to the first 500 MHz of the active service band 24.25 - 24.75 GHz, for both base station and user equipment.

ARTICLE 5

Frequency allocations

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

MOD IAP/6153A13A1/1

22-24.75 GHz

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

Reasons: The identification of the band 24.25-27.5 GHz to IMT will help satisfy the need for additional spectrum in the bands above 24 GHz. As studies show sharing with other services operating in 24.25-27.5 GHz is feasible, these modifications provide an identification for IMT in the frequency range 24.25-27.5 GHz and a primary allocation to the Mobile service, except aeronautical mobile, in 24.25-25.25 GHz. Protection of passive services in 23.6-24 GHz is addressed through the modification of No. 5.338A.

MOD IAP/6153A13A1/2

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 <u>MOBILE except aeronautical</u> <u>mobile ADD 5.A113 MOD</u> <u>5.338A</u>	24.75-25.25 FIXED-SATELLITE (Earth-to-space) 5.535 <u>MOBILE except aeronautical</u> <u>mobile ADD 5.A113 MOD</u> <u>5.338A</u>	24.75-25.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.535 MOBILE <u>ADD 5.A113</u>
25.25-25.5	FIXED INTER-SATELLITE 5.536 MOBILE <u>ADD 5.A113</u> Standard frequency and time signal-satellite (Earth-to-space)	
25.5-27	EARTH EXPLORATION-SATELLITE (space-to Earth) 5.536B FIXED INTER-SATELLITE 5.536 MOBILE <u>ADD 5.A113</u> 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 <u>ADD 5.A113</u>	27-27.5 FIXED FIXED-SATELLITE (Earth-to-space) INTER-SATELLITE 5.536 5.537 MOBILE <u>ADD 5.A113</u>	

Reasons: The identification of the band 24.25-27.5 GHz to IMT will help satisfy the need for additional spectrum in the bands above 24 GHz. As studies show sharing with other services operating in 24.25-27.5 GHz is feasible, these modifications provide an identification for IMT in the frequency range 24.25-27.5 GHz and a primary allocation to the mobile service, except aeronautical mobile, in the frequency range 24.25-25.25 GHz.

ADD IAP/6153A13A1/3

5.A113 The frequency band 24.25-27.5 GHz is identified for use by 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. Resolution **[IAP/A113-IMT 26 GHz] (WRC-19)** applies.

Reasons: The identification of the band 24.25-27.5 GHz to IMT will help satisfy the need for additional spectrum in the bands above 24 GHz. As studies show sharing with other services operating in 24.25-27.5 GHz is feasible, these modifications provide an identification for IMT in the frequency range 24.25-27.5 GHz. 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 IAP/6153A13A1/4

5.338A In the frequency bands 1 350-1 400 MHz, 1 427-1 452 MHz, 22.55-23.55 GHz, 24.25-24.75 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-195)** applies. (WRC-195)

Reasons: The identification of the band 24.25-27.5 GHz to IMT will require limits in Resolution **750 (Rev. WRC-15)** to ensure near adjacent band compatibility with EESS (passive) in the band 23.6-24.0 GHz.

MOD IAP/6153A13A1/5

RESOLUTION 750 (REV.WRC-195)

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

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

- 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 24.25-27.5 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 24.25-27.5 GHz, 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
	<u>24.25-24.75 GHz</u>	<u>Mobile</u>	<u>-28 dBW in any 200 MHz of the EESS (passive) band for IMT base stations</u> <u>-28 dBW in any 200 MHz of the EESS (passive) band for IMT mobile stations</u>
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, 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.

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 ³ -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, transportable radio-relay stations and aeronautical telemetry stations -45 dBW in the 27 MHz of the EESS (passive) band for transportable radio-relay stations -28 dBW in the 27 MHz of the EESS (passive) band for aeronautical telemetry stations ³
		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
86-92 GHz ⁵	81-86 GHz	Fixed	-41 - 14(f - 86) dBW/100 MHz for 86.05 ≤ f ≤ 87 GHz -55 dBW/100 MHz for 87 ≤ f ≤ 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 ≤ f ≤ 91.95 GHz -55 dBW/100 MHz for 86.05 ≤ f ≤ 91 GHz where f is the centre frequency of the 100 MHz reference bandwidth expressed in GHz

Notes to Table 1-2:

- 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.

Reasons: The identification of the band 24.25-27.5 GHz to IMT will require limits in Resolution **750 (Rev. WRC-15)** to ensure near adjacent band compatibility with EESS (passive) in the band 23.6-24.0 GHz.

ADD IAP/6153A13A1/6

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

International Mobile Telecommunications in 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;
- 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 envisaged to provide increased peak data rates and capacity that may require a larger bandwidth;
- 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,

noting

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

recognizing

a) that **5.536A** states that administrations operating earth stations in the Earth exploration satellite service or the space research service shall not claim protection from stations in the fixed or mobile services operated by other administrations;

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 24.25-24.75 GHz frequency band,

resolves

1 that administrations wishing to implement IMT consider the use of 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;

2 that, when deploying outdoor base stations in the frequency bands 24.65-25.25 GHz and 27-27.5 GHz, it shall be ensured that each antenna normally¹ transmits only with the main beam pointing below the horizon and the antenna shall have mechanical pointing below the horizon except when the base station is only receiving,

invites ITU-R

1 to develop harmonized frequency arrangements to facilitate IMT deployment in the frequency band 24.25-27.5 GHz;

2 to develop ITU-R Recommendations, as appropriate, to provide information on possible coordination measures for IMT and existing and future SRS/EESS earth stations operating in the frequency band 25.5-27 GHz;

3 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.

Reasons: The identification of the band 24.25-27.5 GHz to IMT will help satisfy the need for additional spectrum in the bands above 24 GHz.

¹ With reference to *resolves 2* it is assumed that only a very limited number of indoor terminals with positive elevation will be communicating with base stations.