Band overview
26 GHz frequency band

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1. Summary

In the 24.5-26.5 GHz frequency band, fixed point-to-point and point-to-multipoint systems are currently in operation. The necessary entitlements to radio spectrum use were acquired by the right holders in competitive procedures and are mainly used to implement the necessary backhaul network links for mobile services in the frequency band. The entitlements to radio spectrum use will expire in 2024 and 2027 (the vast majority in 2027).

There are a number of international regulatory documents on the future use of the 24.25-27.5 GHz frequency band (known as the 26 GHz frequency band in the context of EU spectrum policy efforts). The most prominent of these from a regulatory point of view are the EU legal acts establishing the obligation to designate and make available the 26 GHz frequency band (which is wider than the frequency band mentioned in the first paragraph and currently used for fixed links) for terrestrial systems capable of providing wireless broadband electronic communications services over mobile and fixed communications networks (MFCN[[1]](#footnote-2)). The 26 GHz frequency band is one of the frequency bands identified by the EU for early 5G deployment (5G pioneer band).

Understanding the demands for use of the 26 GHz frequency band for introducing next-generation radio systems (5G NR[[2]](#footnote-3)) is necessary to identify specific future regulatory actions. As a result of the public consultation, a decision can be taken on the future use of the frequency band, in particular on the way the band is distributed (e.g. making the frequency band fully or partially available for 5G purposes, the possibility of a competitive procedure or other licensing method, meeting national and/or local demands, etc.). Possible steps include the introduction of alternative use, shared use between national and local systems, and a mixed licensing regime adapted to this.

The National Media and Infocommunications Authority (hereinafter: NMHH) already placed the issue of the 26 GHz frequency band on the agenda of its public consultations in 2017 and 2019. Both public consultations ended with the same result. In order to protect existing networks, with regard to the plans related to their own mobile services and in the context of the frequency bands available, operators of backhaul networks in the 24.5-26.5 GHz frequency band considered it premature to launch a competitive procedure for the introduction of 5G in the 26 GHz frequency band. No market demand has emerged for use of the band other than from current right holders. By holding a public consultation, the NMHH aims to find out about the plans and needs of the current right holders and to assess the needs of those outside the current right holders.

The radio spectrum necessary to operate the backhaul network links shall be provided. If rules on the usability of the 26 GHz frequency band change, a different band will have to be made available for the subsequent period and the time needed for migration will also have to be taken into account. The 31.8-33.4 GHz frequency band (hereinafter referred to as: 32 GHz frequency band) could provide a solution for migration, both in terms of the amount of spectrum available and the band characteristics.

1. Introduction

Pursuant to Decree No. 7/2015 (XI. 13.) NMHH on the national frequency allocation and the rules of using frequency bands (hereinafter: NFFF Decree), currently fixed point-to-point and point-to-multipoint systems can operate in the 24.5-26.5 GHz frequency band. Operators mainly implement backhaul network links (typically point-to-point) in the frequency band.

The right holders acquired the entitlements to radio spectrum use through two competitive procedures in 2008-2009[[3]](#footnote-4) and in 2011-2012[[4]](#footnote-5). Consequently, the expiration dates of the entitlements differ. The earlier expiration date is 15 May 2024, and the later is 20 April 2027.

As a result of the decisions of the 2019 World Radiocommunication Conference (WRC-19), the 26 GHz frequency band has been globally identified for IMT use and the entire 26 GHz frequency band (24.25–27.5 GHz frequency band) planned for IMT has been allocated to the mobile service, allowing the introduction of broadband mobile service applications, including 5G NR, in the frequency band at international level.

Based on the RSPG’s[[5]](#footnote-6) opinion[[6]](#footnote-7) on 5G spectrum issues, an EU mandate[[7]](#footnote-8) was established on 7 December 2016, inviting the CEPT[[8]](#footnote-9) to study 5G deployment for the bands specified in the document, taking into account existing uses. In addition to the 700 MHz and 3400-3800 MHz frequency bands, the mandate identified the 24.25-27.5 GHz range, i.e. the 26 GHz frequency band, as the early 5G frequency band candidate (5G pioneer band) in line with the RSPG opinion. The 26 GHz frequency band made available for MFCNs includes, in addition to the frequency band currently used for fixed service networks (24.5-26.5 GHz), the 26.5-27.5 GHz frequency band currently designated for non-civil purposes, as well as the 24.25-24.5 GHz frequency band.

In December 2018, the European Electronic Communications Code[[9]](#footnote-10) (hereinafter: the Code) set out further measures to promote the roll-out of 5G. Article 54 of the Code requires Member States to take the necessary steps by 31 December 2020 to allow the use of at least 1 GHz of the 26 GHz frequency band for electronic communications networks capable of wireless broadband data transmission, where there is clear evidence of market demand and there are no significant barriers for migration of users with existing entitlements to radio spectrum use or band clearance.

For the future use of the 26 GHz frequency band, Commission Implementing Decision (EU) 2019/784[[10]](#footnote-11) was adopted in June 2019 (hereinafter: (EU) 2019/784), requiring Member States to designate and make available, on a non-exclusive basis, the 24.25–27.5 GHz frequency band for terrestrial systems (MFCN) capable of providing wireless broadband electronic communications services by 30 March 2020. The Commission Decision contains harmonised technical conditions for 5G use and provisions for compatibility with existing applications in the frequency band.

Decision (EU) 2019/784 contains a new channel arrangement and band-use conditions (e.g. BEM[[11]](#footnote-12)) for the 26 GHz frequency band for the use of broadband MFCN applications (including 5G), as amended by Commission Implementing Decision (EU)2020/590,[[12]](#footnote-13) published in 2020 (hereinafter: Decision (EU) 2020/590). Decision (EU) 2020/590 added a specification for out-of-band emissions to the specifications for use, in line with the decisions taken at WRC-19.

Following the decision of the Radio Spectrum Committee (RSC) of 7 December 2016, based on the opinion of the RSPG of 9 November 2016[[13]](#footnote-14), the mandate[[14]](#footnote-15) issued by the European Commission to the CEPT[[15]](#footnote-16) (hereinafter: the CEPT mandate) identified the 32 GHz and 42 GHz frequency bands, which had to be assessed, as possible bands for 5G of frequency bands above 6 GHz, but are not among the pioneer bands. Based on WRC-19 preparatory studies, the CEPT did not support the introduction of 5G in the 32 GHz frequency band. As a result of WRC-19 decisions, the 32 GHz frequency band was not identified for IMT, so it is not expected to introduce 5G NR mobile systems in that frequency band in the near future. In the 26 GHz frequency band, existing backhaul networks should be redesigned and, where appropriate, moved to another frequency band in the near future while taking into account market demand. A good solution would be the 32 GHz frequency band[[16]](#footnote-17), which is similar to the 26 GHz frequency band in terms of its application, wave propagation characteristics and spectrum amount.

The public consultation of the NMHH held on 23 November 2017[[17]](#footnote-18) and on 13 December 2019[[18]](#footnote-19) also addressed issues related to the utilisation of the 26 GHz frequency band. During the previous public consultations, no claim was made by the market participants in connection with the use of this frequency band for mobile purposes; furthermore, it was considered premature to initiate a sales procedure in order to protect the existing use.

An important issue for the utilisation of the 26 GHz frequency band is also the possibility of putting into service for 5G the 26.5-27.5 GHz frequency band designated for non-civil purposes under the current legislation, which is not used in practice. The utilisation of the upper 1 GHz radio spectrum for 5G purposes requires information on both civil and non-civil needs. The possibility of allowing the existing use, as granted by Article 4 of Decision (EU) 2019/784, is currently being examined by the NMHH.

The NMHH is aware that the military application of the 5G technology has been officially studied within the framework of a NATO-funded project for a year, in which Hungary is also participating as an observer.

In order to implement Decision (EU) 2019/784 and Decision (EU) 2020/590, the NMHH completes the necessary legislative tasks in two phases. As the first phase of the implementation, the MFCN application was introduced into the legislation with planned status by amending the NFFF Decree. In the second phase of the implementation, a further NFFF Decree amendment (when the status of the whole or part of the frequency band with respect to MFCN use will be upgraded from ‘planned’ to ‘designated’) will be necessary, which will settle the conceptual issues necessary for the distribution of the frequency band, including the launch of the competitive procedure, as well as the regulatory solution for addressing local needs.

During the preparation of the draft amendment to the NFFF Decree sent for technical notification procedure[[19]](#footnote-20) in December 2021, the NMHH took further steps to facilitate the introduction of 5G. In the 24.25-24.5 GHz frequency band, the programme and news transmission application has been deleted and the relevant footnotes of the International Radio Regulations (RR[[20]](#footnote-21)) on the use of the 24.25-27.5 GHz frequency band for IMT have been included in line with the WRC-19 decision.

In the 26 GHz frequency band, the regulatory background for mobile use is almost complete, but an important element, i.e. the work related to the international coordination, has not yet been elaborated. The recommendation on international coordination is expected by mid-2022. Studies show that the co-existence of existing fixed service and potential future MFCN systems can cause compatibility issues. Co-existence can be ensured by using various mitigation techniques, but this would in any case reduce the amount of frequency that can be used and the geographical area covered, so it would be less efficient to use. In the event of the introduction of 5G, due to the increasing data transmission, dense deployment of base stations will be necessary, which implies a more significant use of the backhaul network links, therefore it is inevitable to provide another band.

Based on the above, the NMHH concluded that it is only possible to make the entire 26 GHz frequency band available to MFCN if we ensure the continuous operation of backhaul networks by allowing the use of another frequency band. It was confirmed by the stakeholders at former public consultations. Accordingly, the 32 GHz frequency band, for which the band-use conditions are defined in the NFFF Decree, has been designated for this purpose.

Considerations in the relevant CEPT Decision include the need for at least 800-1000 MHz worth of continuous user blocks per network operator to enable the full capability of IMT-2020/5G systems. The NMHH intends to limit the number of potential right holders and considers a competitive procedure justified, at least for a significant part of the band, with regard to the potential use of the 26 GHz frequency band, i.e. the operation of terrestrial systems capable of providing wireless broadband electronic communications services, in particular the planned 5G use, the ability to provide services nationwide and the amount of radio spectrum available. The number of licenses needs to be restricted in order to safeguard efficient use of spectrum. In addition, the NMHH considers it possible to satisfy local needs if there is a well-founded market demand, with the provision of other distribution methods.

Pursuant to Section 55/B (4) of the Electronic Communications Act[[21]](#footnote-22), the implementation of the Code enables the NMHH to authorize temporarily in the bands specified by decree of the President, for a period not exceeding three years, an alternative use of all or part of a radio spectrum, where there are entitlements to radio spectrum use, instead of the harmonized use of that spectrum. This will be subject to the condition that there no justified need for harmonised use is presented at the public consultation and that the intended use does not hinder the harmonised use of neighbouring Member States.

By holding a public consultation, the NMHH aims to find out about the plans and needs of the current right holders, and to assess the needs of those outside the current right holders. After studying the requirements, the NMHH decides on the possible and necessary regulatory steps.

1. Regulation of 26 GHz frequency band
	1. International regulation
		1. ITU

The international regulation is based on the Radio Regulations (RR) adopted by the ITU[[22]](#footnote-23), according to which in Region 1, which includes Europe, the frequency band 24.25-27.5 GHz is allocated, inter alia, ito fixed and mobile services on a primary basis, allowing the operation of MFCN systems in the whole band.

The RR allocation table is set out in Annex 1 to the NFFF Decree.

At WRC-15 it was decided to include in the agenda items of WRC-19 an investigation of the possibility of identifying higher frequency bands for IMT[[23]](#footnote-24) systems (WRC-19 agenda item 1.13). Within this context, the frequency bands that had to be studied during the WRC-19 preparation period, including the 26 GHz frequency band, were identified. According to the WRC-19 decision, the frequency band 24.25-25.25 GHz (which was not allocated to mobile service earlier in Region 1), has been allocated to mobile service, except aeronautical mobile service, on a primary basis and footnote 5.532AB has been entered in the RR for the whole frequency band 24.25-27.5 GHz. According to the footnote, the frequency band 24.25−27.5 GHz is identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. Resolution **242 (WRC-19)** shall apply. As a result, from an international regulatory perspective, it became possible to introduce 5G worldwide in the 24.25-27.5 GHz frequency band.

* + 1. CEPT
			1. CEPT regulation for existing fixed service systems

The following CEPT documents constitute the regulatory framework for the primary fixed service applications currently used in the 24.5-26.5 GHz frequency band. The national spectrum management requirements have been developed based on these. .

At the CEPT level, *Recommendation T/R 13-02[[24]](#footnote-25)* provides channel arrangement for digital fixed point-to-point systems in the 22-29.5 GHz frequency range. The Recommendation was last amended in May 2019 to allow the use of channels with a bandwidth of 224 MHz, which can be created by merging two adjacent channels with a bandwidth of 112 MHz each (in Hungary 112 MHz is the largest bandwidth that can be used).

*Recommendation* *ECC/REC/(11)01*[[25]](#footnote-26) sets out guidelines for the assignment of frequency blocks for fixed wireless point-to-multipoint systems in the frequency bands 24.5-26.5 GHz, 27.5-29.5 GHz and 31.8-33.4 GHz. This regulatory document states that:

* the size of the basic block is 28 MHz,
* based on this, the sizes of assigned frequency blocks may be multiples of 28 MHz,
* the size of the guard band between the assigned frequency blocks (for both FDD and TDD), and
* the way in which the frequency blocks can be used when different polarizations are used.
	+ - 1. CEPT regulation for planned MFCN systems

Regarding the use of future MFCN systems, the most important documents that form the basis of the regulation were adopted at CEPT level, and they provide the basis for the regulation required for the introduction of 5G NR systems.

* + - * 1. MFCN related decision

On the basis of the Commission’s mandate issued to CEPT[[26]](#footnote-27), the ECC/PT1 Working Group conducted investigations within CEPT, which resulted in the establishment of harmonised technical conditions for the use of 5G NR systems. It also studied the conditions for MFCN systems to be compatible with different applications currently operating in the band and adjacent bands, such as point-to-point, point-to-multipoint or satellite systems. In accordance with the Commission’s mandate, the final report was drawn up by June 2018 (CEPT Report 68[[27]](#footnote-28)) to the Commission. The specifications for making available and designation of the 26 GHz frequency band to MFCN systems (including 5G) and the relevant harmonised technical conditions are set out in Decision ECC/DEC/(18)06[[28]](#footnote-29) (amended twice, latest version 20.11.2020).

Key points of Decision ECC/DEC/(18)06:

* CEPT administrations shall designate, on a non-exclusive basis, the frequency band 24.25-27.5 GHz for MFCN systems, taking into account existing and future earth stations in the space research, Earth exploration-satellite and fixed-satellite service.
* CEPT administrations shall make available at least 1 GHz of spectrum by 2020 for MFCN systems, depending on market demand.
* Only TDD systems can be operated, with unpaired frequency arrangement.
* According to the harmonised frequency arrangement, blocks of 200 MHz can be assigned (smaller blocks that are multiplies of 50 MHz can be assigned for efficient use of the spectrum). For other uses, the blocks can be shifted in 10 MHz steps.
* The Block Edge Masks (BEM) and more detailed technical conditions are set out in Annex 2 to this Decision (the current version of the Decision sets out different values for out-of-band emissions in the 23.6-24 GHz frequency range).
* The use of high-density mobile service and Fixed Wireless Access (FWA) systems in the 22-23.6 GHz frequency band shall be avoided.
* The frequency band shall not be used for downlink transmission between a base station and an aircraft-based user station, and for uplink transmission it can only be used if studies show that coexistence with other services operating in the frequency band can be ensured.



Figure 1 Example of block distribution on the basis of harmonised band arrangement

* + - * 1. Compatibility with other services in the frequency band

First, compatibility with the different satellite systems were studied, and then additional studies began on coexistence with the fixed service systems used in the frequency band across Europe.

Space research and Earth exploration-satellite service

The results of the compatibility studies related to earth stations of the space research and Earth exploration-satellite service operating in the 26 GHz frequency band were published in Recommendation ECC/REC/(19)01[[29]](#footnote-30). This includes provisions on the definition of a protection zone to be applied to earth stations. The Recommendation sets out general principles and a specific calculation method for defining a protection zone around earth stations of the space research, GSO and NGSO Earth exploration-satellite services operating in the 25.5-27 GHz frequency band .

With regards to the national regulation, it should be noted that the frequency band 25.5-27 GHz is designated for applications of the Earth exploration-satellite (space-to-Earth) service and is planned for the applications of space research (space-to-Earth) service on a primary basis. Currently, no earth station is operating in the frequency band, but this does not exclude the possibility of possible future deployment, considering that the frequency band is planned for MFCN systems on a primary basis (or is expected to be designated in full or in part in the future) on the basis of Decisions (EU) 2019/784 and (EU) 2020/590. For the protection of earth stations of space research and Earth exploration-satellite services operating in the frequency band, the provisions of Articles 3 (b) and 5 of Decision (EU) 2019/784 and Decides 1 and 7 of Decision ECC/DEC/(18)06 shall be taken into account.

Fixed-satellite service

Recommendation ECC/REC/(20)01[[30]](#footnote-31) was published as a result of the studies related to earth stations of the fixed-satellite service, another. This Recommendation provides guidance on how to determine the protection zones to be used for earth stations operating in the 24.65-25.25 GHz frequency range, similarly as described in Recommendation ECC/REC/(19)01.

With regards to the national regulation, it should be noted that the frequency band 24.65-25.25 GHz is planned for applications of the fixed-satellite (space-to-Earth) service on a primary basis. Currently, due to its status, no earth station is operating in the frequency band, but this does not exclude the possibility of possible future deployment in the event of changing the status from planned to assigned, considering that the frequency band is planned for MFCN systems on a primary basis (or is expected to be designated in full or in part in the future) on the basis of Decisions (EU) 2019/784 and (EU) 2020/590. For the protection of earth stations of the fixed-satellite service operating in the frequency band, the provisions of Articles 3 (c) and 5 of Decision (EU) 2019/784 and Decides 1 and 7 of Decision ECC/DEC/(18)06 shall be taken into account.

Fixed service

With respect to compatibility with fixed service systems, ECC Report 303[[31]](#footnote-32) was adopted, which provides guidance on the techniques and calculation methods that can be used to avoid mutual interference of 5G mobile systems and existing fixed service systems. The report sets out general principles, but also includes specific calculations. Interference calculation largely depends on system parameters and deployment and wave propagation characteristics and therefore the material is suitable for guidance purposes. In a specific case, specific conclusions for national use may be drawn by taking into account the specific circumstances.

With regard to the coexistence of fixed service systems operating in the frequency band along with mobile service systems, the provisions of Article 4 of Decision (EU) 2019/784 and Decide 1 of Decision ECC/DEC/(18)06 shall be taken into account. According to the Decision, a solution should be found for the coexistence of the two systems on a national basis, and in support of this Report ECC 303 was prepared, which contains specific examples. It should be noted that, in general, this is a very intensively used frequency band within the CEPT, so that it is not possible for the two systems to coexist in many countries, especially where nationwide use is typical and geographical separation is difficult to implement. Frequency separation can also be problematic in the frequency range of 24.5-26.5 GHz, where traditional FDD fixed service systems operate in a paired band, while the planned mobile service 5G systems are TDD systems, thus their channel arrangements (unpaired arrangement and large channel bandwidths – typically 200 MHz and its multiples) are also different. For this reason, in many cases, the evacuation of the band is the only solution, which does not result in added complexity arising from the synchronization of the TDD 5G systems (both in the case of adjacent-channel and co-channel use in border areas).

* + - * 1. Synchronization

The ECC/PT1 Working Group conducted studies on the compatibility of planned TDD MFCN systems in the 26 GHz frequency band. ECC Report 307[[32]](#footnote-33) containing the results of the studies was adopted in March 2020. The figures in the report show well what separation distances are recommended for outdoor deployment for each synchronization option, for co-channel or adjacent-channel use. According to the report, the base stations do not necessarily need to be synchronized in case of indoor deployment, but the installation conditions may affect the interference situation. Compatibility between outdoor and indoor systems is largely dependent on building entry loss when not synchronised. The system parameters used in the studies (channel bandwidth, antenna height, antenna configuration, etc.) and other details (e.g. wave propagation model, simulation method) are included in the relevant chapters of the report.



Figure 2 Synchronization options for outdoor installation and co-channel use (source: ECC Report 307)



Figure 3 Synchronization options for outdoor installation and adjacent-channel use (source: ECC Report 307)

* + - * 1. Licensing issue

The least restrictive technical conditions (LRTC) associated with the use of the 26 GHz frequency band (24.25-27.5 GHz[[33]](#footnote-34)) for MFCN purposes were based on use subject to individual licensing, taking into account passive services in adjacent frequency bands. Various recommendations and reports on co-existence with the applications of other services operating in the frequency band have been drawn up, providing guidance on how to proceed if Member States wish to introduce MFCN systems in the frequency band alongside other existing applications. When adopting the Commission Implementing Decision containing harmonised band use conditions for MFCN systems at European level, the Commission also mandated the CEPT to study the use of authorisation regimes other than individual licensing.

Developed by the ECC/PT1 Working Group, ECC Report 317[[34]](#footnote-35) provides information to administrations on the conditions of co-existence with other services in the case of authorisation regimes other than the individual licensing procedure commonly applied in case of MFCN systems. A good overview of the authorisation regimes is provided with the table in ECC Report 132, the findings and results of which have been used in the development of ECC Report 317.

|  |  |
| --- | --- |
| Individual authorisation(Individual radio spectrum usage rights) | General authorisation(Not individual radio spectrum usage rights) |
| Individual licensing | Light-licensing | Licence-exempt |
| Individual frequency planning / coordination“Traditional licensing procedure” | Individual frequency planning / coordination Simplified licensing procedureNumber of frequency users is limited | No individual frequency planning / coordinationNotification and/or registration of stationsNo limitation on the number of users, no need for coordination | No individual frequency planning / coordinationNo notification nor registration of stations |

Table 1 Licensing regimes (source: ECC Report 132 [[35]](#footnote-36))

According to ECC Report 317, several authorisation regimes can be used in the 26 GHz band. Nationwide and local radio spectrum usage rights can be distributed through the “traditional” individual licensing method. In the latter case, the entitlement to radio spectrum use of the right holder is limited to a smaller area. In the case of light licensing, individual and general licences can be issued. In the former case, the number of licence holders is limited and frequency planning is necessary, while in the latter case these are not relevant, but the stations must be registered, which provides a kind of control over deployments. In unlicensed cases, stations operated in accordance with the prescribed rules cannot cause interference to, nor claim protection from other applications. The various licensing methods may also be combined within a band, either in frequency or in space, or depending on the type of applications in case of shared use.

* + 1. EU

The first document published by the European Commission on the regulation of future 5G systems is the CEPT mandate based on the RSPG’s opinion on 5G spectrum issues[[36]](#footnote-37), in which the Commission mandated the CEPT to study potential 5G frequency bands.

This document set out the following main tasks and deadlines for the CEPT:

* Review the technical conditions for the 3.4-3.8 GHz frequency band (5G pioneer band) for the applicability of 5G terrestrial wireless systems
* Study the 26 GHz (24.25-27.5 GHz) frequency band (5G pioneer band) with regard to compatibility between 5G systems and systems currently in use
* Develop new channel arrangement and conditions for the use of the band by 5G systems in the 26 GHz frequency band (by taking into account the protection of systems currently in operation)
* Develop conditions for the use of the band with respect to cross-border coordination

In response to the mandate for the 26 GHz frequency band, CEPT Report 68[[37]](#footnote-38) containing the results of the study was adopted on 6 July 2018.

CEPT Report 68 provided the basis for Decision (EU) 2019/784 [[38]](#footnote-39).

Key points of Decision (EU) 2019/784 as amended by Decision (EU) 2020/590:

* *Article 1:* This Decision harmonises the essential technical conditions for the availability and efficient use of the 24.25-27.5 GHz frequency band in the Union for terrestrial systems capable of providing wireless broadband electronic communications services.
* *Article 2:* By 30 March 2020, Member States shall designate and make available on a non-exclusive basis the 24.25-27.5 GHz frequency band for terrestrial systems capable of providing wireless broadband electronic communications services, in compliance with the essential technical conditions set out in the Annex.

Depending on the authorisation regime applied in this band, Member States shall analyse 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.

* *Article 3:* Member States shall ensure, in compliance with the relevant technical conditions in the Annex, that the terrestrial systems referred to in Article 1 appropriately protect:
	+ systems in adjacent bands, in particular in the Earth Exploration-Satellite Service (passive) and in the Radio Astronomy Service in the 23.6-24.0 GHz frequency band;
	+ earth stations in the Earth Exploration-Satellite Service and in the Space Research Service for space-to-earth communications operating within the 25.5-27.0 GHz frequency band;
	+ satellite systems for earth-to-space communications in the Fixed-Satellite Service operating within the 24.65-25.25 GHz frequency band;
	+ satellite systems for inter-satellite communications operating within the 24.45-24.75 GHz and 25.25-27.5 GHz frequency bands.
* *Article 4:* Member States may allow the continued operation of fixed links within the 24.25-27.5 GHz frequency band, if the terrestrial systems referred to in Article 1 can co-exist with such fixed links through managed shared spectrum use.

Member States shall regularly monitor the need for continuing the operation of fixed links referred to in the first subparagraph of this Article.

* *Article 5:* Under the condition that the number and locations of new earth stations are determined as not to impose disproportionate constraints on the systems referred to in Article 1, subject to market demand, Member States shall ensure, that the continued deployment of earth stations is made possible:
	+ in the Earth exploration-satellite service (space-to-earth) or in the Space Research Service (space-to-earth) within the 25.5-27.0 GHz frequency band;
	+ in the fixed-satellite service (earth-to-space), within the 24.65-25.25 GHz frequency band.
* *Article 6:* Member States shall facilitate cross-border coordination agreements to enable operation of the terrestrial systems referred to in Article 1, taking into account existing regulatory procedures and rights, as well as relevant international agreements.
* *Article 7:* Member States shall report to the Commission on the implementation of this Decision by 30 June 2020.
* *Article 8:* Member States shall monitor the use of the 24.25-27.5 GHz frequency band, including the progress on co-existence between the terrestrial systems referred to in Article 1 and other systems using the band, and report their findings to the Commission upon request or at their own initiative to allow a timely review of this Decision.

Article 54 of the Code[[39]](#footnote-40) provides for specific rules for the 5G frequency bands necessary for the coordinated timing of frequency assignments. Under the provisions of the Code, Member States shall, by 31 December 2020, take all appropriate measures for terrestrial systems capable of providing wireless broadband services, where necessary in order to facilitate the roll-out of 5G, to allow the use of at least 1 GHz of the 24.25-27.5 GHz band, provided that there is clear evidence of market demand and of the absence of significant constraints for migration of existing users or band clearance.

In addition, there are two regulatory documents related to automotive radars in force in the EU legislation, which indirectly affect the current use. These two EU regulations are Commission Decision *2005/50/EC* and the amending Commission Implementing Decision *2011/485/EU*, which relate to the time-limited use of automotive short-range radar equipment in the 24 GHz frequency band (for more details see Chapter 7).

* 1. National regulation
		1. Current regulation and use

In the frequency band 24.25-27.5 GHz, the use of each application is permitted in accordance with Annex 2 to the NFFF Decree. Considering the draft amendment to the NFFF Decree under technical notification[[40]](#footnote-41), the regulation and the actual use are described below, broken down by sub-bands.

* The 24.25-24.5 GHz frequency band was designated for news and broadcasting applications on a primary basis, however, such use is not typical in Hungary, and there is no actual use in this frequency band, so the application has been removed from the frequency band, facilitating the subsequent introduction of MFCN systems.
* The 24.5-26.5 GHz frequency band is designated for civil fixed service systems on a primary basis (point-to-point and point-to-multipoint). As a result of the competitive procedure, there is a significant nationwide use base on block management.
* In addition to satellite applications not used in Hungary, the 26.5-27.5 GHz frequency band is designated for non-civil mobile and fixed service applications.[[41]](#footnote-42) Based on the public NJFA, aeronautical, land and maritime military systems can operate in the 25.25-27.5 GHz frequency band and land military systems in the 26.5-27.5 GHz frequency band. In addition, other non-civil (but non-military) single- and two-frequency mobile and digital point-to-point systems may also operate. Currently, there is no valid radio licence in the 26.5-27.5 GHz frequency band. The military application of the 5G technology has been officially studied within the framework of a NATO-funded project for a year, in which Hungary is also participating, for the time being as an observer. This is also an indication of the military interest in 5G among NATO Member States, so in the future some military plans in NATO Member States, including Hungary, may use the frequency band or part of it for military 5G purposes. However, there is still no concrete information on this. For non-civil uses in the 26.5-27.5 GHz frequency range, “radio spectrum usage right may be obtained after the harmonisation of the civil and non-civil radio spectrum management aspects, taking into account Decision (EU) 2019/784”.
* The 24.5-27.5 GHz frequency band is designated and planned for various satellite applications, but these are typically not used in Hungary, and there is currently no actual use.
* In the context of the preparation of making available the frequency band for 5G systems, the “terrestrial systems capable of providing wireless broadband electronic communications services” were included in the table of Annex 2 to the NFFF Decree as planned fixed and mobile service application in the entire 24.25-27.5 GHz frequency band on a primary basis, together with the referenced relevant documents (EU) 2019/784 and (EU) 2020/590 (included in the draft amendment to the NFFF Decree) and Decision ECC/DEC/(18)06.
* In addition, some of the short-range devices may be used on a tertiary basis. These devices shall operate at low power and cannot, by virtue of their tertiary nature, claim protection nor cause harmful interference to primary and secondary services (for additional information on automotive radars see Chapter 6).
	+ 1. Current conditions of using the 24.5-26.5 GHz band

**The conditions and spectrum management requirements of the 26 GHzband fixed digital point-to-point and digital point-to-multipoint systems are shown below, based on the NFFF Decree in force.**

Sub-bands of the 24.5-26.5 GHz frequency band:

* 24,500–24,549 MHz: lower guard band
* 24,549–25,445 MHz: lower block band
* 25,445–25,557 MHz: middle guard band
* 25,557–26,453 MHz: upper block band
* 26,453–26,500 MHz: upper guard band

The guard bands cannot be distributed.

In the case of an FDD system, the lower and upper block bands are divided into 32 28 MHz basic blocks and the duplex spacing is 1008 MHz. It is also possible to use a TDD system, the detailed rules for which are included in Annex 3 of the NFFF Decree. In fact, TDD systems are not used by operators in the frequency band. User blocks are created by merging of basic blocks. User blocks has been separated by guard band of one basic block (28 MHz) in accordance with Recommendation ECC/REC/(11)01 (in which the compatibility between point-to-multipoint systems was specifically studied) in order to avoid adjacent block interference, which can be an important factor when point-to-multipoint systems are operated, where sectoral transmitters are used (for point-to-point systems, the likelihood of interference due to concentrated line emission is low).

An electronic communications service may be provided in the frequency band, or the frequency band may be used for electronic communications infrastructure purposes. Entitlement to radio spectrum use could be obtained during a competitive procedure, which is nationwide, and the method of spectrum management is block management. The amount of spectrum that can be acquired is limited; an operator may acquire entitlement radio spectrum use for up to six basic blocks.

For point-to-multipoint systems in the 26 GHz frequency band, the central station → user station, central station → repeater station and repeater station → user station transmission paths can be used in the lower block band, while the reverse paths can be used in the upper block band.

The detailed rules for the maximum transmit power values that can be used by the stations and the interference between two stations in adjacent blocks are included in Annex 3 of the NFFF Decree.

1. Current use of the 24.5-26.5 GHz frequency band

Current entitlements to radio spectrum use are listed in the following table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **RIGHT HOLDER** | **BASIC BLOCK** | **LOWER BAND** | **UPPER BAND** | **ENTITLEMENT EXPIRES ON** |
| AVAILABLE | Basic block 1 |  |  |  |
| AVAILABLE | Basic block 2 |  |  |  |
| AVAILABLE | Basic block 3 |  |  |  |
| **Magyar Telekom Nyrt.** | Basic block 4 | 24633-24661 | 25641-25669 | *5 April 2027* |
| Basic block 5 | 24661-24689 | 25669-25697 |
| GUARD BAND | Basic block 6 | 24689-24717 | 25697-25725 |  |
| **Telenor Magyarország Zrt.[[42]](#footnote-43)** | Basic block 7 | 24717-24745 | 25725-25753 | *5 April 2027* |
| Basic block 8 | 24745-24773 | 25753-25781 |
| Basic block 9 | 24773-24801 | 25781-25809 |
| Basic block 10 | 24801-24829 | 25809-25837 |
| GUARD BAND | Basic block 11 | 24829-24857 | 25837-25865 |  |
| **–** | Basic block 12 | 24857-24885 | 25865-25893 |  |
| **–** | Basic block 13 | 24885-24913 | 25893-25921 |
| **Antenna Hungária Zrt.** | Basic block 14 | 24913-24941 | 25921-25949 | *5 April 2027* |
| Basic block 15 | 24941-24969 | 25949-25977 |
| Basic block 16 | 24969-24997 | 25977-26005 |
| Basic block 17 | 24997-25025 | 26005-26033 |
| GUARD BAND | Basic block 18 | 25025-25053 | 26033-26061 |  |
| **Vodafone Magyarország Zrt.** | Basic block 19 | 25053-25081 | 26061-26089 | *5 April 2027* |
| Basic block 20 | 25081-25109 | 26089-26117 |
| Basic block 21 | 25109-25137 | 26117-26145 |
| Basic block 22 | 25137-26165 | 26145-26173 |
| Basic block 23 | 25165-25193 | 26173-26201 |
| Basic block 24 | 25193-25221 | 26201-26229 |
| GUARD BAND | Basic block 25 | 25221-25249 | 26229-26257 |  |
| **Magyar Telekom Nyrt.** | Basic block 26 | 25249-25277 | 26257-26285 | *5 April 2027* |
| Basic block 27 | 25277-25305 | 26285-26313 | *15 May 2024* |
| Basic block 28 | 25305-25333 | 26313-26341 |
| Basic block 29 | 25333-25361 | 26341-26369 |
| GUARD BAND | Basic block 30 | 25361-25389 | 26369-26397 |  |
| **Digi Kft.** | Basic block 31 | 25389-25417 | 26397-26425 | *5 April 2027* |
| Basic block 32 | 25417-25445 | 26425-26453 |

The entitlement to radio spectrum use for basic blocks 12 and 13 expired in 2019, the right holder (Antenna Hungária Zrt.) did not opt for a 5-year extension, therefore these two basic blocks are currently not distributed, i.e. empty. The entitlement to radio spectrum use for basic blocks 27-29 of Magyar Telekom Nyrt. was also to be expired in 2019, which was extended by 5 years, so the relevant licence expires in 2024. The remaining entitlements to radio spectrum use will expire in 2027.

Current entitlements to radio spectrum use are distributed among the right holders with the following spectrum quantities:

* Magyar Telekom Nyrt.: 2×168 MHz in total, of which 2×84 MHz will expire in 2024.
* Telenor Magyarország Zrt.: 2×112 MHz
* Vodafone Magyarország Zrt.: 2×168 MHz
* Antenna Hungária Zrt.: 2×112 MHz
* Digi Kft.: 2×56 MHz
1. National regulatory plans

The Code and Decision (EU) 2019/784 are the Union acts that have a fundamental impact on the regulation of future use. In accordance with the Union legislation, the 24.25-27.5 GHz frequency band should be designated and made available for terrestrial systems capable of providing wireless broadband electronic communications services, on a non-exclusive basis, and the use of at least 1 GHz of the frequency band should be possible, provided that there is clear evidence of market demand and that there is no significant constraint on the migration of existing use or release of the frequency band. Among the implementation tasks of the Member States, the codification of legislation is not sufficient, but the review of existing rights of use for radio spectrum and the assessment of market needs are also required steps. The NMHH is currently studying the possibilities and ideas of the current radio spectrum users, as well as the needs of those interested, their substantiation, the plans already formulated and the possibilities of implementation. If there is a market demand for the introduction of terrestrial systems capable of providing wireless broadband electronic communications services, the NMHH will study, in the light of existing usage and the ideas related thereto, how the needs relate to the amount of radio spectrum available and will compare this to the expiry date of the rights.

Pursuant to Section 55/B (4) of the Electronic Communications Act, the implementation of the Code enables the NMHH to authorize temporarily in the frequency bands specified by decree of the President, for a period not exceeding three years, an alternative use of all or part of a radio spectrum (including the use of existing bands), where there are rights of use for radio spectrum, instead of the harmonized use of that spectrum. Licensing for alternative use shall be subject to the condition that:

a) a public consultation is held in the interest of a forward-looking assessment of market demand for radio spectrum usage, and there is a lack of market demand for the harmonized use of that radio spectrum; and

b) said alternative use of that radio spectrum does not prevent harmonized use in other Member States.

In the light of the Union’s obligations and market needs for 5G systems, it is necessary to make available another technically appropriate frequency band other than the 26 GHz band for migration of existing systems, which can ensure the continued operation of the backhaul network links. The 32 GHz frequency band has been identified for this purpose. The technical conditions for the planned use of the 32 GHz frequency band have already been published in the NFFF Decree and further details of the planned competitive procedure are already included in the draft amendment to the NFFF Decree, which is currently undergoing technical notification procedure.

Different sub-bands of the 26 GHz frequency band can be used to various degrees to meet future 5G spectrum needs.

* 1. 24.25-24.5 GHz band

Considering that this sub-band is currently not used and is not expected to be used differently from the MFCN in the future, the use of this frequency range of 250 MHz by 5G systems can still be made available.

* 1. 24.5-26.5 GHz band

Where the 24.5-26.5 GHz frequency band becomes available for next-generation MFCN systems, a different frequency band for backhaul network links must be provided for fixed service systems operating on the basis of current entitlements, which:

* is not currently in use, so no compatibility issues need to be considered,
* is suitable for the use of high-capacity fixed service systems, harmonised technical conditions for the use of the frequency band and channel arrangement are available,
* wave propagation characteristics are similar to those of the 26 GHz frequency band (planning can be made with similar link lengths),
* has a continuous spectrum volume similar to that of the 26 GHz frequency band,
* systems can be operated in the framework of block management,
* high-capacity devices capable of serving next-generation base stations are available on the market.

A given quantity of backhaul network links may be transferred to other microwave frequency bands or replaced by optical connection, but this is not always possible, so it is necessary to make a new frequency band available.

* + 1. Possibility of replacing 24.5-26.5 GHz frequency band systems

The 32 GHz frequency band is the most appropriate of the possible frequency bands that meet the above conditions. The frequency band of 28 GHz also came up as an option, but that frequency band is less suitable because it is segmented (some parts available for fixed-satellite service and others for fixed-service systems), which does not allow contiguous spectrum use, band distribution, and only about 1 GHz of spectrum is available for fixed-service applications (including both halves of the paired band).

The 32 GHz frequency band is currently designated for fixed point-to-point and point-to-multipoint systems based on Recommendation ERC/REC/(01)02. Accordingly, the band usage rules are included in the relevant part of the NFFF Decree. The frequency band is also designated for common use ofairport surface detection equipment (ASDE) operating under radar navigation service, but there is no practical use of this kind of application in either civil or non-civil areas. In addition, the 31.8-32.3 GHz band is planned for space research (deep space, space-to-Earth), but such use is not expected in Hungary in the near future. Harmonised technical conditions at CEPT level and channel arrangement rules are available in Recommendation ERC/REC/(01)02, which are already included in the NFFF Decree. **Detailed information on the 32 GHz frequency band is included in the 32 GHz band overview.**

* + 1. Making the 24.5-26.5 GHz band partially available for MFCN purpose

Considering the current entitlements and band distribution, different options are available. The first user block in the lower part of the frequency band starts at 24,633 MHz, which means that 133 MHz free spectrum is available in the lower part of the paired (FDD) 24.5-26.5 GHz frequency band. By transforming the lower free band into an unpaired arrangement and merging it with the 24.25-24.5 GHz band below it, a contiguous TDD spectrum of 383 MHz may be created. A certain amount of it should be used as a guard band for frequency separation due to the adjacent FDD user block if the use of spatial separation or other mitigation techniques do not provide sufficient protection for the smooth operation of systems of different types and modes. It may also be possible to group a user block with entitlements to frequency usage expiring in 2024 in the frequency band by replacing user blocks with different expiry dates and band rearrangements. As a result, after 2024 there would be a large, contiguous unused radio spectrum available for TDD use (spectrum separation considerations should also be taken into account in this case).

* 1. 26.5-27.5 GHz band

This band is currently designated for non-civil purposes and is currently NATO-harmonised[[43]](#footnote-44). For non-civil uses in the 26.5-27.5 GHz frequency range, the radio spectrum usage right may be obtained after the harmonisation of the civil and non-civil radio spectrum management aspects. Under the current rules and pursuant to Decision (EU) 2019/784, the 26.5-27.5 GHz band is planned for civil use. The future use of the band also depends on consultations with the non-civil side and plans for non-civil use.

On the basis of Union obligations, Member States must allow for the use of at least 1 GHz of the 26 GHz frequency band by 31 December 2020 in order to facilitate the deployment of 5G networks where there is a justified market demand. This upper 1 GHz band offers a solution to meet the EU’s obligation, as it is currently not in use. However, this issue must also be treated with extreme caution, since if we were to divide this quantity before the assessment/emergence of the actual needs, and then make arrangements for the whole band later, it might not be optimal for the market. We start from the assumption that an operator actually needs 800-1000 MHz to provide good quality 5G service. In this case, the distribution of 1 GHz can provide two paths:

* by creating a larger contiguous block, a single right holder can acquire radio spectrum in the first round and implement really good 5G service for a single operator, or
* by creating more user blocks with lower acquired spectrum maximum quantitative values, more right holders may appear in the first round, that is, user blocks are smaller than optimal, and then at a later date, in a second round, the whole 26 GHz frequency band will be available with 5G, thus solving the quantitative issue, but then a band rearrangement will be necessary to form larger contiguous blocks.

Another issue is the subsequent compensation of non-civil claims from the remaining 2 GHz.

An important issue for the utilisation of the frequency band is the size of user blocks and what real market needs need to be considered. During the utilisation of the band for 5G purposes, it is also important to avoid the need to rearrange the band shortly after it is put into use, so the needs, professional and user aspects and authorisation regimes must be assessed before the detailed regulation is established.

* 1. Regulatory steps

Detailed regulatory steps related to the utilisation of the 26 GHz frequency band for mobile purposes (amendment to the NFFF Decree, preparation of documentation in case of a competitive procedure) may be taken after the needs have been assessed and the necessary policy and conceptual decisions have been taken, taking into account the following aspects:

* detailed definition of technical conditions by taking into account international regulatory results,
* determine the authorisation regime (as exempted from individual licence, light licensing, first-come, first-served sale or competitive procedure) for the whole or parts of the 26 GHz frequency band in a uniform or different way, and
* regulation of the conditions for obtaining radio spectrum usage right (e.g. minimum, maximum acquisition rules, allowing band rearrangement, secondary trade rules).
1. International coordination
	1. Radio spectrum usage for current fixed use in cross-border regions

Current coordination agreements related to the 24.5-26.5 GHz frequency band based on preferred frequency blocks only apply to FDD point-to-point and point-to-multipoint fixed service systems.

For the 24.549–25.053/25.557–26.061 GHz FDD subbands (basic blocks 1-18), Hungary has concluded international coordination agreements (so-called preferred block agreements) with all neighbouring countries.

The cross-border use of the block range 1-18 may be restricted by the preferred block agreement in the event of the introduction of 5G if the continued operation of fixed networks in a neighbouring country is expected. There is no preferred block agreement with neighbouring countries for basic blocks 19-32; in this frequency band the stations should be coordinated individually if necessary.

* 1. International frequency coordination for future use

A recommendation on cross-border coordination related to TDD networks operating in the 26 GHz frequency band is being developed within the CEPT ECC/PT1 Working Group for the use of MFCN systems in the cross-border region. According to the adopted work programme, the planned target date for the publication of the recommendation containing instructions for international coordination and synchronization configurations is July 2023.

In order to ensure the operation of MFCN systems in the border area, new coordination agreements will need to be concluded with neighbouring countries for the use of 5G systems at the border area in the future, taking into account the different synchronisation cases.

1. Potential sources of interference

Automotive radars mounted on motor vehicles may operate in the 24 GHz frequency band on the basis of Commission Decision *2005/50/EC*[[44]](#footnote-45) and the amending Implementing Decision *2011/485/EU*[[45]](#footnote-46).

Pursuant to Commission Implementing Decision *2011/485/EU*, automotive radars could be placed on the market until 1 January 2018 in the 24.25-26.65 GHz frequency band (see Article 1 (1)). However, short-range radars (SRRs) mounted on motor vehicles for which type approval application has been submitted pursuant to Article 6(6) of Directive 2007/46/EC of the European Parliament and of the Council[[46]](#footnote-47) and has been granted before 1 January 2018, this 1 January 2018 deadline shall be extended by four years (Article 1(2)(c)). Accordingly, no new motor vehicles equipped with radar operating in the 24 GHz frequency band may be placed on the market from 2022, but devices which have been mounted by the factory or mounted in place of such original equipment in vehicles registered, placed on the market or put into service in the Community before that date may still be used. In other words, these devices can be operated until the lifetime of the motor vehicles equipped with 24 GHz automotive radar Given their low level of use at the moment, no significant interference is to be expected.

These radars have broadband emissions, which cover the entire 26 GHz frequency band, but any interference in the upper part of the 26 GHz frequency band is significantly reduced even in the case of direct emission.

The interference caused by motor vehicle radars to fixed service systems has been previously examined, the results of which are contained in ECC Report 023[[47]](#footnote-48).

1. Radio spectrum fees

The method of calculation for regular radio spectrum fees is prescribed by Decree 1/2011 (III.31.) NMHH on frequency reservation and usage fees (hereinafter: Fees Decree). Pursuant to the NFFF Decree, the right holder acquiring radio spectrum rights shall pay a monthly band fee, in the case of radio spectrum for service purposes acquired as a result of a competitive procedure, as a result of the extension of the entitlement to radio spectrum usage, or as a result of the renewal of the entitlement to radio spectrum usage, and resold after acquisition, during the term of the entitlement to radio spectrum usage, starting from the earliest date of the validity of the radio licence determined in Section 22(3) of Decree 4/2011 (X. 6.) NMHH on the Rules of Auctioning and Tendering to Acquire Entitlements to Frequency Usage.

The calculation method of the band fee payable is set out in Section 20 entitled “Fees payable for bands within the scope of block management” and in Annex 9 of the fee Decree. For the determination of the band fee, the unit fee shall be multiplied by the sum of bands sold and acquired, expressed in kHz, and the band multiplier. In the case of duplex band, both parts of the band must be taken into account when determining the volume of band sold and acquired.

The factors determining the current band fee for the 24.5-26.5 GHz frequency band are defined on the basis of the current fixed use as follows:

* for national band use, the band multiplier for the 24.5-26.5 GHz frequency band is 0.002
* unit fee for rights acquired before 15 March 2019: HUF 7500/kHz/month; in the case of rights acquired through sales after 15 March 2019: 6500 HUF/kHz/month

The current Fees Decree does not contain provisions on the fees payable for the entire 26 GHz frequency band. For the 24.25-24.5 GHz and 26.5-27.5 GHz bands, in the case of the introduction of MFCN, including 5G, it is necessary to determine the fee payable, taking into account the method of licensing and the nature of use. If there is a change in the method of use in the 24.5-26.5 GHz band currently used for fixed service, i.e. it becomes available for 5G systems, the current band usage fee should also be revised.

1. MFCN: Mobile/Fixed Communications Network [↑](#footnote-ref-2)
2. NR: New Radio [↑](#footnote-ref-3)
3. The Authority published a tender notice on 22 October 2008 for the entitlements to radio spectrum use related to microwave radio transmission systems (26 GHz) and declared it effective on 30 April 2009. [↑](#footnote-ref-4)
4. The Authority launched an *ex officio* tender procedure for the entitlements to radio spectrum use of the basic blocks of the 26 GHz frequency band by means of a notice published on 7 November 2011, which was declared effective by a decision in February 2012. [↑](#footnote-ref-5)
5. RSPG: Radio Spectrum Policy Group (The Radio Spectrum Policy Group (RSPG), established by Commission Decision 2002/622/EC of 26 July 2002 establishing a Radio Spectrum Policy Group, is an advisory group dealing with European strategic issues of the radio spectrum.) [↑](#footnote-ref-6)
6. <http://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion_5G.pdf> [↑](#footnote-ref-7)
7. <https://digital-strategy.ec.europa.eu/en/library/radio-spectrum-cept-mandates>

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 [↑](#footnote-ref-8)
8. CEPT: Conférence européenne des Administrations des postes et des télécommunications – European Conference of Postal and Telecommunications Administrations (CEPT) [↑](#footnote-ref-9)
9. Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code (OJ L 321, 17.12.2018, p. 36). [↑](#footnote-ref-10)
10. (EU) 2019/784: Commission Implementing Decision (EU) 2019/784 of 14 May 2019 on harmonisation of the 24,25-27,5 GHz frequency band for terrestrial systems capable of providing wireless broadband electronic communications services in the Union [↑](#footnote-ref-11)
11. BEM: Block Edge Mask [↑](#footnote-ref-12)
12. (EU) 2020/590: amending Decision (EU) 2019/784 as regards an update of relevant technical conditions applicable to the 24,25–27,5 GHz frequency band [↑](#footnote-ref-13)
13. <http://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion_5G.pdf> [↑](#footnote-ref-14)
14. <https://digital-strategy.ec.europa.eu/en/library/radio-spectrum-cept-mandates> [↑](#footnote-ref-15)
15. European Conference of Postal and Telecommunications Administrations (CEPT), [↑](#footnote-ref-16)
16. A separate band description has been prepared for the 32 GHz frequency band, where a detailed description can be found. [↑](#footnote-ref-17)
17. <http://nmhh.hu/esemeny/207926/Nyilvanos_meghallgatas_a_mobil_halozatok_uzemeltetesere_alkalmas_frekvenciasavok_hasznositasaval_kapcsolatos_szakmai_kerdesekre> [↑](#footnote-ref-18)
18. <https://nmhh.hu/esemeny/207926/Nyilvanos_meghallgatas_a_mobil_halozatok_uzemeltetesere_alkalmas_frekvenciasavok_hasznositasaval_kapcsolatos_szakmai_kerdesekre> [↑](#footnote-ref-19)
19. Procedure under Directive (EU) 2015/1535, procedure for notification of draft legislation with technical content [↑](#footnote-ref-20)
20. RR: Radio Regulations [↑](#footnote-ref-21)
21. Electronic Communications Act: Act C of 2003 on Electronic Communications [↑](#footnote-ref-22)
22. ITU: International Telecommunications Union [↑](#footnote-ref-23)
23. IMT: International Mobile Telecommunications [↑](#footnote-ref-24)
24. T/R 13-02: Preferred channel arrangements for fixed service systems in the frequency range 22.0 - 29.5 GHz [↑](#footnote-ref-25)
25. ECC/REC/(11)01: Guidelines for assignment of frequency blocks for fixed wireless systems in the bands 24.5-26.5 GHz, 27.5-29.5 GHz and 31.8-33.4 GHz [↑](#footnote-ref-26)
26. <https://digital-strategy.ec.europa.eu/en/library/radio-spectrum-cept-mandates> [↑](#footnote-ref-27)
27. CEPT Report 68: Report B from CEPT to the European Commission in response to the Mandate “to develop harmonised technical conditions for spectrum use in support of the introduction of next-generation (5G) terrestrial wireless systems in the Union”: Harmonised technical conditions for the 24.25-27.5 GHz ('26 GHz') frequency band [↑](#footnote-ref-28)
28. ECC/DEC/(18)06: Harmonised technical conditions for Mobile/Fixed Communications Networks (MFCN) in the band 24.25-27.5 GHz [↑](#footnote-ref-29)
29. ECC/REC/(19)01: Technical toolkit to support the introduction of 5G while ensuring, in a proportionate way, the use of existing and planned EESS/SRS receiving earth stations in the 26 GHz band and the possibility for future deployment of these earth stations [↑](#footnote-ref-30)
30. ECC/REC/(20)01: Guidelines to support the introduction of 5G while ensuring, in a proportionate way, the use of existing and planned FSS transmitting earth stations in the frequency band 24.65-25.25 GHz and the possibility for future deployment of these earth stations [↑](#footnote-ref-31)
31. ECC Report 303: Guidance to administrations for Coexistence between 5G and Fixed Links in the 26 GHz band ("Toolbox") [↑](#footnote-ref-32)
32. ECC Report 307: Toolbox for the most appropriate synchronisation regulatory framework including coexistence of MFCN in 24.25-27.5 GHz in unsynchronised and semi-synchronised mode [↑](#footnote-ref-33)
33. LRTC: Least Restrictive Technical Conditions [↑](#footnote-ref-34)
34. ECC Report 317: Additional work on 26 GHz to address spectrum use under authorisation regimes other than individual rights of use: Technical toolkit to assist administrations [↑](#footnote-ref-35)
35. ECC Report 132: Light licensing, licence-exempt and commons [↑](#footnote-ref-36)
36. <http://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion_5G.pdf> [↑](#footnote-ref-37)
37. CEPT Report 68: Report B from CEPT to the European Commission in response to the Mandate “to develop harmonised technical conditions for spectrum use in support of the introduction of next-generation (5G) terrestrial wireless systems in the Union” Harmonised technical conditions for the 24.25-27.5 GHz ('26 GHz') frequency band [↑](#footnote-ref-38)
38. (EU) 2019/784: Commission Implementing Decision (EU) 2019/784 of 14 May 2019 on harmonisation of the 24,25-27,5 GHz frequency band for terrestrial systems capable of providing wireless broadband electronic communications services in the Union [↑](#footnote-ref-39)
39. Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code (hereinafter referred to as: Code) [↑](#footnote-ref-40)
40. Procedure under Directive (EU) 2015/1535, procedure for notification of draft legislation with technical content [↑](#footnote-ref-41)
41. Public NJFA (2016): NATO Joint Civil/Military Frequency Agreement (2014), Extract for Public Disclosure (2016) [↑](#footnote-ref-42)
42. Yettel as of 1 March 2022. [↑](#footnote-ref-43)
43. NJE refers to the military harmonisation among NATO Member States in the NFFF Decree (the current harmonised military band, Annex 2 to the NFFF Decree). [↑](#footnote-ref-44)
44. 2005/50/EC: Commission Decision of 17 January 2005 on the harmonisation of the 24 GHz range radio spectrum band for the time-limited use by automotive short-range radar equipment in the Community [↑](#footnote-ref-45)
45. 2011/485/EU: Commission Implementing Decision of 29 July 2011 amending Decision 2005/50/EC on the harmonisation of the 24 GHz range radio spectrum band for the time-limited use by automotive short-range radar equipment in the Community [↑](#footnote-ref-46)
46. 2007/46/EC: Directive 2007/46/EC of the European Parliament and of the Council of 5 September 2007 establishing a framework for the approval of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles [↑](#footnote-ref-47)
47. ECC Report 023: Compatibility of automotive collision warning Short Range Radar operating at 24 GHz with FS, EESS and Radio Astronomy [↑](#footnote-ref-48)