CEPT Report <No>

Report from CEPT to the European Commission in response to the Mandate

“to develop least restrictive harmonised technical conditions suitable for next-generation (5G) terrestrial wireless systems for priority frequency bands above 24 GHz”

Harmonised least restrictive technical conditions for the 40.5-43.5 GHz frequency band

**Report approved on DD Month YYYY by the ECC**

**[last updated: DD Month YYYY) [date of the latest update]]**

**NOTE: This is a working document.. All texts will be further reviewed and discussed in upcoming correspondence group meetings until the next ECC PT1 meeting.**

# Executive summary

This report addresses Tasks 1 and 2 of the EC Mandate to CEPT to develop least restrictive harmonised technical conditions suitable for next-generation (5G) terrestrial wireless systems for priority frequency bands above 24 GHz (EC mandate – see Annex 1).

*Editor’s Note: This may be redrafted when the body of the report is stable*

[The technical conditions identified in this Report address sharing and compatibility conditions to ensure protection of other users of spectrum in the 40.5-43.5 GHz frequency band (e.g. FS, RAS and FSS) and in adjacent bands (FSS, FS).

A review of the current and planned use of the 40.5-43.5 GHz frequency band taking into account the radio applications according to ERC Report 25 (ECA table) was done and the results of the ECO Questionnaire from 2016 were evaluated. No additional questionnaire was needed as the incumbent services to be protected in preparation for WRC-19 stayed the same: FS, RAS and FSS.

[Based on the results of the review of the current and planned use of the 40.5-43.5 GHz frequency, the frequency arrangements and common and minimal (least restrictive) technical conditions were developed, including sharing conditions, for the aforementioned frequency band, which are suitable for terrestrial wireless systems, including 5G, in compliance with the principles of technology and service neutrality.

In preparation of the Conference Preparatory Meeting (CPM) to the WRC-19 Agenda item 1.13, in accordance with the Resolution 238 (WRC-15), the ITU-R Task Group 5/1 carried out several studies on the spectrum needs, technical and operational characteristics including protection criteria, and deployment scenarios for the terrestrial component of IMT. These sharing and compatibility studies were conducted taking into account the protection of services to which the band is allocated on a primary basis [1].

Following the ITU WRC-19, it was decided on the primary allocation of 40.5-42.5 GHz band for land mobile service and it was identified the frequency band 40.5-43.5 GHz for IMT (land mobile) on a global basis. In addition, the new Resolution 243 “Terrestrial component of International Mobile Telecommunications in the frequency bands 37-43.5 GHz and 47.2-48.2 GHz” was included which addresses already the coexistence between IMT and other services to which the frequency band is allocated, including the protection of these other services. To ensure the coexistence between services, administrations shall fulfil a set of conditions on the unwanted emission power level, antenna tilt of base stations, among other parameters [2].

The technical conditions identified in this Report address sharing and compatibility conditions to ensure protection of other users of spectrum in the 40.5-43.5 GHz frequency band (e.g. FS, RAS and FSS) and in adjacent bands (e.g. FSS, FS) [1]. It is noted that sharing with active services above 40 GHz may be easier than systems operating at lower frequencies for several reasons [3]: high transmitting directivity can be easily achieved with antennas of practical size; the line-of-sight and atmospheric attenuation is higher at these frequencies, diffraction is weaker (leading to stronger shielding by obstacles); the scattering of signals by the troposphere decreases with increasing frequency]

**TABLE OF CONTENTS**

[0 Executive summary 2](#_Toc50031944)

[1 Introduction 5](#_Toc50031945)

[2 EXISTING, planned, and Future USE OF 40.5-43.5 GHZ 6](#_Toc50031946)

[3 ADJACENT BANDS USE 8](#_Toc50031947)

[4 5G CHARACTERISTICS 10](#_Toc50031948)

[4.1 5G Usage Scenarios in 40.5-43.5 GHz 10](#_Toc50031949)

[4.2 5G Parameters Used in Sharing Studies 10](#_Toc50031950)

[5 COEXISTENCE ISSUES 11](#_Toc50031951)

[5.1 Fixed Links 11](#_Toc50031952)

[5.2 Radio Astronomy Service 11](#_Toc50031953)

[5.3 Fixed-Satellite Service 11](#_Toc50031954)

[5.3.1 Fixed-Satellite Service 40.5-42.5 GHz 12](#_Toc50031955)

[5.3.2 Fixed-Satellite Service 42.5-43.5 GHz 12](#_Toc50031956)

[6 Conclusions 13](#_Toc50031957)

[ANNEX 1: CEPT MANDATE 14](#_Toc50031958)

[1. Purpose 14](#_Toc50031959)

[ANNEX 2: Band plan 18](#_Toc50031960)

[ANNEX 3: Technical conditions 19](#_Toc50031961)

[ANNEX 4: List of reference 20](#_Toc50031963)

**Note on the Table of Contents (delete after reading)**

This is automatically styled and compiled from the headings, subheadings and page numbers from the document that follows. To update the Table of Contents move cursor within the table and press F9.

**LIST OF ABBREVIATIONS**

|  |  |
| --- | --- |
| **Abbreviation** | **Explanation** |
| **BEM** | Block Edge Mask |
| **BS** | Base Station |
| **CEPT** | European Conference of Postal and Telecommunications Administrations |
| **EC** | European Commission |
| **ECC** | Electronic Communications Committee |
| **EESS** | Earth Exploration Satellite Service |
|  |  |
|  |  |
|  |  |
|  |  |

# Introduction

This report addresses Tasks 1 and 2 of the EC Mandate to CEPT to develop least restrictive harmonised technical conditions suitable for next-generation (5G) terrestrial wireless systems for priority frequency bands above 24 GHz (EC mandate – see Annex 1):

“1. Review the current and planned use of the 40.5-43.5 GHz frequency band and identify relevant scenarios for shared spectrum use between those uses and next-generation (5G) wireless broadband electronic communications services, in order to ensure co-existence and further development of all relevant services within the band.

2. Based on the results under Task 1, develop frequency arrangements and common and minimal (least restrictive) technical conditions, including sharing conditions, for the aforementioned frequency band, which are suitable for terrestrial wireless systems, including 5G, in compliance with the principles of technology and service neutrality. In this regard, consider the need to ensure coherence of the harmonised frequency arrangements within the 40.5-43.5 GHz frequency band with the envisaged use of the 37-40.5 GHz frequency range in other world regions.”

This CEPT Report provides an overview of the current and planned use in 40.5-43.5 GHz and in adjacent bands, describes the relevant 5G characteristics and analyses the various coexistence issues in the band and adjacent bands. It assesses requirements for cross-border coordination, wherever relevant, including at the EU outer borders.

The relevant technical conditions to be included in the future EC Decision 40 GHz under the Radio Spectrum Decision [4] are provided in the Annex X.

# EXISTING, planned, and FUTURE USE OF 40.5-43.5 GHZ

This band is allocated to BSS, FSS, FS and RAS.

Description of usage and planned use of different services/applications fixed links, BSS, FSS, FS and RAS

## Fixed service

The band 42.5-43.5 GHz is allocated to the Fixed Service on a primary basis. ECC Report 173 provides an overview of current usage and future trends of Fixed Service in the CEPT countries. The majority of countries reports in the latest update of the ECC Report 173 an increasing usage of the band 40.5-43.5 GHz for the FS. Typical hop lengths are between 1km to 4km. This kind of short links are mainly deployed in urban and suburban areas.

## RAS

From the RAS perspective, there are relatively few mm-wave observatories to be protected and these are mostly located in areas of low population density.

Until recently there have been relatively few active services operating above 40 GHz and therefore few reported cases of interference to the RAS.

The sites listed in the table below are currently operating (or capable of operating) at 42.5 – 43.5 GHz and should be appropriately protected from MFCN emissions.

Table 1: European RAS sites currently operating (or capable of operating) at 42.5 – 43.5 GHz

|  |  | Location |
| --- | --- | --- |
| Station Name | Responsible Administration | Lattiude | Longitude |
| Metsahovi | Finland | 60° 13′ 05″ N | 24° 23′ 36" E |
| Bure | France | 44° 38′ 02" N | 05° 54′ 28" E |
| Effelsberg | Germany | 50° 31′ 29″ N | 06° 53′ 01″ E |
| Wettzell | Germany | 49° 8′ 38″ N | 12° 52′ 40″ E |
| Noto | Italy | 36° 52′ 33″ N | 14° 59′ 20″ E |
| Sardinia | Italy | 39° 29′ 34″ N | 09° 14′ 42″ E |
| Medicina | Italy | 44° 31′ 15″ N | 11° 38′ 49″ E |
| Torun  | Poland | 53° 05′ 43″ N | 18° 33′ 46″ E |
| Pushchino | Russian Federation | 54° 49′ 20″ N | 37°37′ 53″ E |
| Yebes | Spain | 40° 31′ 29″ N | 03° 05′ 13″ W |
| Robledo | Spain | 40° 25′ 38″ N | 04° 14′ 57″ W |
| Pico Veleta | Spain | 37° 3' 58" N | 3° 23' 34" W |
| Onsala | Sweden | 57° 23′ 45″ N | 11° 55′ 35″ E |
| Cambridge | United Kingdom | 52° 09′ 59″ N | 00° 02′ 20″ E |

## FSS

The frequency band 40.5-43.5 GHz is part of the generally known “Q/V band” (Q/V band also includes 37.5-47 GHz, 47.2-50.2 GHz and 50.4-52.4 GHz). Many satellite operators have already launched or are developing systems that will use the Q/V band allocations in the near future including in Europe and some operators have already obtained authorisations in other regions. Earth stations operating with GSO and non-GSO satellites are planned for these bands.

Therefore, the satellite industry will need access to spectrum for gateway stations and for terminals. There are plans for gateway earth stations use which implies the need for access to large amounts of spectrum required for feeder links. There are also future plans for the introduction of user terminals, including mobile terminals (e.g. using phased array antennas).

The band 40.5-42.5 GHz is allocated to the FSS in the space-to-Earth direction and to the BSS. The interest in this band in Europe is primarily for receiving gateway FSS earth stations where a relatively limited number of stations is needed, which is feasible to operate on a shared basis with terrestrial services.

The band 42.5-43.5 GHz is allocated to the FSS in the Earth-to-space direction. The interest in this band in Europe is primarily for transmitting gateway FSS earth stations, which is feasible on a shared basis with terrestrial services. For this band, there are also satellite space station receivers planned, for which studies have shown that sharing is feasible.

# 5G CHARACTERISTICS

## 5G Usage Scenarios in 40.5-43.5 GHz

*Editor’s Note: Text from draft ECC Decision, as well the clarification of possible UAS usage in both transmissions. At this stage only terrestrial usage is studied. Regarding UAS: if new WI is defined it should be used in line with the satellite transmission – needs to be studied). It is out of the scope of EC Mandate.*

There will be a progressive introduction of 5G services in 40.5 -43.5 GHz in EU Member States. 5G will be introduced before 202[X] in EU Member States (at least in one main city).

In the 40.5-43.5 GHz band, MFCN will support mainly urban and suburban hotspot areas. The deployment of MFCN is expected to target only cells with a small range. Due to the characteristics of this frequency band, there is no expectation that it will be used for contiguous wide/nationwide coverage of MFCN networks areas. There may be a need for a limited number of hotspots in rural areas. MFCN networks at 40 GHz could be deployed indoor and outdoor. It has been assumed during the WRC preparation that MFCN base stations will operate under a authorisation regime where locations are known. Additional considerations are needed for an authorisation regime where the location of base stations are not known to ensure that the harmonised technical conditions in this Decision are met. CEPT noted, that definition of authorisation regime is a national matter. The LRTC for MFCN in 40.5 – 43.5 GHz band have been developed assuming an authorisation where the location of transmitters and receivers are known.

40.5 - 43.5 GHz networks will benefit from technologies with wider radio channels than in other previously harmonised bands in the EU.

## 5G Parameters Used in Sharing Studies

The characteristics of 5G systems used in the sharing studies are those used in the ITU preparatory work for WRC-19 agenda item 1.13, in particular in ITU-R Recommendation M.2101 “Modelling and simulation of IMT networks and systems in sharing and compatibility studies” [5].

## Definition of Total Radiated Power (TRP)

TRP is defined as the integral of the power transmitted in different directions over the entire radiation sphere as shown in the expression below.

 (1)

where

* is equal to the total conducted power input into the antenna array system less any losses in the antenna array system;
* : power radiated by an antenna array system in direction

 (2)

where

* : conducted power (Watts) input to the array system;
* : array systems directional gain along direction.

The maximum EIRP for an active antenna system (AAS) base station can be written in log domain as follows:

 (3)

where is the antenna element gain in dBi, and is the number of beam forming elements.

## Unsynchronised and Semi-synchronized Networks

For cases other than synchronised WBB ECS operations, if no geographic separation between these WBB ECS networks is available, a restricted baseline applies. Less stringent technical parameters, if agreed among the operators of such networks, may also be used. In addition, depending on national circumstances, Member States may define relaxed baseline limit applying to specific implementation cases.

# COEXISTENCE ISSUES

## Fixed Links

Studies for WRC-19 evaluated the possible coexistence between MFCN and FS in the mmWave bands show, that a coexistence is generally possible, but that coordination between both services is needed, if they should be deployed in the same area in the same frequency range. The coordination could be done on a case-by-case basis on a national level.

Any migration issues are to be managed at national level and are subject to a national decision. Co-channel deployment of 5G with fixed links remains possible depending on national situations. There is no need to define a common date for management of a migration to an alternative band or to clear the 40.5-43.5 GHz band from fixed services. Due to the nature of fixed service bi- or multi-lateral cross-border coordination may be necessary.

## Radio Astronomy Service

RAS sharing with MFCN is feasible. For MFCN at these frequencies high transmit directivity can be achieved with active antenna systems (AAS) and various site engineering techniques may reduce the risk of interference in the direction of an observatory. For RAS, the interference issue is from MFCN networks into RAS equipment operating in RAS sites.

For protection of radio astronomy, generic compatibility studies between RAS and IMT systems have been studied for WRC-19:

A generic in-band sharing study between the RAS in the band 42.5-43.5 GHz and IMT systems in the same band shows that separation distances around RAS stations are required to protect this service from IMT operations, with radii of up to 56 km. A generic compatibility study between the RAS in the band 42.5‑43.5 GHz and IMT systems in the band 40.5-42.5 GHz shows that separation distances 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, separation distances of up to 44 km radius are required. For the ‑30 dBm/MHz emission level as specified for Category B devices, the separation distances may be reduced to about 7 km. For both studies a flat terrain profile was considered. Separation distances for individual RAS stations need to be calculated using site-specific terrain and clutter information. It is considered that the protection of radio astronomy observations is a national issue, for both the in-band sharing and the spurious emission scenarios, to be addressed on a case-by-case basis.

In the frequency band 40.5-43.5 GHz coordination zones around RAS stations are required to protect this service from MFCN emissions. These would be managed on a case by case national basis and the size of the zone would be dependent on the local environment and expected MFCN deployment densities.

##  Fixed-Satellite Service

Within 40.5-43.5 GHz, two sub-bands are relevant for space and satellite services:

* 40.5-42.5 GHz allocated to FSS (Space-to-earth).
* 42.5-43.5 GHz allocated to FSS (Earth-to-space).

### Fixed-Satellite Service 40.5-42.5 GHz

With respect to the protection of the FSS earth station receiver: based on the results of the WRC-19 studies, coexistence issues can be managed at national level, and in any case without impacting the LRTC developed in this report.

CEPT is developing a ECC Recommendation (target date: November 2021) “Guidelines to support the introduction of 5G while ensuring, in a proportionate way, the use of FSS receiving earth stations in the frequency band 40.5-42.5 GHz and the use of FSS transmitting earth stations in the frequency band 42.5-43.5GHz and the possibility for future deployment of these earth stations”.

WRC-19 sharing studies between IMT and FSS (space-to-Earth) in this band provide results in terms of separation distances between an IMT network and an FSS earth station, and probabilities that an IMT network may have the potential to cause interference to an FSS earth station at different separation distances. Separation distances calculated in these studies are between 210 metres, up to a maximum of around 2 kilometres, with low probabilities that the levels of aggregate emissions from an IMT network may potentially cause interference to an FSS earth station.

Separation distances for individual Earth stations need to be calculated using site-specific terrain and clutter information. It is considered that the protection of FSS (s-E) in this band is a national issue to be addressed on a case by case basis since the use of the band by FSS is limited to coordinated Earth stations.

### Fixed-Satellite Service 42.5-43.5 GHz

With respect to the protection of the FSS satellite receiver in 40.5 – 43.5 GHz: based on the deployment scenarios and characteristics provided for the WRC-19 studies, sharing studies between IMT and FSS (Earth-to-space) in the 42.5-43.5 GHz band show there is a sufficient protection margin between the level of emissions that would be expected from MFCN networks and the level that could potentially cause interference (aggregated) to FSS space stations.

Also based on results of the WRC-19 sharing studies, coexistence issues in terms of protection of MFCN from FSS earth station emissions can be managed at national level, and in any case without impacting the LRTC developed in this report.

WRC-19 studies found the following:

FSS GSO: All baseline sharing studies, using the agreed parameters, have shown that GSO Fixed-Satellite Service (FSS) would be protected with a positive margin. Study showed I/N values ranging from -43.46 dB I/N to -26.5 dB I/N. When compared with the -10.5 dB I/N (exceeded up to 20% or I/N average) protection criterion, all studies show a positive margin. Sensitivity analysis, in line with the agreed methodology on how to vary the parameters, found a positive margin compared to the protection criterion is maintained.

FSS non-GSO: All baseline sharing studies, using the agreed parameters, have shown that non-GSO Fixed Satellite Service (FSS) would be protected with a positive margin. Studies have showed I/N values ranging from -34.8 dB I/N to -38.2 dB I/N for both fixed orbit positions and dynamic cases. One study showed a worst case I/N value of -21.3 dB I/N. However, several other simulations under similar assumptions have resulted in an I/N below -30 dB instead of -21.3 dB. When compared with the -10.5 dB I/N (20% or I/N average) protection criterion, all studies show a positive margin.

A study, diverged from the other studies and was documented in the CPM Report, conducted sensitivity analyses using IMT parameters and assumptions other than those considered by ITU-R as well as differing from the agreed course of action on how to vary these parameters on how to conduct sharing and compatibility studies, using multiple simultaneous deviations on the IMT characteristics (i.e. up to 5 dB higher antenna element conducted power than that specified in the baseline or 16×16 antenna array and network loading factor up to 50%). One study provided long-term I/N values from −11.5 dB to −1.9 dB depending on different input data and assumptions. In the worst case, the long-term protection criterion of −10.5 dB will be exceeded by 8.6 dB (11.6 dB with apportionment). These results were not replicated by other studies.

FSS into IMT: Studies showed separation distances between IMT base stations and FSS Earth stations are from 160 m to 4 km. Where FSS earth stations and IMT stations are in the same geographical area sharing could be dealt with on a case-by-case basis.

CEPT intends to assess the evolution of WBB ECS system characteristics, including network deployments, in a 5 year timeline, so as to be able to provide additional confidence that such evolution will continue to ensure the adequate protection of other services, in particular space services.

In addition, the harmonised technical conditions include a general provision requiring that outdoor base station deployments shall ensure that the antenna beam is normally below the horizon and outdoor base station shall not have mechanical pointing above the horizon. This would help preventing having 5G base stations with antenna pointing directly towards the sky which, in case there are many such deployments, would significantly increase the interference potential to FSS.

# CEPT is developing a ECC Recommendation (target date: November 2021) “Guidelines to support the introduction of 5G while ensuring, in a proportionate way, the use of FSS receiving earth stations in the frequency band 40.5-42.5 GHz and the use of FSS transmitting earth stations in the frequency band 42.5-43.5GHz and the possibility for future deployment of these earth stations”.fMFCN (5G) authorisation regime

When developing the proposed attached technical conditions, The harmonised technical conditions for MFCN set out in this decision have been developed on the basis of an authorisation regime where the base station location are known. Additional considerations may be needed on a national basis for an authorisation regime where the location of base stations are not known to ensure that the harmonised technical conditions in this Decision are met. CEPT also noted, that definition of authorisation regime is a national matter.

Depending on the authorisation regime applied in this band, there is a need for administrations to assess if it is necessary to impose additional technical conditions in order to ensure appropriate co-existence of terrestrial systems capable of providing wireless broadband electronic communications services with other services in the band. CEPT initiated an additional analysis in order to support administrations.

# Conclusions

Body text (style: ECC Paragraph)

(advice: a conclusion may review the main points of the Report. A conclusion might elaborate on the results of the Report and suggest extensions.)

1. CEPT MANDATE

|  |  |
| --- | --- |
|  | EUROPEAN COMMISSIONDIRECTORATE-GENERAL FOR COMMUNICATIONS NETWORKS, CONTENT AND TECHNOLOGYThe Director-GeneralBrusselsCNECT.B.4 |

**Mandate to CEPT**

**to develop least restrictive harmonised technical conditions suitable for next-generation (5G) terrestrial wireless systems for priority frequency bands above 24 GHz**

1. **Purpose**

This Mandate is a follow-up to the Commission mandates regarding the development of harmonised technical conditions suitable for the provision of next-generation (5G) electronic communications services in ‘pioneer’ bands (RSCOM16-40rev3) as well as in EU-harmonised bands (RSCOM18-19rev1). It should deliver least restrictive harmonised technical conditions in the context of technology and service neutrality, including relevant sharing conditions, which allow use of the priority frequency band 40.5-43.5 GHz for terrestrial wireless systems capable of providing wireless broadband electronic communications services. Furthermore, it should assess the need to update the EU-harmonised technical conditions for the same type of use of the priority frequency band 66-71 GHz. The technical conditions for both bands should take into account 5G usage scenarios related to very high-capacity networks and meet the overarching objective of ensuring efficient spectrum use.

1. **POLICY CONTEXT AND INPUTS**

The ITU-R vision for the next-generation mobile telecommunications[[1]](#footnote-2) outlines three major 5G usage scenarios – enhanced mobile broadband (eMBB), massive machine type communications (mMTC), and ultra-reliable and low latency communications (URLLC). Millimetre-wave bands are particularly suitable for the provision of high-speed and low-latency services while ensuring high network capacity.

In its 5G Action Plan[[2]](#footnote-3), the Commission advanced action on the EU-level identification and harmonisation of 5G spectrum regarding pioneer frequency bands as well as **additional** frequency bands, based on the opinion of the Radio Spectrum Policy Group (RSPG). In its Opinions on a "Strategic Roadmap towards 5G in Europe"[[3]](#footnote-4), the RSPG identified the 40.5-43.5 GHz and 66-71 GHz frequency bands as priority bands for the rollout of 5G terrestrial wireless systems in the Union.

The RSPG considered the band 40.5-43.5 GHz as a viable option for 5G in the longer term, taking into account the support from mobile industry and the need to take into account the general balance between the mobile and satellite sectors to access the 40-50 GHz frequency range. The RSPG takes the view that shift of non-5G use from other bands to the 40.5-43.5 GHz band should be avoided as far as possible in order to facilitate its availability for 5G in the future.

Furthermore, the RSPG emphasized that there is no reported use of the 66-71 GHz frequency band. Its proximity to the 57-66 GHz band, already designated and used for multiple-gigabit wireless systems (WiGig), indicates that 5G equipment could potentially be available in the 66-71 GHz frequency band relatively early by benefiting from the ecosystem being developed in the adjacent band, in particular under general authorisation, which remains an important enabler of innovative 5G services and applications. The 66-71 GHz band has better propagation characteristics than the adjacent 57-66 GHz band as it falls outside the so-called oxygen absorption peak, and therefore can be a viable alternative to lower mm-wave bands ensuring comparable cell radiuses in the range of 50-200 metres.

The 66-71 GHz frequency band is currently harmonised in the Union by virtue of the Commission Decision on short range devices[[4]](#footnote-5) for use with wideband data transmission devices. Any amendment to the EU-harmonised technical conditions applicable to this band, in order to accommodate 5G use, should be implemented unambiguously within a single legal instrument.

The World Radiocommunication Conference in 2019 (WRC-19) amended the ITU-R Radio Regulations by providing a global mobile allocation and IMT (including 5G) identification of both, the 37-43.5 GHz frequency band, or portions thereof (i.e. including the case of using only the 40.5-43.5 GHz band), and the 66-71 GHz frequency band. Therefore, use of the 37-43.5 GHz frequency range would vary across the globe within the concept of a common tuning range. The deployment of 5G services worldwide would benefit from a degree of coherence of the applicable harmonised technical conditions throughout this frequency range on a global scale. For the 40.5-43.5 GHz frequency band, the amended Radio Regulations stipulate measures to ensure co-existence between 5G services and fixed satellite services (space-to-earth) as well as radio astronomy services within the band. The amended Radio Regulations also provide for coexistence of 5G systems and wireless access systems such as multiple-gigabit wireless systems within the 66-71 GHz frequency band. Furthermore, co-existence with certain satellite services should be considered for the latter band.

1. **JUSTIFICATION**

Pursuant to Article 4(2) of the Radio Spectrum Decision[[5]](#footnote-6) the Commission may issue mandates to the CEPT for the development of technical implementing measures with a view to ensuring harmonised conditions for the availability and efficient use of radio spectrum necessary for the functioning of the internal market. Such mandates shall set the tasks to be performed and their timetable. Pursuant to Article 1 of the Radio Spectrum Decision, activities under the Decision must facilitate policy making with regard to the strategic planning and harmonisation of radio spectrum use as well as ensure the effective implementation of radio spectrum policy in the EU while serving the aim of coordination of policy approaches. Furthermore, they shall take due account of the work of international organisations related to spectrum management such as ITU.

The Commission Communication on the Gigabit Society[[6]](#footnote-7) sets out even more ambitious Gigabit connectivity targets for households, socio-economic drivers, urban areas and major transport paths, taking account progressing 5G network rollout. The European Electronic Communications Code[[7]](#footnote-8) refers to the importance of studying the 40.5-43.5 GHz and 66-71 GHz frequency bands for high-capacity 5G networks.

Advances in international standardisation and regulations within 3GPP and ITU, as well as ongoing international deployment of 5G, call for a continued coordination at the EU level in order to deliver sufficient and appropriate 5G spectrum in the Union according to anticipated deployment of 5G usage scenarios.

**4. TASK ORDER AND SCHEDULE**

CEPT is herewith mandated to develop harmonised least restrictive technical conditions for the 40.5-43.5 GHz frequency band and to revise, only if necessary, the harmonised technical conditions in the 66-71 GHz frequency band, with a view to their suitability for *next-generation (5G) terrestrial wireless systems,* in line with the policy priorities set out in this Mandate and taking into account relevant needs for shared spectrum use with incumbent uses. CEPT should give utmost consideration to the overall EU spectrum policy objectives such as effective and efficient spectrum use and take utmost account of applicable principles established in EU law such as those relating to service and technological neutrality, non-discrimination and proportionality insofar as technically possible.

CEPT is requested to collaborate actively with the European Telecommunications Standardisation Institute (ETSI), which develops harmonised standards for conformity under the Radio Equipment Directive[[8]](#footnote-9). In addition, CEPT should take into consideration emerging technologies and ETSI standards, which define 5G systems, facilitate shared spectrum use and foster economies of scale.

More specifically, CEPT is mandated to perform the following tasks with a view to developing harmonised least restrictive technical conditions for spectrum use:

1. Review the current and planned use of the 40.5-43.5 GHz frequency band and identify relevant scenarios for shared spectrum use between those uses and next-generation (5G) wireless broadband electronic communications services, in order to ensure co-existence and further development of all relevant services within the band.
2. Based on the results under Task 1, develop frequency arrangements and common and minimal (least restrictive) technical conditions[[9]](#footnote-10), including sharing conditions, for the aforementioned frequency band, which are suitable for terrestrial wireless systems, including 5G, in compliance with the principles of technology and service neutrality. In this regard, consider the need to ensure coherence of the harmonised frequency arrangements within the 40.5-43.5 GHz frequency band with the envisaged use of the 37-40.5 GHz frequency range in other world regions.
3. Review and revise, only if necessary, the EU-harmonised technical conditions for use of the 66-71 GHz frequency band4 with a view to use of this band for next-generation (5G) wireless broadband electronic communications services, taking into account relevant scenarios for shared spectrum use and the further development of all relevant services within the band. In this regard, ensure coherence of results and reporting to the Commission, taking into account the ongoing work on the permanent mandate to CEPT on short-range devices[[10]](#footnote-11), in accordance with the latest Commission guidance[[11]](#footnote-12).

The conditions under Tasks 2 and 3 should take into account relevant authorisation modes and be sufficient to mitigate interference and to ensure co-existence with incumbent radio services/applications in the same band or in adjacent bands, in line with their regulatory status, including at the EU outer borders.

1. Assess the need for and develop, if necessary, guidance for cross-border coordination.

Overall, the CEPT should provide deliverables under this Mandate according to the following schedule:

|  |  |  |
| --- | --- | --- |
| **Delivery date** | **Deliverable** | **Subject** |
| March 2021  | Draft Report(s) from CEPT to the Commission[[12]](#footnote-13). | Description of the work undertaken and the results. |
| July 2021 | Final Report(s) from CEPT to the Commission, taking into account the outcome of the public consultation. | Description of the work undertaken and the results. |

CEPT is requested to report on the progress of its work pursuant to this Mandate to all meetings of the Radio Spectrum Committee taking place during the course of the Mandate.

The Commission, with the assistance of the Radio Spectrum Committee and pursuant to Article 4 of the Radio Spectrum Decision, may consider applying the results of this mandate in the Union taking into account any relevant guidance of the RSPG.

1. Band plan
2. Technical conditions
3. List of reference
4. ITU, [Annex 5 to Task Group 5/1 Chairman’s Report: Sharing and Compatibility Studies of IMT Systems in the 37-43.5 GHz Frequency Range](https://www.itu.int/dms_ties/itu-r/md/15/tg5.1/c/R15-TG5.1-C-0478%21N05%21MSW-E.docx), October 2018.
5. ITU, [The Final Acts World Radiocommunication Conference 2019 (WRC-19)](https://www.itu.int/pub/R-ACT-WRC.14-2019/en), March 2020.
6. ITU, [Handbook on Radio Astronomy](https://www.itu.int/pub/R-HDB-22-2013), 2013.
7. ITU, Radio Regulations Edition of 2016
8. ITU-R Recommendation M.2101-0 “Modelling and simulation of IMT networks and systems in sharing and compatibility studies”.
9. ERC Recommendation 74-01: “Unwanted emissions in the spurious domain”, Amended May 2019
1. In the ITU context of "International Mobile Telecommunications for 2020 (IMT2020)", s. ITU Recommendation: [https://www.itu.int/dms\_pubrec/itu-r/rec/m/R-REC-M.2083-0-201509-I!!PDF-E.pdf](https://www.itu.int/dms_pubrec/itu-r/rec/m/R-REC-M.2083-0-201509-I%21%21PDF-E.pdf) [↑](#footnote-ref-2)
2. See: <https://ec.europa.eu/digital-single-market/en/5g-europe-action-plan> [↑](#footnote-ref-3)
3. Documents RSPG16-032 final (9 November 2016) and RSPG18-005 final (30 January 2018) [↑](#footnote-ref-4)
4. Commission Decision 2006/771/EC as last amended by Commission Decision (EU) 2019/1345. [↑](#footnote-ref-5)
5. Decision 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community, OJ L 108 of 24.4.2002 [↑](#footnote-ref-6)
6. COM(2016)587 final [↑](#footnote-ref-7)
7. Directive (EU) 2018/1972. [↑](#footnote-ref-8)
8. Directive 2014/53/EU. [↑](#footnote-ref-9)
9. Such as the definition of appropriate Block Edge Masks (BEMs). [↑](#footnote-ref-10)
10. Document RSCOM 06-27 Rev (5 July 2006) [↑](#footnote-ref-11)
11. Document RSCOM19-9rev2 [↑](#footnote-ref-12)
12. Subject to subsequent public consultation [↑](#footnote-ref-13)