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DRAFT CEPT BRIEF ON 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)

# ISSUE

This agenda item considers possible new spectrum allocations suitable for delivery of terrestrial wireless broadband in the frequency range between 24.25 GHz and 86 GHz. This will encompass the following elements, set out in full in Resolution 238 (WRC-15):

* Spectrum needs for the terrestrial component of IMT
* Sharing and compatibility studies[[1]](#footnote-1) for the following frequency bands:

24.25-27.5 GHz[[2]](#footnote-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

31.8-33.4 GHz, 40.5-42.5 GHz and 47-47.2 GHz

# Preliminary CEPT position

CEPT supports the results of the ITU-R studies[[3]](#footnote-3) on IMT spectrum needs in the range 24.25-86 GHz. CEPT supports sharing and compatibility studies for the bands listed in Resolves 2 of Resolution 238 (24.25-27.5 GHz, 31.8-33.4 GHz, 37-43.5 GHz, 45.5-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz), with the focus on the frequency bands 24.25-27.5 GHz, 40.5-43.5 GHz and 66-71 GHz.

CEPT supports the identification of global bands for IMT among the bands listed in resolves to invite ITU‑R 2 of Resolution 238, taking into account the results of sharing and compatibility studies with existing services. Bands outside those listed in resolves to invite ITU-R 2 of Resolution 238 are not supported for consideration under this Agenda item.

* CEPT intends to harmonise the 24.25-27.5 GHz band for Europe for 5G before WRC-19 through the adoption of a harmonisation decision and to promote it for worldwide harmonisation by an IMT identification. Hence the 24.25-27.5 GHz is a clear priority for immediate study within CEPT and these studies are assuming an individual authorisation regime. Studies need to take into account the compatibility with and protection of all existing services, including their future deployments, in the same and adjacent frequency bands; in particular the protection of current and future EESS/SRS earth stations should be addressed.

Note: CEPT has developed a Roadmap on 5G (<http://cept.org/ecc/topics/spectrum-for-wireless-broadband-5g#roadmap>). In this respect it is noted that “Europe has harmonised the 27.5-29.5 GHz band for broadband satellite and is supportive of the worldwide use of this band for ESIM. This band is therefore not available for 5G”.

# Background

This agenda item received widespread worldwide support at WRC-15.

The Agenda item considers new spectrum allocations to the mobile service and identification of frequency bands for IMT. The rationale for this agenda item is to address demand for terrestrial wireless broadband, where terrestrial wireless provides a key means of delivery, alongside cable, fibre and satellite.

Other radiocommunication services with allocations in spectrum bands under consideration are potentially affected, so technical studies will assess any potential impact and consider what technical measures might be necessary to manage compatibility.

CPM19-1 agreed a decision (see Annex 9 of Circular [CA/226](http://www.itu.int/md/R00-CA-CIR-0226/en)) on the establishment and terms of reference of SG5 TG5/1 on WRC-19 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)”.

The CPM19-1 decision requests WP 5D to conduct and complete the studies as indicated in resolves to invite ITU-R 1 of Resolution 238 (WRC-15), with regards to spectrum needs, technical and operational characteristics including protection criteria, and deployment scenarios for the terrestrial component of IMT by 31 March 2017 and report the results of these studies to TG5/1.

WP 5D provided in Liaison Statement to TG 5/1 (Document 5-1/36-E) information on spectrum needs and characteristics for the terrestrial component of IMT in the frequency range between 24.25 GHz and 86 GHz.

In order to determine the spectrum needs for the terrestrial component of IMT in the frequency range between 24.25 GHz and 86 GHz, WP 5D considered several approaches. Pursuant to the questionnaire in the WP 5D Chairman’s Report, WP 5D received information on the spectrum needs for IMT based on input contributed on national spectrum needs in some countries and summarized and communicated this information to TG 5/1.

In response to the requirement for the technical and operational characteristics, including protection criteria, as requested by TG 5/1 for its work, WP 5D developed “Characteristics of terrestrial IMT systems for frequency sharing/interference analyses in the frequency range between 24.25 GHz and 86 GHz”.

RSPG has agreed an opinion on spectrum related aspects for next-generation wireless systems (5G). The RSPG opinion recommends the 24.25-27.5 GHz as a pioneer band for 5G above 24 GHz which can be studied and harmonised in Europe for early implementation. ECC#43 has approved a comprehensive list of actions regarding the fifth generation of mobile technology (5G) named “CEPT roadmap for 5G”.

## **ESTIMATES ON SPECTRUM NEEDS**

Studies for WRC-19 Agenda item 1.13 estimated the spectrum needs for the terrestrial component of IMT in the frequency range between 24.25 GHz and 86 GHz, in accordance with Resolution 238 (WRC-15) and [CA/226](http://www.itu.int/md/R00-CA-CIR-0226/en).

Terrestrial IMT-2020 systems will incorporate the use of new technologies that benefit from the physical characteristics of the frequencies in the frequency range from 24.25 to 86 GHz and the large bandwidths potentially available which will provide higher data rates and lower latencies. A number of approaches were considered and the results obtained using the application-based and the technical performance-based approaches are summarized in Table 6 of ITU-R TG5/1 Document 5-1/36 Attachment 1. The estimated spectrum needs would be different based on the approaches used together with the assumptions thereof.

Furthermore, some administrations provided information on spectrum needs in their countries based on their national considerations, which is also summarized in Table 6 of ITU-R TG5/1 Document 5-1/36 Attachment 1.

As indicated in these approaches, for the spectrum needs of IMT-2020 in the range of 24.25 and 86 GHz, different channel propagation characteristics and available channel bandwidth should be taken into account. With a view to accommodating the wide range of usage and deployment scenarios for IMT-2020, it is important to consider different frequencies within the range 24.25 and 86 GHz.

## deployment scenarios for 5G in the bands above 24 GHz

In the bands above 24 GHz, mobile communication services will mainly target urban and sub-urban hotspot areas. There is no expectation that the bands above 24 GHz will be used for contiguous nationwide coverage of MFCN networks. There may be a need for hotspots also in rural areas e.g. dedicated locations or along major roads and railway tracks. The deployment of MFCN will target mainly a small cells type of usage ([around 150 m]). These frequency bands do not present the characteristics to support a national coverage objective (xxx) and wide coverage areas (xxx). MFCN networks could be deployed indoor and/or outdoor.

ITU-R WP 5D has developed “Characteristics of terrestrial IMT systems for frequency sharing/interference analyses in the frequency range between 24.25 GHz and 86 GHz”. This includes the assumptions on typical deployment environments for IMT-2020 to be used in sharing studies in the bands 24.25-86 GHz[[4]](#footnote-4). Information is provided for the environments: Outdoor Suburban hotspot, Outdoor Urban hotspot and Indoor. Furthermore, an optional Outdoor suburban open space hotspot scenario is provided.

## **Consideration of frequency bands**

### 24.25-27.5 GHz

The studies undertaken under this Agenda item for this band have been undertaken on the assumption that the IMT-2020 networks are operated on an individual licensed basis.

EESS (passive)

The studies presented in CEPT so far consistently show that the current IMT-2020 unwanted emissions levels would be insufficient to ensure protection of the EESS (passive) sensors in the 23.6-24 GHz band and that only a drastic reduction of the IMT-2020 emissions in the 23.6-24 GHz can ensure such protection. These studies show that required emission levels in this band should be TBD[[5]](#footnote-5) dBW/200 MHz for BS and TBD[[6]](#footnote-6) dBW/200 MHz for UE.

CEPT also notes that on-going work in 3GPP to address such unwanted emissions reduction is still not conclusive. It is also noted that the current limits for unwanted emissions in the spurious domain in Europe are described in Recommendation ITU-R SM.329 and ERC Rec. 74-01,the latter being under review.

EESS(s-E)/SRS(s-E)

Studies have shown that the separation distances around several EESS/SRS earth stations locations within Europe would be in the order of:

* 4 km around earth stations supporting NGSO EESS satellites
* 3 to 10 km around earth stations supporting GSO EESS satellites
* 30 to 70 km around the two earth stations supporting SRS spacecraft in Europe (up to 77 km for Malargüe in Argentina)

Since the distances for the protection of SRS are significantly larger than those for EESS, the SRS distances can be considered as coordination distances. For EESS, they can be established as exclusion zones.

These separation distances were calculated for a single suburban open space base station with a power per antenna element of 10 dBm/200 MHz and a 8x8 elements antenna. When considering an increase of power by 5 dB or a 16 x 16 antenna the distances increase by a factor 2 to 3 respectively. It should be noted that the exclusion/coordination zones around EESS and SRS receiving earth stations have been established on the assumption that the IMT-2020 networks are operated on an individual licensed basis. A study has shown that the probability of aggregate interference for a random deployment of IMT-2020 stations around a specific earth station supporting a GSO EESS satellite is small. For the deployment scenarios specified in the study, the probability of interference is approximately 0.1% (1 in 1,000) or less. In general, when considering the aggregation of multiple BS and associated UE, the distances indicated above are not expected to increase as long as BS antenna panels are not concurrently pointing towards the earth station in azimuth.

Since the deployment of IMT-2020 at 26 GHz is expected in hot spots only and there are only a small number of EESS/SRS earth stations, then it is considered that co-existence is technically feasible and can be managed on a national basis. CEPT is working on a methodology in order to assist Administrations with this regard.

Radioastronomy

Generic compatibility study between the RAS in the passive band 23.6-24 GHz and IMT systems in the frequency band 24.25-27.5 GHz show emission-free zones around RAS stations are required to protect this service from IMT spurious emissions. For spurious emissions of IMT systems at the -13 dBm/MHz level, exclusion zones of up to 46 km radius may be needed. For the -30 dBm/MHz emission level as specified for Category B devices, the exclusion zones may be reduced to about 15 km radius. Protection zones need to be calculated using the out of band limits decided from the EESS (passive) study for the same band and use terrain and clutter information specific to individual Radioastronomy sites. It is considered that the protection of Radioastronomy is a national issue to be addressed on a case by case basis.

Inter-Satellite Service

The technical studies of coexistence between IMT-2020 and ISS at 26 GHz, based on assumptions and technical parameters provided by ITU study groups into TG5/1, have been presented from the UK and France, and have shown significant protection margin. The protection margin for an aggregated scenario is more than 16 dB and in some configuration shown in the studies it can be as large as 27 dB. Hence CEPT concludes that coexistence would be feasible with ISS, if those assumption made in the studies are met.

Fixed Satellite Service

IMT into FSS: assuming the IMT deployment model of documents 5-1/36 attachment 2, 5-1/99 and 5-1/100, and provided that assumptions made in these studies are met, for IMT base station eirp values up to 53 dBm/200 MHz (for an antenna array of 64 elements). Current studies show that there is no harmful interference from IMT-2020 networks into the FSS space stations.

FSS into IMT: there may be a need to calculate the separation distances required between IMT base stations and FSS Earth stations.

Since the band is used for large FSS Earth stations in CEPT countries at known locations (i.e. gateways), appropriate exclusion zones can be ensured around FSS Earth stations, under the current assumption that IMT operates under an individual licence regime, to achieve compatibility and ensure interference-free co-existence of IMT and FSS Earth stations.

### 31.8-33.4 GHz

Radionavigation

Radionavigation service is allocated on a worldwide basis and used in a number of countries for ground-based airport surface detection equipment (ASDE) radar, mainly to detect traffic at airports and by aircraft radars for ground mapping, weather avoidance, to calibrate aircraft on-board navigation systems for accurate aerial delivery in adverse weather conditions and for Enhanced Flight Visibility Systems (EFVS).

EFVS system generates navigation information and a synthesis image of the external scene in the cockpit with the main purpose to permit, in poor visibility conditions, landing (and potentially providing assistance for taxiing), where landing would not be safe otherwise (in particular for airport not equipped with ground landing assistance systems such as ILS).

The band offers a good compromise between resolution and atmosphere penetration in bad weather conditions.

All technical studies presented in TG5/1 have shown the incompatibility between IMT and radionavigation service in the 32 GHz band, in particular in the case of aircraft radars for which coordination/exclusion zones approaching 100 km around any small airport cannot be envisaged.

EESS (passive)

The studies presented in CEPT and in ITU-R so far consistently show that the current IMT-2020 unwanted emissions levels would be insufficient to ensure protection of the EESS (passive) sensors in the 31.3-31.8 GHz band and that only a drastic reduction of the IMT-2020 emissions in this band can ensure such protection. These studies show that required emission levels in this band should be in the range -55.8 to – 59.8 dBW/200 MHz for BS and -53.7to -59.2 dBW/200 MHz for UE.

SRS(s-E)

SRS(s-E) is allocated in the band 31.8-32.3 GHz. Studies show that the maximum separation distances required to protect SRS (s-to-E) earth stations operating in the band 31.8-32.3 GHz would be in the order of 30  to 52  km.

Radioastronomy

Generic compatibility study between the RAS in the band 31.3-31.8 GHz and IMT systems in the frequency band 31.8-33.4 GHz GHz show emission-free zones around RAS stations are required to protect this service from IMT spurious emissions. For spurious emissions of IMT systems at the -13 dBm/MHz level, exclusion zones of up to 43 km radius are required. For the -30 dBm/MHz emission level as specified for Category B devices, the exclusion zones are reduced to about 9 km radius.

Fixed service

If this band is not used for IMT/5G, it may be used to accommodate fixed links which may be migrated from the 26 GHz band.

### 37-40.5 GHz

Studies show that the maximum separation distances required to protect SRS (s-to-E) earth stations operating in the band 37-38 GHz would be in the order of 30  to 82  km.

### 40.5- 42.5 GHz

[placeholder]

### 42.5-43.5 GHz

[placeholder]

### 45.5-50.2 GHz

EESS(passive)

The studies presented in CEPT and in ITU-R so far consistently show that the current IMT-2020 unwanted emissions levels would be insufficient to ensure protection of the EESS (passive) sensors in the 50.2-50.4 GHz band and that only a drastic reduction of the IMT-2020 emissions in this band can ensure such protection. These studies show that required emission levels in this band should be in the range ––60.6 to –65.3 dBW/200 MHz for BS and –58.9 to –63.8 dBW/200 MHz for UE.

### 50.4-52.6 GHz

EESS(passive)

The studies presented in CEPT and in ITU-R so far consistently show that the current IMT-2020 unwanted emissions levels would be insufficient to ensure protection of the EESS (passive) sensors in the 50.2-50.4 GHz and 52.6-53.25 GHz bands and that only a drastic reduction of the IMT-2020 emissions in these bands can ensure such protection. These studies show that required emission levels from IMT operating in the 50.4-52.6 GHz band in the 50.2-50.4 GHz band should be in the range ––60.6 to –65.3 dBW/200 MHz for BS and –58.9 to –63.8 dBW/200 MHz for UE, and the required emission levels in the 52.6-53.25 GHz band should be in the range –49.2 to –54.1 dBW/100 MHz for BS and –48.2 to –52.8 dBW/100 MHz for UE.

### 66-71 GHz

[placeholder]

### 71 – 76 GHz

Radiolocation

Automotive radars are operating in the frequency band 76-81 GHz under radiolocation service.

Initial compatibility study has been submitted to CEPT in order to assess the impact of spurious emission of IMT-2020 into the automotive radar in case of operation in particular of urban street in the frequency band 71-76 GHz.

### 81-86 GHz

Radiolocation

Automotive radars are operating in the frequency band 76-81 GHz under radiolocation service.

Initial compatibility study has been submitted to CEPT in order to assess the impact of spurious emission of IMT-2020 into the automotive radar in case of operation in particular of urban street in the frequency band 81-86 GHz.

EESS(passive)

The studies presented in CEPT and in ITU-R so far consistently show that the current IMT-2020 unwanted emissions levels would be insufficient to ensure protection of the EESS (passive) sensors in the 86 -92 GHz band and that only a drastic reduction of the IMT-2020 emissions in this band can ensure such protection. These studies show that required emission levels in this band should be in the range -55.4 to – 60.2 dBW/100 MHz for BS and -55.2 to – 60 dBW/100 MHz for UE.

# List of relevant documents

ITU-Documentation (Recommendations, Reports, other)

* ITU-R TG5/1 Document 5-1/36: Spectrum needs and characteristics for the terrestrial component of IMT in the frequency range between 24.25 GHz and 86 GHz
* Recommendation ITU-R M.2101, “Methodology for modelling and simulation of IMT networks for use in sharing and compatibility studies between IMT and other systems and/or applications”
* ITU-R TG5/1 Document 5-1/92: Chairman’s Report of the 2nd meeting of TG5/1CEPT and/or ECC Documentation (Decisions, Recommendations, Reports)
* ECC PT1 (16)133 Annex 31Rev1 Summary of responses to questionnaire on bands for AI1.13
* ECC PT1 (16)133 Annex 33 Table of information for AI1.13
* ECC(17)034 Annex 05 CEPT roadmap for 5G

EU Documentation (Directives, Decisions, Recommendations, other), if applicable

* 5G action plan – COM(2016)588
* RSPG Opinion 16-032 - Opinion on spectrum related aspects for next-generation wireless systems (5G)
* RSCOM16-40rev3 - Mandate to CEPT to develop harmonised technical conditions for spectrum use in support of the introduction of next-generation (5G) terrestrial wireless systems in the Union

# Actions to be taken

Carry out sharing and compatibility studies for the bands listed in Resolves 2 of Resolution 238.

Review positions of other regional groups

Continue Correspondence Group on 26 GHz and 40 GHz

For 24.65-25.25 GHz, ECC PT1 needs to investigate ways to safeguard the use of existing and possible future deployment of FSS earth stations in that band.

Consider contributions to TG5/1

Consider the output of ITU-R WP5D on IMT2020 parameters to ITU-R TG5/1

Consider the implication of Nos 5.536B and 5.536C

# Relevant information from outside CEPT (examples of these are below)

## European Union (date of proposal)

## Regional telecommunication organisations

APT (date of proposal)

ATU (date of proposal)

ASMG (April 2017)

ASMG support initiating studies in the frequency bands listed below, which are included in Resolution 238 (WRC 15):

24.25 - 27.5 GHz

31.8 - 33.4 GHz

40.5 - 42.5 GHz

42.5 - 43.5 GHz

ASMG do not support discussing any study or contribution on the frequency bands which are not included in Resolution 238 (WRC 15) in the work of Task Group 5/1 (TG 5/1).

CITEL (December 2017)

Brazil:

Agenda Item 1.13 is key to the future development of IMT systems for the delivery of IMT-2020 services.. The aim of IMT-2020 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 IMT-2020 radio interface. This will allow mobile networks to dynamically allocate resources to support the varying needs of a diverse set of connections – ranging from industrial machinery in factories, to automated vehicles as well as smartphones. 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. IMT-2020 is no different, ultra-fast IMT-2020 services will require large amounts of spectrum including above 24 GHz where wide bandwidths are more readily available. Spectrum above 24 GHz is well recognized worldwide as being the key component for the data intensive IMT-2020 services. Without them, IMT-2020 won’t be able to deliver significantly faster data speeds or support projected extensive mobile traffic growth.

With that in mind, we support appropriate sharing and compatibility studies under Agenda Item 1.13 in the bands 24.25-27.5 GHz, 31.8-33.4 GHz, 37-43.5 GHz, 45.5-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz. Such studies should consider that the significant extra capacity of IMT-2020 systems will need to be perfectly integrated with heterogenous networks, including fibre, satellite and microwave systems, taking into account their specific benefits which are crucial to developing countries.

Canada

Canada supports and is participating in the studies under WRC-19 agenda item 1.13, taking place in ITU-R TG 5/1, in the following frequency bands:

24.25-27.5 GHz, 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.

Canada is of the view that passive services in frequency bands adjacent to those under study in AI 1.13 should be protected taking into account the relevant provisions of the Radio Regulations.

USA:

Support studies under WRC-19 agenda item 1.13 and take appropriate action based on the results of these sharing and compatibility studies in accordance with Resolution 238 in the following bands:

24.25-27.5 GHz, 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.

Colombia:

While all bands remain suitable for identification at this stage, Colombia would like to make the following observations regarding the lower portions of the range, from 24.25 GHz to 43.5 GHz:

* Responses received until the previous meeting of CCP.II to the questionnaire show that, except for a few cases, there are either no services licensed in these bands or the services belong to the fixed service category. When they belong to other service categories (such as FSS), most of them occupy a relatively small (500MHz or less) bandwidth with-respect-to the total range being considered for study (e.g. 3.25 GHz for 24.25GHz – 27.5GHz).
* Other regions initiated discussions on suitable bands among the lists of candidate bands. As an example, Europe ([2], [3]) identified the 24.25 GHz – 27.5 GHz as a “pioneer band”, while other bands up to 43.5 GHz have been positively considered. With the view of seeking not only regional but global frequency harmonization to the possible extent, it is positive to take under consideration activities of other regions.
* The lower portions of the range would provide comparatively more suitable propagation characteristics for deployment compared to the upper portions, considering that some installations could cover outdoor and indoor environments with some Non-Line-of-Sight (NLoS) situations.

Based on the considerations above, Colombia is of the initial view that the lower portions of the frequency range (from 24.25 GHz to 43.5 GHz) provide good opportunities in terms of availability, technical performance and potential for global harmonization. Colombia would like to invite other members to consider this initial view for consideration and collaboration towards a regional (and possibly global) harmonization of the frequency bands.

Mexico:

Regional harmonization for this item on the agenda should consider similar approaches in terms of allocations and plans for the radio spectrum, in order to favor cost reduction and encourage the development of a sustainable ecosystem for the deployment of IMT systems.

A public survey is currently being prepared in Mexico to identify the IMT spectrum requirements from 24.25 GHz to 86 GHz. To this end, we plan to study the discussions and documents issued by the different working groups of both the International Telecommunication Union (ITU) and CITEL regarding regional and global spectral requirements for IMT at the frequencies of 24.25 to 86 GHz.

For this reason, we deem it necessary to conduct, in the best terms possible, the planned studies on sharing and compatibility in the bands agreed on through Resolution 238 (WRC-15), i.e., the segments of 24.25-27.5 GHz, 31.8-33.4 GHz, 37-43.5 GHz, 45.5-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz, in order for the CITEL administrations to make better, more fully-grounded decisions to achieve regional or global harmonization for the future development of IMT-2020 systems.

RCC (14 September , 2017)

The RCC Administrations consider it reasonable to perform the compatibility studies of IMT systems first in the frequency bands 24.25–27.5 GHz, 31.8–33.4 GHz, 40.5–42.5 GHz and 66‑71 GHz, where a global harmonization could be achieved.

The RCC Administrations support identification of frequency bands for future development of IMT, including possible additional allocations to the mobile service on a primary basis, in separate bands in the frequency band 24.25-86 GHz in accordance with Resolution 238 (WRC-15).

The RCC Administrations consider that when developing technical conditions and regulatory provisions for the allocation of frequency bands to the MS and their identification for IMT it is necessary to ensure protection of other services having allocation in the considered and adjacent frequency bands taking into account the need in their development, first of all for existing systems or those planned to be used by RCC Administrations.

The RCC Administrations consider that when performing studies an impact of aggregate interferences on receiving space or aeronautical stations shall be taken into account.

## International organisations

IARU (27th June 2017)

The IARU is of the view that the spectrum requirements identified for IMT in the frequency range between 24.25 GHz and 86 GHz can be fully met in the frequency bands that are already allocated to the mobile service on a primary basis, and do not justify the allocation of 47.0-47.2 GHz to the mobile service. This narrow primary allocation to the amateur service is the only spectrum in which amateur experimentation with millimeter wavelengths can be conducted without practical constraints imposed by sharing with other services. Therefore, the IARU opposes additional allocations in this band to other services, including the mobile service. If either or both of the bands that are adjacent to 47.0-47.2 GHz are identified for the terrestrial component of IMT, suitable emission limits must be included in order to ensure the protection of existing and future amateur and amateur-satellite stations in the 47.0-47.2 GHz band. IARU is further of the view that any allocation to IMT in the frequency range 24.25-27.5 GHz shall include full consideration and protection for the amateur and amateur-satellite service’s primary allocation at 24-24.05 GHz.

IATA (date of proposal)

ICAO (16/09/2017)

Document PTC(16)INFO003 provides the following draft position of ICAO:

The frequency band 24.25-24.65 GHz is used for airport surface detection equipment (ASDE) in some countries. Additionally, the frequency range 31.8-33.4 GHz is identified in the “Handbook on Radio Frequency Spectrum Requirements for Civil Aviation”[[7]](#footnote-7) as also being used for ASDE. The higher frequency ranges give greater resolution; a factor that is gaining greater importance with the ever increasing density of traffic at airports.

The 31.8-33.4 GHz frequency range is also used for embedded systems that generate navigation information and a video image of the external scene and provide them to the pilot. The band offers a good compromise between resolution and atmosphere penetration in bad weather conditions.

The frequency range 76-81 GHz is allocated to the radiolocation service on a primary basis in all three ITU Regions and is planned to be used for non safety-critical, advisory applications on the airport surface such as wing-tip radar. According to Resolution 238 (WRC‑15) the frequency range 76-81 GHz is excluded from consideration for IMT, however, any new identification for the terrestrial component of IMT should ensure adjacent band protection of these aviation applications.

Finally, the frequency bands 43.5-47 GHz and 66-71 GHz have allocations to the Radionavigation and/or Radionavigation-Satellite services. However no aeronautical systems have currently been identified as operating in those frequency bands.

ICAO Position:

To oppose any identification of a frequency band for IMT that could impact aviation systems, within a new or existing allocation to the mobile service in the frequency range 24.25 GHz to 86 GHz, unless agreed ITU-R studies demonstrate no adverse impact to those systems.

IMO (date of proposal)

NATO (December 2017)

This is a High Priority WRC AI for NATO, which mainly operates satellite services across the entire 24.25 - 86 GHz frequency range, with the exceptions of the 47 - 50.2 GHz range where there are no NATO harmonised bands. Additionally, NATO operates fixed strategic and mobile communications in 25.25 - 27.5GHz and in the radiolocation service in 33.4 - 36 GHz.

Two essential NATO bands 30 - 31 GHz and 43.5 - 45.5 GHz may be impacted by adjacent bands selected for IMT studies. The important NATO bands 24.05 - 24.25 GHz and 33.4 - 36 GHz may be impacted by adjacent bands selected for IMT studies and 25.25 - 27.5 GHz may be directly impacted by bands identified for IMT.

Additionally, the planned NATO band 81 - 84 GHz is also directly impacted by a frequency band identified for possible IMT use.

From a military perspective, studies will need to show that sharing of the proposed IMT bands with existing services is possible and that the introduction of IMT in these bands has no harmful impact on military usage in these and adjacent NATO harmonised bands.

NATO is evaluating the results of sharing and compatibility studies between IMT and incumbent services for the bands listed in Resolves 2 of Resolution 238 impacting military systems operating in NJFA Bands. NATO recognises the CEPT and EU intent to harmonise the 24.25-27.5 GHz band for 5G before WRC-19 and that CEPT promotes it for worldwide harmonization by an IMT identification.

SFCG (14/09/2017)

SFCG supports the protection of existing space science service allocations. No new allocation/identification of spectrum to support mobile broadband systems (IMT-2020) should be made in space science service bands unless acceptable sharing criteria and conditions are developed.

SFCG does not support consideration of any frequency band that is not included in the list of potential candidate bands as identified in Resolution 238 (WRC-15).

A particularly critical situation concerns the band 25.5-27 GHz which is expected to be heavily used by many future EESS and SRS satellite missions for data downlinks. As recognized in Resolution 238 (WRC-15) (footnote 2 of resolves to invite ITU-R 2) for the 25.5-27 GHz band, it is fundamental for SFCG Member Agencies to be assured that EESS and SRS earth stations will continue to be able to expand in the future both in terms of number of satellites serviced and number of earth stations. Licences for these earth stations, which inherently provide protection from interference by IMT systems, must not be refused or restricted on the basis that such action may limit IMT operational areas. Negative experiences in the past with earlier cellular mobile systems in the band 2110-2120 MHz must not be repeated.

Protection of the 31.8-32.3 GHz band usage by current and future SRS deep space systems (s-E) should also be ensured.

Other specific concerns for SFCG are:

* 24.25-27.5 GHz: 25.25-27.5 GHz is allocated to inter-satellite service (ISS) on primary basis and is used for data relay satellite return links.
* 31.8-33.4 GHz: The adjacent 31.3-31.8 GHz band is allocated to EESS/SRS (passive) and is protected under RR No. 5.340.
* 37-40.5 GHz: The adjacent 36-37 GHz band is allocated to EESS/SRS (passive). 37-38 GHz is allocated to SRS (space-to-Earth), while 40-40.5 GHz is allocated to EESS/SRS (Earth-to-space).
* 47.2-50.2 GHz: The adjacent band (50.2-50.4 GHz) is allocated to EESS/SRS (passive) and is protected under RR No. 5.340.
* 50.4-52.6 GHz: The adjacent band (50.2-50.4 GHz) is allocated to EESS/SRS (passive) and is protected under RR No. 5.340.
* 81-86 GHz: The adjacent band (86-92 GHz) is allocated to EESS/SRS (passive) and is protected under RR No. 5.340.

Frequency overlaps with other WRC-19 AI’s (1.6 and 1.14) need to be taken into account.

WMO and EUMETNET January 2017

WMO supports the need to conduct studies under Agenda Item 1.13. WMO does not oppose new IMT 5G identification/allocations provided that protection of ISS, EESS (Earth-to-space and space-to-Earth) and EESS (passive) is ensured and that guarantees are given on the long-term usage and future deployment of receiving EESS earth stations (in particular in the 25.5-27 GHz band).

The protection of EESS (passive) would require appropriate unwanted emission limits in Resolution 750 (rev. WRC-15).

Furthermore, WMO would appreciate the development of a solution to ensure the effective operation of the ground-based radiometers in the 22-28 GHz and 50.4-51.4 GHz frequency bands.

## Regional organisations

ESA: see SFCG

EUMETSAT (September 2017)

EUMETSAT operates a number of passive microwave sensors in adjacent or nearby bands (mostly covered by the RR footnote 5.340) considered under Agenda Item 1.13 which could suffer from harmful interference caused by unwanted emissions of 5G (IMT-2020) deployments. These passive microwave sensors are indispensable for observations of weather and climate from space, requiring access to uncontaminated frequency bands that each provides essential information on specific phenomenology. This is because passive microwave sensors use specific frequencies that uniquely correspond to resonances of important atmospheric molecules and cannot be changed, as they are fixed by nature. These frequency bands need to be free of radio interference to ensure the usefulness and correctness of the measurements which is acknowledged through RR FN 5.340. Thus, it is of outmost importance to limit 5G systems unwanted emissions into the passive sensing frequency bands (namely 23.6-24 GHz, 31.3-31.8 GHz, 36-37 GHz, 50.2-50.4 GHz, 52.6-54.25 GHz and 86-92 GHz bands) o the extent required to protect these measurements.

Furthermore, meteorological and Earth exploration satellite systems currently in operation or under development have to rely on the availability of the EESS frequency allocation in the band 25.5-27 GHz (26 GHz band) for ensuring that dedicated Earth stations are able to acquire the measurement data. This is also the case for the next generation geostationary and non-geostationary MetSat systems of EUMETSAT, namely MTG and EPS-SG. To ensure that Earth stations are able to be deployed and protected in the presence of potential 5G deployments in this frequency band, appropriate regulatory conditions need to be agreed at WRC-19, and further-on established in national/regional authorisation processes for 5G networks.

Eurocontrol (date of proposal)

## OTHER INTERNATIONAL AND REGIONAL ORGANISATIONS

EBU (9/3/17)

5G developments are still ongoing and there are many issues that will need to be addressed, including technical, market-related and regulatory. Nevertheless the large scale delivery of audio-visual content is considered to be one of the key 5G applications to be included in next IMT-2000 standards.

We believe that the performance targets proposed for IMT-2020, in particular the very high throughput, can only be achieved if the system has access to a large amount of radio spectrum and uses large contiguous bandwidth (e.g. 100 MHz or more per channel), which can only be found in the higher frequency ranges. The WRC-19 discussions point towards bands in the range 24.25-86 GHz. EBU supports that considerations of bands above 6 GHz for IMT-2020 shall be limited to the bands identified by WRC-15 in order to strengthen the opportunities for global harmonisation.

GSMA (19th April 2017)

WRC-19 Agenda Item 1.13 should be seen in the wider context of ‘5G spectrum’. The success of 5G will be dependent on availability of significant new widely harmonised mobile spectrum to ensure that 5G services can meet future expectations and deliver the full range of potential capabilities. Spectrum for 5G will be needed within three key frequency ranges in order to deliver widespread coverage and support all foreseen use cases, namely sub-1 GHz, 1-6 GHz and above 6 GHz. A successful outcome from WRC-19 will be vital to realise the 5G vision with low cost devices, higher reliability and very high capacity where there is high density of usage.

The GSMA supports studies of bands listed in Resolution 238 (WRC-15), with initial focus primarily on bands below 43.5 GHz. This includes, in particular, the band 24.25 - 27.5 GHz that has been decided by EC as a ‘pioneer band’ for 5G in Europe. This band provides possibility for equipment to support a continuous ‘tuning range’ to facilitate harmonisation with spectrum above 27.5 GHz that will be used for early 5G deployments in a number of countries including US, Korea and Japan. The GSMA also supports studies of the bands 31.8 - 33.4 GHz and 40.5 - 43.5 GHz which have also been recognised by RSPG as priority bands to be studied, and 37 - 40.5 GHz which (in conjunction with 40.5 - 43.5 GHz) also provides potential for global harmonisation by means of a ‘tuning range’.

GSA (19th April 2017)

Some of the 5G/IMT-2020 requirements will be met by frequency bands below 6 GHz, whereas frequency bands considered under AI 1.13 would allow to meet some specific 5G requirements, such as provision of very high data rates in hot spot areas.

For AI 1.13, GSA supports the initial focus of the CEPT studies on the 24.25-27.5 GHz “pioneer band”. Identification of this band for IMT would give a significant amount of spectrum for meeting specific 5G requirements. This would also allow Europe to benefit from economies of scale due to the possibility for equipment to support a continuous “tuning range” covering the spectrum above 27.5 GHz that will be used for early 5G deployments including in the US, Korea and Japan.

In addition to the European pioneer band 24.25-27.5 GHz, GSA is of the view that the 40.5-43.5 GHz band is also an important band for CEPT studies under AI 1.13. GSA supports the position of RSPG that ”shift of use from other bands to this 40.5-43.5GHz band should be avoided as far as possible in order to keep the option open to make it available for 5G in the future”.

GSA further supports studies of the all other frequency bands listed under Agenda Item 1.13. Prioritization of those bands is for further discussion.

Finally, GSA emphasizes that spectrum harmonization remains important for the success of 5G, and even more important for higher frequencies in order to support the development of a new 5G ecosystem. It is also of paramount importance that in order to avoid undue limitations on the IMT usage, the sharing and compatibility studies should be based on realistic parameters, deployment scenarios and assumptions.

DIGITALEUROPE (19th April 2017)

Spectrum for 5G/IMT-2020 will require harmonized mobile spectrum in various frequency ranges below and above 6 GHz to ensure that 5G services will meet the full range of capabilities.

For AI 1.13 DIGITALEUROPE supports studies for all bands listed in Resolution 238 (WRC-15).

DIGITALEUROPE supports the initial priority of the CEPT studies on the 24.25-27.5 GHz “pioneer band”. Identification of this band for IMT would give a significant amount of spectrum for meeting early 5G requirements. This would also allow Europe to benefit from economies of scale due to the possibility for equipment to support a harmonized and continuous “tuning range” through association with the spectrum above 27.5 GHz that will be used for early 5G deployments including in the US, Korea and Japan.

DIGITALEUROPE sees also advantages for the band 40.5-43.5 GHz, such as availability of a broad spectrum range, potentially fewer constraints on the mobile use due to the lower degree of utilization by the current incumbent users and a potential for global harmonization by association with the band 37-40.5 GHz.

Finally, DIGITALEUROPE emphasizes that spectrum harmonization remains important for the success of 5G, and even more important for higher frequencies in order to support the development of a new 5G ecosystem. It is also of paramount importance that in order to avoid undue limitations on the IMT usage, the sharing and compatibility studies should be based on realistic parameters, deployment scenarios and assumptions. Digital Europe supports the content of the deliverables provided by ITU-R SG3 and WP5D to ITU-R TG5/1.

31st August 2017

DIGITALEUROPE is of the view that 26 GHz spectrum should be licensed and in particular, licence-exempt use in the 26 GHz could be ruled out in the ongoing ECC PT1 studies on sharing and compatibility.

CRAF (27th June 2017)

CRAF supports the protection of existing RAS, SRS, and EESS (passive) frequency allocations. No changes should be made to the RR unless acceptable sharing and compatibility criteria are developed to ensure the protection of RAS, SRS, and EESS (passive) from future IMT operations. A number of RAS and passive frequency bands, which may be affected by the future IMT allocations are listed in the Table below.

|  |  |  |
| --- | --- | --- |
| Frequency Band (GHz) | RAS Status | RR Footnote |
| 23.6-24.0 | PRI | 5.340 |
| 31.3-31.5 | PRI | 5.340 |
| 42.5-43.5 | PRI | 5.149 |
| 48.54-49.04 | PRI | 5.340, 5.149 |
| 50.2-50.4 |  | 5.340 |
| 76.0-77.0 | PRI | 5.149 |
| 81.0-86.0 | PRI | 5.149 |

1. Including studies with respect to services in adjacent bands, as appropriate. [↑](#footnote-ref-1)
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. [↑](#footnote-ref-2)
3. i.e. excluding Annex B from Doc ITU-R TG5/1 Document 5-1/36 Attachment 1: Information on spectrum needs in some countries [↑](#footnote-ref-3)
4. These deployment environments are based on information available on how IMT-2020 is expected to be deployed in bands 24.25-86 GHz and should not be used to limit any IMT-2020 deployments in the future. [↑](#footnote-ref-4)
5. Values provided to ECC PT1: -54.2 (ECCPT1(17)243), -48.6...-51.1 (ECCPT1(17)247), -36.8 (ECCPT1(17)258), -36.6...47.8 (ECCPT1(17)239), -31.2 (ECCPT1(17)264), -35.0 (ECCPT1(17)222) [↑](#footnote-ref-5)
6. Values provided to ECC PT1: -50.4 (ECCPT1(17)243), -31.1...-45.7 (ECCPT1(17)247), -33.1 (ECCPT1(17)258), -28.1...-41.2 (ECCPT1(17)239), -36.0 (ECCPT1(17)264), -31.0 (ECCPT1(17)222) [↑](#footnote-ref-6)
7. Doc 9718, AN/957, Volume I, ICAO spectrum strategy, policy statements and related information, First Edition, 2014 [↑](#footnote-ref-7)