
Band introduction

2600 MHz frequency band

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Summary

The 2500–2690 MHz frequency band (hereinafter referred to as the '2600 MHz frequency band') consists of a frequency division duplex (FDD¹) access paired frequency range (2500–2570/2620–2690 MHz) and a time division duplex (TDD²) access unpaired frequency range (2570–2620 MHz). In the tender procedure carried out in 2014, the National Media and Infocommunications Authority (hereinafter referred to as the NMHH) awarded radio spectrum usage rights for the entire FDD band and for the 2575–2600 MHz sub-band in the available TDD frequency range (2575–2615 MHz). Following public hearings and competitive procedures held after the awarding procedure in 2014, there was no interest in the remaining 2600–2615 MHz frequency range.

As a result of the technological development since 2014 and the changes in the related technical requirements, the technical conditions for the use of new generation systems have been incorporated into the Hungarian regulations in line with international regulations. Thus the use of active antenna systems has been enabled in the 2600 MHz frequency band, and the use of supplemental downlinks (SDL³) has been made possible in the 2575–2615 MHz frequency range, in addition to TDD mode. At this hearing, in view of the more flexible radio spectrum usage conditions and the increasing demand from new generation networks for spectrum, we will reassess the needs for the previously ungranted 15 MHz unpaired frequency range.

¹ FDD: Frequency Division Duplex

² TDD: Time Division Duplex

³ SDL: Supplemental Downlink

1. Introduction

Since the 2600 MHz frequency band is suitable for the deployment of broadband access networks in densely populated built-in areas, it can be used, in terms of service provision, as a complementary band for the 700 and 800 MHz broadband access systems with high coverage. The tender procedure, which included the 2600 MHz frequency band, was carried out by the NMHH in 2014. In the procedure for the frequency use entitlements related to broadband services launched on 22 May 2014, the entire spectrum of the paired frequency range was allocated, while 1 user block of the unpaired frequency range was awarded from the 2575–2600 MHz (5x5 MHz, i.e. 25 MHz, unpaired) frequency range⁴.

Following the 2014 tender, the NMHH held public hearings⁵ in 2017, and subsequently in 2019 and 2022, to assess market needs, at which market players were able to express their views on, among other things, the needs for the remaining 2600–2615 MHz (3x5 MHz, i.e. 15 MHz) unpaired radio spectrum in the 2600 MHz frequency band. During the public hearings held, no market player has expressed interest in using the 2600 MHz unpaired frequency range⁶.

In the ex officio auction procedure initiated by the NMHH Office on 18 July 2019 concerning frequency use entitlements supporting the introduction of 5G and related to further wireless broadband services, radio spectrum usage rights in the 2500–2690 MHz frequency band were also available to acquire, but the NMHH did not select a winner in the auction due to a lack of applicants.

Therefore, the 2600–2615 MHz (3x5 MHz, i.e. 15 MHz) unpaired radio spectrum is still unused, allowing for the acquisition of radio spectrum usage rights to operate TDD systems and supplemental downlinks, in line with emerging needs.

⁴ https://nmhh.hu/dokumentum/164404/uf_1579288_2014_hatarozat_frekvenciapalyazat.pdf

⁵ https://nmhh.hu/esemeny/190542/Nyilvanos_meghallgas_a_VHF_III_es_az_UHF_sav_hasznositasarol_szolo_nemzeti_utenyterv_vegrehajasaval_osszefuggo_feladatokrol

⁶ https://nmhh.hu/cikk/191649/Osszefoglalo_a_VHF_III_es_az_UHF_sav_hasznositasarol_szolo_nemzeti_utenyterv_vegrehajasaval_osszefuggo_feladatokrol

2. Regulation of the 2600 MHz frequency band

2.1. International regulation

2.1.1. ITU

International regulation is based on the Radio Regulations (hereinafter referred to as the 'RR'⁷) adopted by the ITU⁸. According to the RR, in Region 1, which includes Europe, the 2500–2690 MHz frequency band is allocated to, inter alia, fixed and mobile services on a primary basis, with the possibility to operate MFCN⁹ systems in the entire frequency band.

Annex 1 of the NFFF¹⁰ contains the international allocation according to the RR.

According to RR Footnote 5.384A, the 2500–2690 MHz frequency band or parts thereof are intended for use by administrations wishing to implement international mobile telecommunications (IMT) in accordance with Resolution 223 (Rev.WRC-15). This provision does not preclude the use of these frequency bands by any application of the services to which they have been allocated, nor does it establish priority in the RR. (WRC-15).

2.1.2. CEPT¹¹

The harmonised rules for the use of MFCN applications operating in the 2600 MHz frequency band are set out in ECC/DEC/(05)05¹², the latest version of which, including substantial amendments, was adopted on 5 July 2019 (only a corrected non-technical version was published on 4 March 2022). The NMHH implemented the decision and incorporated rules and technical conditions, including requirements for active antenna systems, into the NFFF.

The coordination principles for the cross-border use of MFCN systems operating in the 2600 MHz frequency band have been set out in ECC/REC/(11)05¹³ to ensure equal access to radio spectrum for neighbouring countries and, where possible, the interference free operation of stations. The most recent version of the Recommendation¹⁴ does not currently include requirements for active antenna systems (there are no plans to revise the Recommendation in this regard), but it does provide detailed guidance on different synchronisation scenarios for FDD systems operating in the paired frequency range and TDD systems operating in the unpaired frequency range.

⁷ RR: Radio Regulations

⁸ ITU: International Telecommunications Union

⁹ MFCN: Mobile/Fixed Communication Networks

¹⁰ NMHH Decree 7/2015 (XI. 13.) on the national frequency allocation and on the rules of using frequency bands

¹¹ CEPT: European Conference of Postal and Telecommunications Administration

¹² ECC Decision (05)05: Harmonised utilization of spectrum for Mobile/Fixed Communications Networks (MFCN) operating within the band 2500–2690 MHz

¹³ ECC/REC/(11)05: Cross-border Coordination for Mobile/Fixed Communications Networks (MFCN) in the frequency band 2500–2690 MHz

¹⁴ 3 February 2017

2.1.3. European Union

The harmonised rules for the use of the 2600 MHz frequency band were first laid down by the Commission in Decision 2008/477/EC¹⁵. The aim of the Decision was to harmonise the conditions for the availability and efficient use of the 2500–2690 MHz frequency band for terrestrial systems capable of providing electronic communications services in the European Union.

Technological developments have made it necessary to revise the Decision, resulting in Commission Implementing Decision (EU) 2020/636 of 8 May 2020 on amending Decision 2008/477/EC as regards an update of relevant technical conditions applicable to the 2500–2690 MHz frequency band (hereinafter referred to as the ‘Commission Implementing Decision (EU) 2020/636’).

Essentially, Commission Implementing Decision (EU) 2020/636 was part of the EU package of measures for the deployment of 5G. The amendment to the previous harmonisation rules also allows the use of active antenna systems in the 2600 MHz frequency band to facilitate the deployment of 5G networks, and the amended rules allow the use of supplemental downlinks (SDL), in addition to TDD, in the 2570–2620 MHz sub-band for unpaired use. Member States may also choose between synchronised, semi-synchronised and unsynchronised TDD network operation in the 2570–2620 MHz sub-band, and must ensure efficient spectrum use. The Decision was transposed into the NFFF in 2020, with the amendment coming into effect on 21 December 2020. The amendment also introduced more flexibility in the regulation of spectrum use in Hungary. Since, with the increasing use of TDD, a growing number of frequency bands are covered by the set of rules related to synchronisation, a general set of rules covering several frequency bands was created during the implementation, instead of a band-specific solution.

2.2. National regulation

2.2.1. Applications in the 2600–2615 MHz frequency range

Only TDD or SDL MFCN systems are allowed to operate in the 2600–2615 MHz frequency range, subject to the present hearing, which is still available in the 2600 MHz frequency band, in accordance with Annexes 2 and 3 of the NFFF. As this is a technology-neutral frequency band, both fixed and mobile service systems and any IMT technology (e.g. LTE, NR) within these services are allowed to be used.

In the 2500–2690 MHz frequency band, the use of LTE-MTC¹⁶, LTE-eMTC¹⁷ and NB-IoT¹⁸ applications is generally allowed, except in the unpaired 2570–2620 MHz frequency range,

¹⁵ Commission Decision of 13 June 2008 on the harmonisation of the 2500–2690 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community

¹⁶ LTE-MTC: LTE Machine Type Communications

¹⁷ LTE-eMTC: LTE evolved Machine Type Communications

¹⁸ NB-IoT: Narrowband IoT

meaning that such applications cannot be used in the still available 2600–2615 MHz frequency range either.

2.2.2. Current conditions of use in the 2600–2615 MHz frequency range

In the 2600 MHz frequency band, electronic communications services can be provided, and the radio spectrum usage rights can be obtained through a competitive tender procedure. If the right to use radio spectrum is acquired through a competitive procedure, nationwide geographical area may be used; if it is acquired through a transfer, even smaller geographical areas may be used. The right to use radio spectrum may be transferred or leased in whole or in part; partial transfer of frequency may be per base block. Band rearrangement and the possibility to renew the right to use radio spectrum are allowed. The right to use radio spectrum is valid for 15 years and can be extended once for 5 years. The detailed rules and conditions for the extension are set out in the tender document and in the decision or public contract closing the competitive procedure. Renewal is not excluded.

Depending on the technology of the system operated by the service providers with radio spectrum usage rights using adjacent user blocks, it may be necessary to provide separation between channel edges at the boundaries of user blocks (NFFF Annex 3, Section 3.2b). As narrowband IoT¹⁹ systems can only be used in the paired frequency range (2500–2570/2620–2690 MHz), there is no need for this type of separation between adjacent user blocks in the 2600–2615 MHz frequency range (only broadband systems can be used in this frequency range).

Specific radio spectrum allocation and emission requirements and other detailed rules for each application are set out in Annex 3, Section 3.11 of the NFFF.

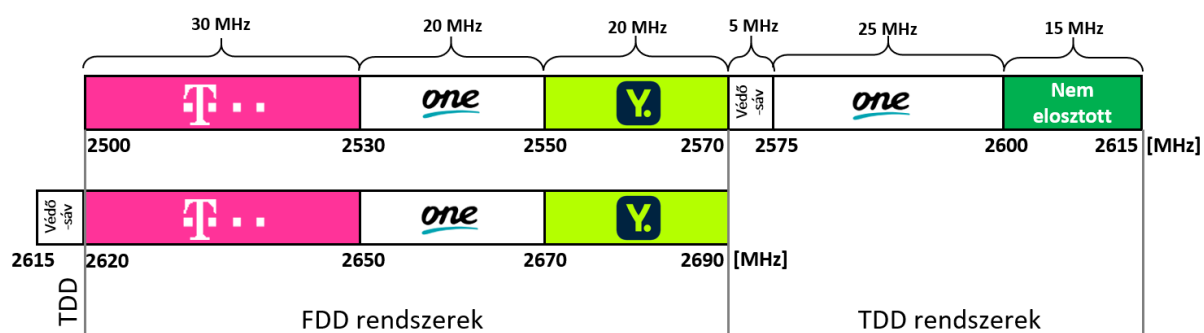
¹⁹ IoT: Internet of Things

3. Current use of the 2600 MHz frequency band

Current radio spectrum usage rights are shown in Table 1 and Figure 1.

Operator	TDD frequency band	FDD frequency band		Expiry of rights of use
		2500–2530 MHz	2620–2650 MHz	15.06.2029 (+5 years)
		2530–2550 MHz	2650–2670 MHz	15.06.2029 (+5 years)
		2550–2570 MHz	2670–2690 MHz	15.06.2029 (+5 years)
	2575–2600 MHz			15.06.2029 (+5 years)
Not allocated	2600–2615 MHz			

1 – Current radio spectrum usage rights in the 2600 MHz frequency band



1 – Current use of the 2600 MHz frequency band

Védősáv	Guard band
Nem elosztott	Not awarded yet
FDD rendszerek	FDD systems
TDD rendszerek	TDD systems

4. National regulatory plans

The applicable international regulation has been implemented in the Hungarian regulation; however, based on international examples of use, it is worth noting that, in some countries, certain frequency ranges in the unpaired part of the band can be used for regional or local purposes (e.g. Croatia, France), so if no market demand arises for national use, local needs may also be considered, contingent upon changing the regulation. The NMHH will consider the possibility of amending the regulation if demand arises.

5. International coordination

To promote efficient spectrum use in the border area, we have concluded coordination agreements with most of our neighbouring countries for the 2500–2690 MHz frequency band. The coordination agreements are based on ECC/REC/(11)05 on the cross-border use of MFCN systems in the 2500–2690 MHz frequency band, developed by the ECC/PT1 Working Group. The basic document was drafted in 2011, amended in 2017, amended again in 2022, and then corrected in 2024 (the latest official version was published on 8 March 2024). Since, however, the last two versions do not contain any substantive changes to the technical content, the 2017 version contains all relevant information in this respect. This Recommendation sets out the coordination principles to ensure equal access to radio spectrum for neighbouring countries and, where possible, the interference-free operation of stations in the border area. The Recommendation does not include requirements for active antenna systems (and there are no plans to revise the Recommendation in this regard), but it does provide detailed guidance on different synchronisation scenarios for FDD systems operating in the paired frequency range and TDD systems operating in the unpaired frequency range.

Table 2 shows the agreements concluded with neighbouring countries and the technology covered.

2600 MHz	Technology	SVK	AUT	SVN	HRV	SRB	ROU	UKR
2500–2690 MHz LTE, UMTS, WiMAX, NR	LTE/UMTS/WiMAX vs. LTE/UMTS/WiMAX	Vienna, 12.10.2011	Budapest, 15.02.2018			–	03.07.2013 by correspondence	–

2 – Coordination agreements listed by technology

The Ukrainian administration previously (in 2017) informed us that it was planning to introduce 4G in the 2600 MHz frequency band, and therefore envisaged the conclusion of an MFCN agreement for this frequency band; the Serbian administration promised to explore the possibility of concluding an agreement after 2018, but no progress has been made on either issue so far.

In 2018, the Slovak and Romanian administrations informed us that they would examine our 2018 agreement with Austria, Slovenia and Croatia, with a view to reviewing our previous agreement between us. So far, no substantial progress has been made in this respect.

6. Compatibility issues between MFCN and other radio services

6.1. Consideration of interfering emissions outside the band

When deploying MFCN stations, the interference from previously licensed military radars in the 1250–1350 MHz, 2200–2300 MHz and 2700–3410 MHz frequency bands, but in particular in the 2700–3100 MHz frequency range, must be taken into account.

The interference effects of radars in their proximity must be considered when the system at hand is being designed and its stations are deployed. During the design phase, it is recommended to carry out measurements on site, as radar stations may not necessarily cause interference due to wave propagation and shielding effects.

Data on the emission sources relevant in terms of interference (location and coordinates of radar stations, duration of operation of the frequency band) are listed in Table 3.

Sites	Geographic coordinates of the site (WGS-84)		Operating frequency band	Duration of operation
	North	East		
Kecskemét	46°54'30"	19°44'20"	2.7–2.9 GHz	continuous
Pápa	47°15'13"	17°28'09"	2.7–2.9 GHz	continuous
Kup	47°15'07"	17°28'13"	2.7–3.1 GHz	continuous
Juta	46°23'27"	17°44'06"	2.7–3.1 GHz	continuous
Békéscsaba	46°41'06"	21°00'48"	2.7–3.1 GHz	ad hoc, 5 days/year
Medina	46°28'15"	18°37'11"	2.7–3.1 GHz	ad hoc, 5 days/year
Ferihegy	47°25'05"	19°18'12"	2.7–2.9 GHz	continuous

3 – Interfering emission sources

The radiation parameters of the radar stations (possible spurious power level, frequency band, antenna height) are listed in Tables 4 to 10.

Emission source	Frequency band	Maximum EIRP (pulse peak power)
Kecskemét antenna height: 20 m	2500–2610 MHz	none
	2610–2660 MHz	20–50 dBm/MHz
	2660–2690 MHz	50 dBm/MHz

4 – Parameters of the Kecskemét radar station

Emission source	Frequency band	Maximum EIRP (pulse peak power)
Pápa antenna height: 20 m	2500–2640 MHz	none
	2640–2660 MHz	20–30 dBm/MHz
	2660–2690 MHz	30 dBm/MHz

5 – Parameters of the Pápa radar station

Emission source type no. 1	Frequency band	Maximum EIRP (pulse peak power)	Characteristics
Kup, Juta antenna height: 10 m	2500–2650 MHz	30 dBm/MHz	Duty cycle relevant to distant point: 0.00056% Antenna rotation: n=6/minute Operation: 24/7
	2650–2670 MHz	30–40 dBm/MHz	
	2670–2690 MHz	40–50 dBm/MHz	

6 – Parameters of the Kup and Juta radar stations (type 1)

Emission source type no. 1	Frequency band	Maximum EIRP (pulse peak power)	Characteristics
Békéscsaba, Medina antenna height: 10 m Operation: periodic (5 day/year)	2500–2650 MHz	30 dBm/MHz	Duty cycle relevant to distant point: 0.00056% Antenna rotation: n=6/min Radar operation during ad- hoc operation: 24/7
	2650–2670 MHz	30– 40 dBm/MHz	
	2670–2690 MHz	40–50 dBm/MHz	

7 – Parameters of the Békéscsaba and Medina radar stations (type 1)

Emission source type no. 2	Frequency band	Maximum EIRP (pulse peak power)	Characteristics
Kup, Juta antenna height: 10 m	2500–2690 MHz	65–80 dBm/MHz	Duty cycle relevant to distant point: 0.087% (in the given direction, as it does not rotate) Antenna rotation: vertical Operation: 3-5% of the time

8 – Parameters of the Kup and Juta radar stations (type 2)

Emission source type no. 2	Frequency band	Maximum EIRP (pulse peak power)	Characteristics
Békéscsaba, Medina antenna height: 10 m Operation: periodic (5 day/year)	2500–2690 MHz	65–80 dBm/MHz	Duty cycle relevant to distant point: 0.087% (in the given direction, as it does not rotate) Antenna rotation: vertical Radar operation during ad-hoc operation: 3 to 5% of the time

9 – Parameters of the Békéscsaba and Medina radar stations (type 2)

Emission source	Frequency band	Maximum EIRP (pulse peak power)
Ferihegy antenna height: 20 m	2500–2540 MHz	none
	2540–2640 MHz	20–30 dBm/MHz
	2640–2690 MHz	30 dBm/MHz

10 – Parameters of the Ferihegy radar station

6.2. Requirements to avoid interference to applications in adjacent frequency bands

When installing an MFCN station, in order to avoid causing interference to previously licensed military and civil radars operating in the 2700–3100 MHz frequency band, the field strength levels of the base stations of MFCN systems providing communications services shall not exceed the values shown in Table 11 at the location of military and civil radars.

Sites	Geographic coordinates of the site (WGS-84)		Equipment	The maximum permitted field strength of the MFCN BS at the radar site
	North	East		
Kup	47°15'07"	17°28'13"	Military radars	70 dBμV/m in the 2620–2690 MHz frequency band
Juta	46°23'27"	17°44'06"	Military radars	
Békéscsaba	46°41'06"	21°00'48"	Military radars	
Medina	46°28'15"	18°37'11"	Military radars	
Ferihegy TAR-1	47°26'51"	19°15'47"	Civil radar	74 dBμV/m in the 2620–2690 MHz frequency band

Sites	Geographic coordinates of the site (WGS-84)		Equipment	The maximum permitted field strength of the MFCN BS at the radar site
	North	East		
Ferihegy TAR-2	47°25'05"	19°18'12"	Civil radar	72 dBµV/m in the 2620–2690 MHz frequency band

11 – MFCN BS restrictions at radar sites

7. Radio spectrum fees

The calculation method of the regular radio spectrum fee is defined in NMHH Decree 1/2011 (III. 31.) on frequency reservation and usage fees (hereinafter referred to as the 'Fee Decree'). Based on the NFFF, in the case of radio spectrum usage rights covered by block management according to the NFFF, acquired as a result of a service procurement and competitive procedure, as a result of the extension of radio spectrum usage rights or as a result of the renewal of radio spectrum usage rights, and in the case of radio spectrum resold after acquisition, the holder of the radio spectrum usage rights shall pay a monthly band fee during the term of the right to use radio spectrum, from the earliest date of the validity of the radio licence as specified in Section 22(3) of NMHH Decree 4/2011 (X. 6.) on the rules of auction or tender for obtaining entitlements to frequency use.

The rules governing the calculation of frequency band fees to be paid are set out in Section 20 under the heading 'Fees for bands subject to block management' and in Annex 9 of the Fee Decree.