nmhh
Nemzeti Média- és Hírközlési Hatóság

Band introduction
700 MHz frequency band

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National Media and Infocommunications Authority

14 August 2025

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Summary

The EU legal acts establishing obligations for the use of the 694–790 MHz frequency band (hereafter referred to as "700 MHz frequency band") give Member States some flexibility to regulate the use of the 700 MHz frequency band within a harmonised framework. Within this regulatory framework, 2×30 MHz within the 700 MHz frequency band had to be made available on a compulsory basis to mobile and fixed communications networks (hereinafter referred to as "MFCNs"[1]) suitable for providing wireless broadband communication services, while in other sub-bands the options of use should be available at national level, subject to fulfilment of the specified technical conditions. Under EU legal acts, such optional usages in certain sub-bands other than the 2×30 MHz sub-band include: broadband radio applications for public protection and disaster relief (hereinafter referred to as "BB-PPDR"[2]), supplemental downlink communications necessary for increased downlink traffic (hereinafter referred to as "SDL"[3]), applications related to broadcasting, programme making and special events (hereinafter referred to as "PMSE"[4] applications) and machine-to-machine communication (hereinafter referred to as "M2M"[5]). The key decisions about the future of the 700 MHz frequency band are set out in the National Roadmap[6], prepared under an EU obligation.

The issue of utilising the 700 MHz frequency band relates to a number of strongly interrelated processes of radio spectrum management and a number of industries using frequencies. A typical issue is the implementation of broadband PPDR networks, for which, from the perspective of radio spectrum management, there are several options considering the dedicated frequency bands or the nature of implementation (operation of a dedicated government network, use of services provided on a commercial basis, or a hybrid solution combining both).

Of the 2x30 MHz frequency band available for MFCN systems under the EU obligation, a 2x25 MHz spectrum was awarded in the 2020 auction, the status of the remaining 2x5 MHz spectrum is still planned and further spectrum is available in the 700 MHz duplex gap, regarding the further use of which the decision based on the options available under EU rules is left to national discretion, according to needs. According to the information currently available, NMHH sees no market demand for SDL utilisation in the duplex gap, and therefore the spectrum can be utilized for PMSE purposes if required.

In this hearing, we will again assess the needs, taking into account the growing spectrum requirements of next generation networks. As a result of the public hearing, a decision can be

[1] MFCN: Mobile/Fixed Communications Networks
[2] BB-PPDR: Broadband Public Protection and Disaster Relief
[3] SDL: Supplemental Downlink
[4] PMSE: Programme Making and Special Events
[5] M2M: Machine to Machine
[6] National Roadmap for the utilisation of the VHF III (174–230 MHz) and UHF (470–790 MHz) frequency bands, published by the NMHH on its website on 8 September 2017:
http://nmhh.hu/dokumentum/189921/uhf_nemzeti_utemterv.pdf

taken on the future use of the as-yet unallocated parts of the band, in particular on the method and possibilities of authorisation (e.g. launching a competitive procedure).

1. Introduction

Regarding the mobile broadband use of the 700 MHz frequency band previously used for broadcasting, in 2016, Commission Implementing Decision (EU) 2016/687 on harmonised technical conditions for the use of frequency bands[7] (hereinafter referred to as "Commission Implementing Decision") was adopted in the European Union, providing a harmonised technical regulatory framework for Member States to regulate such use. This was followed, in 2017, by the publication of a Parliament and Council Decision[8] setting out the obligations of Member States for the continued use of the entire 470–790 MHz frequency band and setting out expectations for the future of TV broadcasting.

The 700 MHz frequency band is of key significance from the perspective of introducing 5G. Based on the 5G Action Plan of the European Commission[9] and the 5G strategic agenda[10] laid down in the RSPG expert's statement, the 700 MHz frequency band is considered one of the primary bands in the introduction of 5G together with the 3400–3800 MHz and the 24.25–27.5 GHz frequency bands (so-called "pioneer bands"). Licences for the 700 MHz frequency band have already been issued to EU Member States[11].

The physical characteristics of the 700 MHz frequency band allow cost-effective coverage of large areas, making it an advantage for efficient nationwide coverage, especially in sparsely populated rural areas, and also for providing indoor coverage and Machine to Machine communications.

Based on the Commission Implementing Decision, wireless broadband electronic communications service that can be implemented by mobile and fixed communications networks (MFCN) and other non-MFCN applications may also be introduced in the frequency band. As a national option, part of the 700 MHz frequency band may be used for supplemental downlink (SDL), i.e. transmission starting from an only downlink (i.e. unidirectional) base station, forming part of a terrestrial wireless broadband electronic communications service. The SDL's purpose is the increase of the downlink capacity of the service, thereby managing the asymmetry of data traffic demand. The national options that may be introduced in the 700 MHz frequency band under the Commission Implementing Decision include, in addition to the 2×30 MHz sub-band, BB-PPDR, wireless audio PMSE applications and M2M.

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[7] Commission Implementing Decision (EU) 2016/687 of 28 April 2016 on the harmonisation of the 694–790 MHz frequency band for terrestrial systems capable of providing wireless broadband electronic communications services and for flexible national use in the Union

[8] Decision (EU) 2017/899 of the European Parliament and of the Council of 17 May 2017 on the use of the 470–790 MHz frequency band in the Union

[9] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – 5G for Europe: An Action Plan COM(2016) 588

[10] RADIO SPECTRUM POLICY GROUP STRATEGIC ROADMAP TOWARDS 5G FOR EUROPE Opinion on spectrum related aspects for next-generation wireless systems (5G), 9 November 2016

[11] With the exception of Malta, where the 700 MHz frequency band was not allocated due to lack of market demand.

2. Regulation of the 700 MHz frequency band

2.1. International regulation

The introduction of the 5th generation of mobile technology (more commonly known as 5G or NR), known in ITU terminology as IMT-2020[12], has created new opportunities in mobile radio communications, and the provision of the necessary spectrum and the drafting of the relevant international regulation have been handled as priorities by the relevant international professional organisations. Based on the expert's statement of RSPG[13] issued in the subject of the questions of 5G in 2016[14], the 700 MHz frequency band is one of the so-called 5G pioneer bands. Making the 700 MHz frequency band available for the mobile broadband applications and the drafting of the current regulation required lengthy international preparation, undertaken by the international organisations and groups responsible for frequency management (ITU[15], CEPT[16], European Commission, RSPG, and RSC[17]). The main elements of international regulation are summarised below.

2.1.1. ITU

Annex 1 of NMHH Decree 7/2015 (XI. 13.) on the national frequency allocation and the rules of using frequency bands (hereinafter referred to as "NFFF") contains international allocation according to the Radio Regulations (hereinafter referred to as "RR"). According to the currently effective Radio Regulations, the 694–790 MHz frequency band is allocated for broadcasting and mobile (except aeronautical mobile) services on a primary basis.

The use for broadcasting was regulated by the agreement and frequency plan (GE06[18]) approved at the Regional Radiocommunication Conference (RRC-06[19]) held in Geneva, 2006. Besides the plan containing broadcasting frequency use, the GE06 includes the procedures that are required for the international coordination of services other than broadcasting.

[12] IMT-2020: International Mobile Telecommunications 2020
[13] RSPG: Radio Spectrum Policy Group – Pursuant to 2002/622/EC Commission Decision of 26 July 2002 establishing a Radio Spectrum Policy Group (RSPG), the RSPG acts as an advisor in European strategic issues on radio spectrum.
[14] RADIO SPECTRUM POLICY GROUP STRATEGIC ROADMAP TOWARDS 5G FOR EUROPE Opinion on spectrum related aspects for next-generation wireless systems (5G), 9 November 2016
[15] ITU: International Telecommunication Union
[16] CEPT: Conférence européenne des Administrations des postes et des télécommunications, European Conference of Postal and Telecommunications Administration
[17] RSC: Radio Spectrum Committee
[18] GE06 – Final Acts of the Regional Radiocommunication Conference for planning of the digital terrestrial broadcasting service in parts of Regions 1 and 3, in the frequency bands 174–230 MHz and 470–862 MHz (RRC-06), Geneva, 2006
[19] Regional Radiocommunication Conference (RRC-06), Geneva, 2006

In Region 1 of the ITU[20], the use of the 694–790 MHz frequency band for mobile (except aeronautical mobile) services has been approved by WRC-15[21], while keeping the primary status of broadcasting.

The conditions of use of mobile service are described in footnotes 5.312A and 5.317A:

5.312A In Region 1, the use of the frequency band 694–790 MHz by the mobile, except aeronautical mobile, service is subject to the provisions of Resolution 760 (WRC-15)[22]. See also Resolution 224 (Rev. WRC-15)[23]. (WRC-15)

5.317A The parts of the frequency band 698–960 MHz in Region 2 and the frequency bands 694–790 MHz in Region 1 and 790–960 MHz in Regions 3 which are allocated to the mobile service on a primary basis are identified for use by administrations wishing to implement International Mobile Telecommunications (IMT[24]) – see Resolutions 224 (Rev. WRC-15), 760 (WRC-15) and 749 (Rev. WRC-15)[25], where applicable. This identification does not preclude the use of these frequency bands by any other application of the services to which it is allocated and does not establish priori-ty in the Radio Regulations. (WRC-15)

Following the WRC-15 Conference, the 700 MHz frequency band was allocated on a primary basis in all three regions of the ITU to mobile service (besides broadcasting), becoming available for broadband mobile service applications (IMT). When making the frequency arrangement, the harmonisation among regions (Europe and the Asia-Pacific regions) was an important aspect for the production of assets in scale economy and unobstructed global roaming.

The frequency bands identified for IMT and channel arrangements are listed in the ITU-R M. 1036-5[26] recommendation. In some countries, the 700 MHz frequency band is allocated to aeronautical radionavigation service (hereinafter referred to as "ARNS"[27]) on a primary basis, based on footnote 5.312 of the Radio Regulations:

5.312 Additional allocation: In Armenia, Azerbaijan, Belarus, the Russian Federation, Georgia, Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, Turkmenistan, and Ukraine the 645–862 MHz frequency band, in Bulgaria the 646–686 MHz, 726–758 MHz, 766–814 MHz,

[20] Europe, Africa and part of Asia
[21] WRC-15: World Radiocommunication Conference 2015
[22] Resolution 760 (WRC-15): Provisions relating to the use of the frequency band 694–790 MHz in Region 1 by the mobile, except aeronautical mobile, service and by other services
[23] Resolution 224 (Rev.WRC-15): Frequency bands for the terrestrial component of International Mobile Telecommunications below 1 GHz
[24] IMT: International Mobile Telecommunications
[25] Resolution 749 (Rev.WRC-15): Use of the frequency band 790–862 MHz in countries of Region 1 and the Islamic Republic of Iran by mobile applications and by other services
[26] Recommendation ITU-R M.1036-5 (10/2015): Frequency arrangements for implementation of the terrestrial component of International Mobile Telecommunications (IMT) in the bands identified for IMT in the Radio Regulations (RR)
[27] ARNS: Aeronautical Radionavigation Service

and 822–862 MHz frequency bands, and in Poland, until 31 December 2017, the 860–862 MHz frequency band are also allocated to the aeronautical radionavigation service on a primary basis. (WRC-15)

The use of the 700 MHz frequency band for IMT purposes raised a number of regulatory questions, including the determination of the permissible out-of-band emission levels of mobile user devices (in the broadcasting band), questions of compatibility between mobile service and broadcasting, and the acceptance of the technical criteria concerning the common band use of IMT and ARNS.

Concerning the protection of broadcasting, WRC-15 has decided no further regulatory standards are necessary, the GE06 agreement contains all necessary procedures for the international coordination between IMT and broadcasting.

The ARNS systems operating in the countries listed in footnote 5.312 of RR may significantly limit the use of the 700 MHz frequency band for mobile service, and therefore bilateral coordination agreements had to be concluded to allow the IMT use of the 700 MHz frequency band to avoid the problems arising from the different radio spectrum usage of the countries in question. Of the neighbouring countries, Ukraine operates ARNS equipment, therefore Hungary – similarly to the other countries concerned – had to conclude an agreement with Ukraine for the protection of ARNS.

In view of the increasing demand for spectrum for broadband mobile services, WRC-23 examined the current use and future spectrum requirements for the entire 470–964 MHz frequency band under agenda item 1.5, including the possibility of allocating the 470–694 MHz frequency band to mobile service (except aeronautical mobile). Based on the results of WRC-23, secondary mobile service allocation in the 470–694 MHz frequency band has been made possible in most countries of ITU Region 1 (including Hungary) in accordance with footnote 5.295A.

5.295A *In Albania, Germany, Andorra, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Cyprus, the Vatican City, Croatia, Denmark, Estonia, Finland, France, Georgia, Greece, Hungary, Ireland, Iceland, Latvia, Liechtenstein, Lithuania, Luxembourg, North Macedonia, Malta, Moldova, Monaco, Montenegro, Norway, Uzbekistan, Netherlands, Poland, Portugal, Turkey, Slovakia, Czech Republic, Romania, the United Kingdom, San Marino, Serbia, Slovenia, Sweden, Switzerland and Ukraine, the 470–694 MHz frequency band was allocated to the mobile service on a secondary basis, except for aeronautical mobile service, subject to the agreement obtained in accordance with paragraph 9.21. In order to protect the broadcasting service, mobile service stations must not create field strength greater than the value calculated in accordance with clause 4.1.3.2 of Annex 2 to the GE06 Agreement at the highest point of the terrain elevation, at a height of 10 m above ground level, for more than 1% of the time at the boundary of any other administration's area, considering the possibility of multiple interference, Table A.1.10 and the methodology specified in the GE06 Agreement. This limit may be exceeded on*

the territory of any country whose administration has so agreed. This allocation must in no way adversely affect the development of broadcasting and must not prevent the entry of new broadcasting services into the GE06 Plan. (WRC 23)

2.1.2. CEPT

Two reports have been prepared by the responsible CEPT working group on behalf of the European Commission[28]:

- CEPT Report 53[29] (Report A): Report A from CEPT to the European Commission in response to the Mandate "To develop harmonised technical conditions for the 694–790 MHz frequency band in the EU for the provision of wireless broadband and other uses in support of EU spectrum policy objectives" (28 November 2014);
- CEPT Report 60[30] (Report B): Report B from CEPT to the European Commission in response to the Mandate "To develop harmonised technical conditions for the 694–790 MHz frequency band in the EU for the provision of wireless broadband and other uses in support of EU spectrum policy objectives" (1 March 2016).

These CEPT reports have provided the basis for harmonised technical conditions for the use of the 700 MHz frequency band for MFCN.

CEPT working groups have also studied the use of the 700 MHz frequency band by MFCN and non-MFCN (PMSE, M2M) systems, and several additional CEPT documents have been adopted with the approval of ECC[31], such as:

- ECC/DEC/15(01)[32] containing the harmonised technical conditions of the use of the 700 MHz frequency band for MFCN purposes, for example the recommended channel arrangement for the 700 MHz frequency band and the maximum emission power levels ensuring the coexistence of the various radio services;
- ECC Report 242[33] containing the compatibility studies and technical conditions of sharing for the M2M applications that can be operated in the 733–736/788–791 MHz frequency band;

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[28] Mandate to CEPT to develop harmonised technical conditions for the 694–790 MHz ('700 MHz') frequency band in the EU for the provision of wireless broadband and other uses in support of EU spectrum policy objectives

[29] CEPT Report 53: Report A from CEPT to the European Commission in response to the Mandate "To develop harmonised technical conditions for the 694–790 MHz ('700 MHz') frequency band in the EU for the provision of wireless broadband and other uses in support of EU spectrum policy objectives

[30] CEPT Report 60: Report B from CEPT to the European Commission in response to the Mandate "To develop harmonised technical conditions for the 694–790 MHz ('700 MHz') frequency band in the EU for the provision of wireless broadband and other uses in support of EU spectrum policy objectives"

[31] ECC: Electronic Communications Committee

[32] ECC/DEC/(15)01: Harmonised technical conditions for mobile/fixed communications networks (MFCN) in the band 694–790 MHz including a paired frequency arrangement (Frequency Division Duplex 2x30 MHz) and an optional unpaired frequency arrangement (Supplemental Downlink)

[33] ECC Report 242: Compatibility and sharing studies for M2M applications in the 733–736 MHz/788–791 MHz band

- ECC Report 266[34] examining the implementation possibilities of M2M applications based on narrowband and broadband cell systems in the harmonised MFCN frequency bands – among them the 700 MHz frequency band – under the technical regulatory conditions accepted for MFCN. In the 700 MHz frequency band, the LTE MTC and eMTC, and the NB-IoT can be introduced within the MFCN systems.
- ECC Report 221[35] containing the compatibility studies between PMSE and MFCN operating in adjacent frequency bands;
- Recommendation ECC/REC/(15)01[36] containing the coordination provisions concerning MFCN systems in the 700 MHz frequency band (and the 1452–1492 MHz and 3400–3800 MHz frequency bands).

The CEPT regulation accepted for the 700 MHz frequency band ensures flexible harmonisation, which provides FDD frequency arrangement for harmonised MFCN purposes and, adjusting to national demand, makes available certain sub-bands of the guard band and/or the duplex gap for supplemental downlink MFCN use (MFCN SDL) and other indicated applications.

The harmonised frequency arrangement for MFCN and the harmonised technical conditions for MFCN use are described in ECC/DEC/15(01).

<table>
<tr><td>694-703</td><td>703-708</td><td>708-713</td><td>713-718</td><td>718-723</td><td>723-728</td><td>728-733</td><td>733-738</td><td>738-743</td><td>743-748</td><td>748-753</td><td>753-758</td><td>758-763</td><td>763-768</td><td>768-773</td><td>773-778</td><td>778-783</td><td>783-788</td><td>788-791</td></tr>
<tr><td rowspan="2">Guard band</td><td colspan="6" rowspan="2">Uplink</td><td colspan="5">Duplex gap</td><td colspan="6" rowspan="2">Downlink</td><td rowspan="2">Guard band</td></tr>
<tr><td>Duplex gap</td><td colspan="4">SDL</td></tr>
<tr><td>9 MHz</td><td colspan="6">30 MHz (6 x 5 MHz blocks)</td><td>5 MHz</td><td colspan="4">20 MHz (max. 4 x 5 MHz blocks)</td><td colspan="6">30 MHz (6 x 5 MHz blocks)</td><td>3 MHz</td></tr>
</table>

Figure 1 – MFCN frequency arrangement
[Source: ECC/DEC/(15)01]

Given that, in the frequency arrangement included in ECC/DEC/15(01), the 790–791 MHz frequency band overlaps with the 790–862 MHz frequency band (i.e. the 800 MHz frequency band), the technical conditions for the 790–791 MHz frequency range must be applied in such a way that the provisions of the ECC decision for the 800 MHz frequency band are also met.

In accordance with the flexible harmonisation according to decision ECC/DEC/15(01), the 700 MHz frequency band contains a harmonised MFCN channel arrangement, which includes a paired 2x30 MHz FDD frequency arrangement and an optional unpaired arrangement for SDL

[34] ECC Report 266: The suitability of the current ECC regulatory framework for the future usage of Wideband and Narrowband M2M in the frequency bands 700 MHz, 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300MHz, 2600 MHz, 3400–3600 MHz and 3600–3800 MHz
[35] ECC Report 221: Adjacent band compatibility between MFCN and PMSE audio applications in the 700 MHz frequency band
[36] ECC/REC/(15)01: Cross-border coordination for mobile / fixed communications networks (MFCN) in the frequency bands: 694–790 MHz, 1452–1492 MHz, 3400–3600 MHz and 3600–3800 MHz

purposes, containing a maximum of 4 pieces of 5 MHz frequency blocks. Conditions of harmonised MFCN use:

- the size of frequency blocks may be 5 MHz or a multiple thereof, which does not exclude the use of smaller channel bandwidths within the 5 MHz blocks;
- In case of FDD arrangement, the transmission bands of end user equipment and the base stations can be found in the 703–733 MHz and 758–788 MHz frequency ranges, respectively.
- The SDL use contains the following frequency blocks: 738–743 MHz, 743–748 MHz, 748–753 MHz and 753–758 MHz; decision on the contiguous blocks used for SDL, depending on national demand, may be made on a national level;
- In addition to MFCN (FDD and SDL) decision may be made on non-MFCN options (such as PMSE or M2M) on a national level within the scope of flexible harmonisation.

Thanks to the application of the block edge mask (hereinafter referred to as "BEM") determined by CEPT, several types of radio applications may use certain parts of the frequency band, ensuring technology neutrality with respect to the use of the frequency band. The use of the appropriate BEMs allows the use of the sub-bands in question by various radio services, depending on the demand in the various countries. BEM ensures the least restrictive technical conditions for the interference-free operation of various MFCN networks and MFCN and other radio services (e.g. broadcasting under 694 MHz). Various conditions have been determined for base stations, mobile terminals and PMSE devices. Their application makes coordination easier among countries in case they use parts of the frequency band differently. In case the terrestrial broadcasting should cause interference to MFCN, individual assessment must be carried out by using appropriate mitigation techniques at national level.

The block edge masks in the current CEPT regulations apply to non-active antenna systems (non-AAS[37]), and CEPT is planning to review ECC/DEC/15(01) to see if active antenna systems (AAS) can be used in the 700 MHz frequency band.

For PMSE, the guard band and the duplex gap may be used respecting the technical conditions published in the decision.

The current spectrum use of PMSE devices and future demand are described in CEPT Report 204. The compatibility conditions related to interference-free operation of PMSE and MFCN operating in adjacent frequency bands are described in ECC Report 221.

The M2M systems can be implemented in the 700 MHz frequency band within the MFCN networks, or as a national option in accordance with the flexible harmonisation ensured by ECC/DEC/15(01), the 2x3 MHz dedicated sub-band may also be designated for M2M in the 733–736 MHz/788–791 MHz frequency ranges (in the sub-band separating the duplex sub-bands and in the guard band).

[37] non-AAS: non-Active Antenna System

The results of the compatibility studies concerning the 733–736 MHz/788-791 MHz sub-bands, in order to avoid interference between the M2M (LTE-based or narrowband M2M) and other applications, are described in ECC Report 242.

The possible uses of the 700 MHz frequency band and the compatibility cases that may arise are summarised in Figure 2.

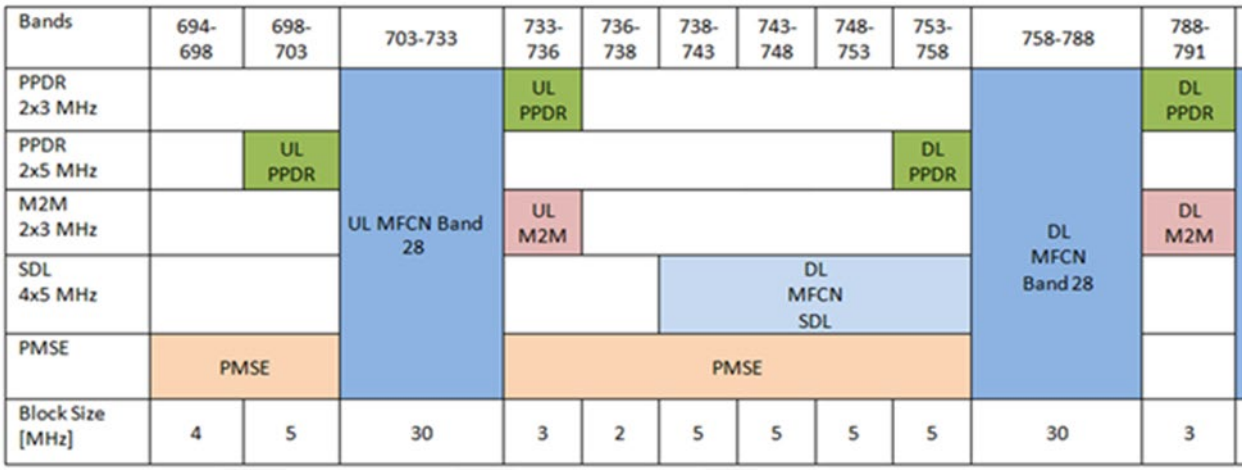

Figure 2 – Possible uses of the 700 MHz frequency band
[Source: ECC Report 242]

2.1.3. European Union

Since the creation of the Digital Single Market strategy, the European Commission treats the 700 MHz frequency band as a priority due to its suitability for wireless broadband electronic communications services, especially in rural areas. [38]The EU Radio Spectrum Policy Programme emphasises that the Member States must set as an objective that they ensure the necessary spectrum quantity for PMSE as well, in coherence with the objectives related to improving the internal market integration of the European Union and access to culture. It is another important objective that wireless communication technologies serving of radio frequency identification (RFID) and other Internet of Things (IoT) purposes (including machine-to-machine communication – M2M) should also have available spectrum, and that they promote, in cooperation with one another, the elaboration of standards and the harmonisation of spectrum use for the IoT communication among Member States.

Taking the above objectives into consideration, the decision of the Commission concerning the use of the 700 MHz frequency band for wireless broadband electronic services and the decision of the European Parliament and of the Council on the future of the UHF band have been accepted:

[38] Decision of the European Parliament and of the Council of 14 March 2012 establishing a multiannual radio spectrum policy programme

- **(EU) 2016/687**[39]: Commission Implementing Decision (EU) 2016/687 of 28 April 2016 on the harmonisation of the 694–790 MHz frequency band for terrestrial systems capable of providing wireless broadband electronic communications services and for flexible national use in the Union;
- **(EU) 2017/899**[40]**:** Decision (EU) 2017/899 of the European Parliament and of the Council of 17 May 2017 on the use of the 470-790 MHz frequency band in the Union.

The Commission Implementing Decision harmonises the technical conditions for the efficient use and accessibility in the EU of the 694–790 MHz frequency band for terrestrial systems capable of providing wireless broadband electronic communications services. In addition, in accordance with specific national needs, the regulation also aims to promote the usage for harmonised, flexible national demand and decisions, in coherence with RSPP's spectrum policy priorities.

In accordance with harmonised use, on a non-exclusive basis, the 703–733 MHz and 758–788 MHz frequency bands must be designated for terrestrial systems capable of providing wireless broadband electronic communications services (MFCN). In addition to the 2x30 MHz sub-band dedicated to MFCN, there are additional optional applications depending on national needs, in particular:

- so-called supplementary downlinks (SDL), limited to downlink transmission (SDL) by the base station, to provide asymmetric MFCN traffic,
- PMSE: audio PMSE, indoor use,
- defines national options for IoT/M2M (733-736 MHz/788-791 MHz, FDD mode) applications.

Certain provisions of Commission Implementing Decision (EU) 2016/687 concerning the 700 MHz frequency band also apply to the **790–791 MHz** frequency range, which overlaps the 790–862 MHz (800 MHz) frequency band. Therefore, the harmonised conditions of the 790–791 MHz frequency range included in Commission Implementing Decision (EU) 2016/687 must be applied so as to ensure the provisions of Commission Decision 2010/267/EU for the 800 MHz frequency band are also met.

Decision (EU) 2017/899 of the European Parliament and of the Council regulates the implementation duties and other Member State obligations for the 700 MHz frequency band, and also includes provisions for the use of the 470–694 MHz frequency band.

[39] Commission Implementing Decision (EU) 2016/687 of 28 April 2016 on the harmonisation of the 694–790 MHz frequency band for terrestrial systems capable of providing wireless broadband electronic communications services and for flexible national use in the Union

[40]Decision (EU) 2017/899 of the European Parliament and of the Council of 17 May 2017 on the use of the 470–790 MHz frequency band in the Union

2.2. National regulation

According to the current NFFF in force, the 700 MHz frequency band is allocated to broadcasting, the mobile (except aeronautical mobile) service on a primary basis, and – in deviation from RR – to the fixed service.

The NFFF regulation is in line with EU legal requirements, and the NFFF amendment has been notified to the Commission. Based on the Commission Implementing Decision and Decision (EU) 2017/899 of the European Parliament and of the Council, the necessary legislative tasks were carried out in several phases.

	A	B
1	**Subject of condition**	**Specification**
2	Purpose of use	electronic communications service provision
3	Method of authorisation	competitive procedure
4	Maximum quantity of frequency range	a radio spectrum right holder may hold radio spectrum usage rights for a maximum of 2 base blocks within the territorial extent of the radio spectrum usage right; radio spectrum usage right holders belonging to the same group of undertakings may jointly hold radio spectrum usage rights for up to 2 base blocks within the territorial extent of the radio spectrum usage right;
5		if, after the end of a competitive procedure, a radio spectrum usage right holder or a group of radio spectrum usage right holders exceeds the maximum frequency spectrum allowance, they shall reduce the maximum amount of frequency range available to them to the maximum allowable amount within 1 year of having exceeded it.
6	Minimum quantity of frequency range	a radio spectrum usage right holder must have the right to use at least 1 base block of radio spectrum usage right
7		
8	Territorial extent of the right to use radio spectrum	if the right to use radio spectrum is acquired through competitive procedure, a nationwide geographical area is allowed; if it is acquired through transfer, a smaller geographical area is allowed
9	Method of management	block allocation
10	Secondary trading	radio spectrum right of use may be transferred or leased in whole or in part; partial transfer of frequency may be per base block in relation to the leasing of the right to use radio spectrum, the tender documents may lay down conditions to promote effective competition and avoid distortions of competition
11	Band rearrangement	allowed

Table 1 – Conditions for obtaining the right to use radio spectrum and frequency band use (708–733/763–788 MHz)

[Source: NFFF Annex 3]

	A	B
1	**Requirement subject**	**Specification**
2	Frequency band for uplink connections of end-user station, repeater station	708–733 MHz
3	Frequency band for downlink to MFCN station	763–788 MHz
4	Duplex spacing	55 MHz
5	Access mode	FDD

Table 2 – Frequency management requirements

[Source: NFFF Annex 3]

3. Use of the 700 MHz frequency band

The decisions and investigations related to the use of the 700 MHz frequency band for mobile services have been finalised at the international level. Decisions regarding the future use of the 2x5 MHz sub-band in the 700 MHz frequency band in Hungary, which is planned for MFCN in the current NFFF, as well as optional decisions regarding its future use (e.g. PMSE, MFCN SDL) still need to be taken, and national regulations need to be modified accordingly. The latest public hearing, held on 22 March 2022[41], reinforced the belief that market players, including potential government users, consider the 700 MHz frequency band to be of particular importance for 5G deployment.

3.1. Actual use

As a result of the competitive procedure held in 2020, the Hungarian mobile operators (Magyar Telekom Plc, Vodafone Hungary[42], Telenor Hungary[43]) were entitled to use a total of 2x25 MHz of Frequency Division Duplex (FDD) spectrum out of the 2x30 MHz spectrum available in the 700 MHz frequency band.

The MFCN networks for the provision of electronic communications services will operate in the 708–733/763–788 MHz frequency range from 6 September 2020, following the switch-off of digital terrestrial television stations.

Current spectrum usage rights are shown in Table 3 and Figure 3.

Operator	Frequency band	Bandwidth	Expiry of entitlement
T	708–718/763–773 MHz	2x10 MHz	2035 (+5 years)
one	718–728/773–783 MHz	2x10 MHz	2035 (+5 years)
Y.	728–733/783–788 MHz	2x5 MHz	2035 (+5 years)

Table 3 – Current use of the 700 MHz frequency band

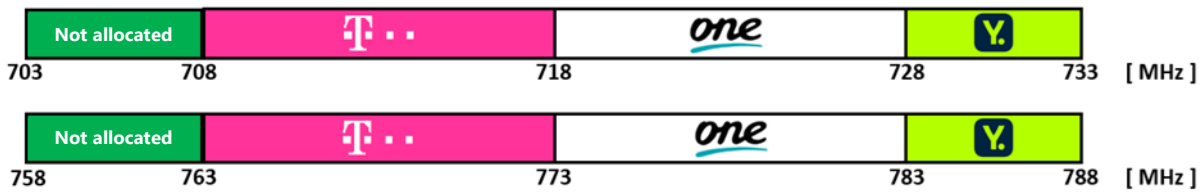

Figure 3 – Current use of the 700 MHz frequency band

[41] Public hearing on the ideas and market needs for frequency bands that can be used for wireless broadband services • National Media and Infocommunications Authority (nmhh.hu)
[42] One Hungary Zrt. from 1 January 2025
[43] Yettel Hungary Zrt. from 1 March 2022

3.2. Possible uses under the current legislation

The arrangement and current use of the 700 MHz frequency band, with the sub-band in designated status and the duplex gap, is summarised in Figure 4.

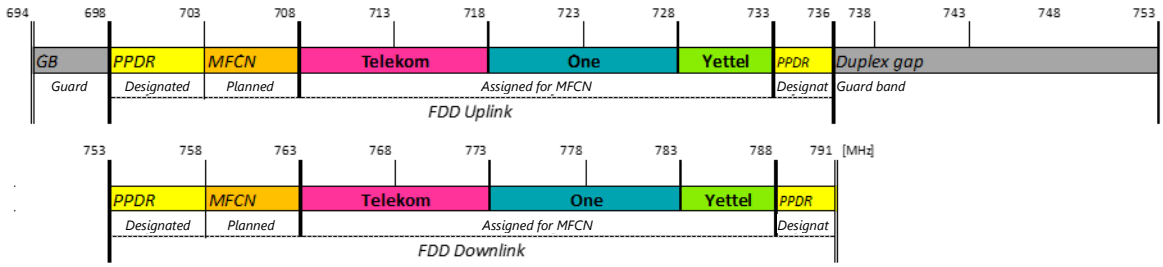

Figure 4 – Designated and planned use of the 700 MHz frequency band under the current regulation

3.3. Further options for use of the duplex gap

The 736–753 MHz sub-band can be used for a number of purposes according to emerging needs, such as:

- use of the 736–753 MHz frequency range for PMSE purposes according to ERC Recommendation 25-10 [44] (Figure 5)

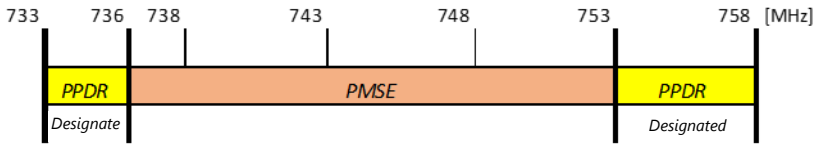

Figure 5 – Possibility of PMSE in the duplex gap

- use of the 738-753 MHz frequency band for MFCN SDL (maximum 3x5 MHz block) (Figure 6)

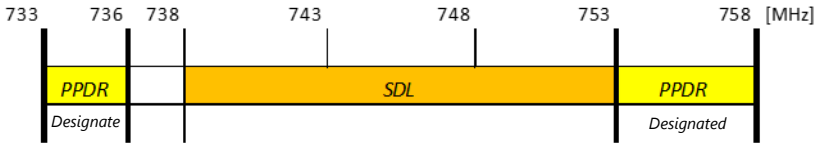

Figure 6: Possibility of SDL in the duplex gap

The purpose of the present consultation is, inter alia, to assess the spectrum usage needs for the use of the duplex gap in the 700 MHz frequency band.

[44] ERC/REC 25-10: Frequency Ranges for the Use of Terrestrial Audio and Video Programme Making and Special Events (PMSE) applications

4. Frequency use and international coordination beyond the borders

In Hungary and most of the neighbouring countries, the 700 MHz frequency band is currently used for MFCN. The switch-off of terrestrial television broadcasting in two of the countries concerned (Ukraine and Bosnia and Herzegovina) has not yet been completed, but these countries are also expected to introduce MFCN in the longer term. Among the neighbouring countries, Ukraine also operates aeronautical radio navigation systems in the 700 MHz frequency band. In the framework of the RSPG good offices working group, negotiations are ongoing between Ukraine and the European Union to retune Ukrainian broadcasters causing interference in the 700 MHz frequency band. The financial conditions for the retransmission of Ukrainian broadcasters were discussed. If a decision is taken on funding, the interference could be resolved within a few months. During the EU accession negotiations, Ukraine committed, inter alia, to use the 700 MHz frequency band in line with the harmonisation rules. Ukraine plans to launch a competitive procedure for the use of MFCN by 2027. However, due to the ongoing war, it is extremely uncertain whether this will occur as planned. Our measurements indicate that no interference is expected from transmitters in Bosnia and Herzegovina in the 700 MHz frequency band.

As for the use of radio frequencies in national border zones, only stations meeting prevailing relevant conditions set forth in international coordination documents may be permitted.

The international coordination requirements have been developed in the competent CEPT working groups. In 2018, Hungary signed a coordination agreement[45] based on ECC/REC/(15)01[46] with Austria, Slovenia, Croatia, Romania, and Slovakia, among the neighbouring countries. Serbia indicated its intention to join the 700 MHz agreement in 2024, and we have proposed to update the agreement signed in 2018 to include NR. In addition to Serbia, Austria, Croatia, Slovakia, and Slovenia have so far joined the agreement, extended for NR, while negotiations are still ongoing with Romania.

The coordination agreement is based on the field strength limitations applicable in border zones and the use of preferred codes; accordingly, if the countries concerned adhere to the values specified in the agreement, individual coordination is not necessary.

Hungary has already successfully concluded an agreement[47] with Ukraine for the coordination procedure between MFCN and the aeronautical radio navigation service regarding the 700 MHz frequency band.

[45] Technical Arrangement on border coordination for terrestrial systems capable of providing electronic communications services in the 700 MHz frequency band (Budapest, 15th February 2018)

[46] ECC/REC/(15)01: Cross-border coordination for Mobile/Fixed Communications Networks (MFCN) in the frequency bands: 694–790 MHz, 1427–1518 MHz and 3400–3800 MHz

[47] Technical Arrangement concerning the use of the frequency band 694–790 MHz for terrestrial systems in the border areas of Hungary and Ukraine (October 2015)

5. Other potential interference problems

One of the main goals of radio spectrum regulation is to protect various radio services or applications from interference. When introducing new technologies, particular attention must be paid to the protection of radio applications operating in the same or adjacent frequency bands and to avoid any interference between them, at the same time taking precautions to avoid any interference phenomena in wired technologies as well.

5.1. Terrestrial television broadcasting

For the purpose of protecting the digital television broadcasting stations operating in the bands below the 700 MHz frequency range, the out of band emission limits have been determined so as to protect the 48th television channel if the guard bands are maintained.

If, despite full compliance with applicable technical requirements, harmful interference occurs or there is reason to suspect its presence, all operators affected shall take action as needed and cooperate in eliminating interference within the possible shortest timeframe.

In case of the introduction of the BB-PPDR application that can be implemented in the guard band (698–703/753–758 MHz), the application of the interference mitigation techniques recommended in ECC Report 239 for the protection of digital television operating below 694 MHz.

5.2. PMSE

Based on the National Roadmap, the PMSE use of the 700 MHz frequency band is not planned. Under NFFF, PMSE equipment were allowed to operate in this frequency band until 5 September 2020; however, if no need arises to use SDL, PMSE use may also be an option. The protection of PMSE devices operating in the frequency band below the 694 MHz band is planned at least until 2030 by Decision (EU) 2017/899 of the European Parliament and of the Council. Commission Implementing Decision (EU) 2016/687 also specifies that terrestrial wireless broadband electronic communications services in the 700 MHz frequency band and the other national options introduced in the frequency band must ensure, in accordance with their regulatory statuses, the appropriate protection of the existing wireless PMSE applications below 694 MHz. To ensure the compatibility of the wireless audio frequency PMSE equipment and mobile electronic communications networks using the adjacent frequency bands, the application of solutions similar to those described in Commission Implementing Decision 2014/641/EU[48] to mitigate interference may be necessary.

5.3. Cable television

Based on the experience gained in the 800 MHz frequency band and in relation to the use of the 700 MHz frequency band, it was established that LTE terminal equipment can cause

[48] Commission Implementing Decision of 1 September 2014 on harmonised technical conditions of radio spectrum use by wireless audio programme making and special events equipment in the Union

interference in set top boxes resulting in reduced image quality and loss of data transmission, and the LTE base stations installed nearby may also cause further interference.

In order to ensure seamless interoperability of cable TV networks and broadband mobile systems operating in the 700 MHz frequency band, full compliance with technical requirements (e.g. use of quality equipment, cables and modems compatible with standards and electromagnetic compatibility regulations, installation of connection points, use of appropriate receiver equipment) and a precise cable TV network design are required. For purposes of minimising interference, affected service providers shall take whatever steps are required to ensure customers receive adequate information (e.g. user manuals, information brochures) and mutually cooperate so as to eliminate any possible interference at the shortest possible notice.

6. Radio spectrum fees

The calculation method of the regular radio spectrum fee is described in NMHH Decree 1/2011 (III. 31.) on frequency reservation and usage fees. In the case of radio spectrum used for a service and acquired through a competitive procedure, as a result of the extension of the right to use radio spectrum or as a result of the renewal of the right to use radio spectrum, and, in the case of radio spectrum resold after acquisition, for the duration of the right to use radio spectrum, the right holder shall be subject to payment of a band fee, starting 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 the auction or tender for obtaining the right to use radio spectrum.