



NMHH

Nemzeti Média- és Hírközlési Hatóság

Band introduction the 694-790 MHz band

7 November 2017

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1. Summary

The International Radio Regulations, adopted by the World Radiocommunication Conference (WRC-15¹) in 2015, allocated the 694-790 MHz band (700 MHz band) currently used for broadcasting, to both broadcasting and mobile services (except for aeronautical mobile services), on a co-primary basis. The band below the 700 MHz frequency range (470-694 MHz) will continue to be allocated solely to the broadcasting service on a primary basis.

The European Commission's Digital Single Market Strategy² has already highlighted the importance of the 700 MHz band in the provision of broadband services in rural areas, and stressed the need for the release of a harmonised spectrum bandwidth that would also be suitable for fulfilling the specific needs of audiovisual media broadcasting, in order to promote investments affecting the establishment of high-speed broadband networks and to enhance the spread of advanced digital services. With regard to the future mobile broadband utilisation of the 700 MHz band, Commission Implementing Decision (EU) 2016/687 containing the harmonised conditions for the use of the band³ (hereinafter: "Commission Implementing Decision") was adopted, and a Decision of the Parliament and of the Council was elaborated⁴, which, in respect of the further utilisation of the full 470-790 MHz band currently used for broadcasting, stipulates the Member States' obligations, including the related deadlines, as well as expectations regarding the future of TV broadcasting.

The Commission Implementing Decision provides a flexible framework for Member States to regulate the use of the 700 MHz band. Within this regulatory framework, the 2×30 MHz bandwidth within the 700 MHz band must be made compulsorily available to mobile and fixed communications networks (MFCNs⁵) suitable for providing wireless broadband communication services, while in other sub-bands the use options should be available at national level, subject to fulfilment of the specified technical conditions. Such optional usages include: broadband radio applications for public protection and disaster relief (hereinafter: BB-PPDR⁶), supplemental downlink communications necessary for increased downlink traffic (SDL⁷), applications related to broadcasting, programme making and special events (hereinafter: PMSE⁸ applications) and machine-to-machine communication (hereinafter: M2M⁹).

The issue of utilising the 700 MHz frequency band relates to a number of strongly interrelated processes of frequency management and a number of frequency using industries (e.g. media, emergency organisations, healthcare, transportation). A typical key issue is the construction of broadband PPDR networks in the 700 MHz band, for which there are several options considering the available frequency bands (e.g. availability of the 400 MHz band besides the 700 MHz band) or the nature of the implementation (operation of a dedicated government network, use of services provided on a commercial basis or a hybrid solution combining both).

¹ World Radiocommunication Conference 2015, Geneva, 2-27 November 2015

² http://ec.europa.eu/priorities/digital-single-market/index_hu.htm

³ (EU) 2016/687: 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;

⁴ (EU) 2017/899: 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

⁵ MFCN: Mobile/Fixed Communications Networks (With regards to the convergence of the fixed and mobile wireless communication services, the CEPT regulation introduced the umbrella term 'MFCN' (Mobile/Fixed Communication Networks). This also includes the IMT (International Mobile Telecommunication) systems used in ITU terminology.)

⁶ BB-PPDR: Broadband: Public Protection and Disaster Relief

⁷ SDL: Supplemental Downlink

⁸ PMSE: Programme Making and Special Events

⁹ M2M: Machine to Machine

In line with international efforts, the provision and the licensing, as required, of the radio spectrum necessary for the further development of mobile broadband services is one of the key strategic goals of the National Media and Infocommunications Authority (hereinafter: NMHH) for the period between 2016-2020, and in this context it has been specified as a specific goal, that the conditions for mobile band usage in the 694-790 MHz band must be prepared and the sale must be completed by the date specified in the EU legislation for clearing the band. The fundamental decisions on the future of the band were set out¹⁰ in the National Roadmap.

The entitlement to frequency use for the operation of the broadcasting networks also affecting the 700 MHz band will expire on 5 September 2020, after which date the band may become available for mobile service applications. The National Roadmap determined the date of the tender for the subsequent period (which no longer covers the 700 MHz frequency band) in an effort to ensure continuity of the broadcasting service.

In order to make possible the use of the 700 MHz band for mobile purposes, a number of national law amendments are required. As a first step, NMHH decree 7/2015 (XI.13.) on the national frequency allocation and the rules of using frequency bands (hereinafter: NFFF) was amended through the adoption of the mandatory technical harmonisation criteria. The NFF amendment containing the detailed regulation concerning the mobile use of the band will take place after demand is assessed and the necessary decisions are made.

¹⁰ National Roadmap for the utilisation of the VHF III (174-230 MHz) and UHF (470-790 MHz) frequency bands, published by the NMHH after prior public consultation, on 8 September 2017 on its http://nmhh.hu/dokumentum/189921/uhf_nemzeti_utemterv.pdf website.

2. Introduction

Due to increase in demand for a frequency spectrum that can be used for broadband mobile services, investigations have started, at international level, over the recent years on how to release for mobile purposes the frequency bands that have been designated for other service providers and are currently used by them; demand for this is continuously increasing, thanks to which the scope of the aforementioned investigations is continually being extended. The digitalisation of broadcasting rendered the use of the broadcasting frequencies more efficient, therefore the possibility of freeing up a part of the UHF band allocated for terrestrial television broadcasting,¹¹ the so-called digital dividend¹² for mobile purposes was examined. As a first step, examining the use of the 790-862 MHz band (hereinafter: 800 MHz band or “digital dividend 1”, DD1), while as a second step, examining the use of the 694-790 MHz band (hereinafter: 700 MHz band or “digital dividend 2”, DD2) terrestrial systems capable of providing wireless broadband electronic communications services other than broadcasting was carried out.

The physical properties characteristic of the band allow the cost-efficient coverage of large territories, the spectrum in the 700 MHz frequency band allows further capacity as well as nationwide coverage, on the one hand in the rural areas in a more difficult economic situation, and on the other hand for indoor use and for Machine to Machine for distant machines.

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 band. As a national option, part of the 700 MHz 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. The national options that can be introduced in the 700 MHz band also include BB-PPDR operated on independent networks or terrestrial systems capable of providing electronic communications services, wireless audio frequency PMSE applications and M2M.

The 700 MHz band is of particular importance in 5G implementation as well. The 5th generation mobile technology introduced in ITU terminology as ‘IMT-2020’¹³ opens up new horizons for mobile communications., and ensuring the new 5G spectrum is one of the most important current tasks in the areas of frequency management and standardisation. Based on the¹⁴ expert's statement of RSPG issued in the subject of the questions of 5G¹⁵, the 700 MHz band is one of the 5G pioneer bands. In order to fulfil 5G user demands, they equally require both lower and higher frequency ranges, and therefore, of all the bandwidths below 1 GHz, the 700 MHz band is exceptionally suitable for this purpose, considering that this band is globally usable, it may become widely available to the mobile market even by 2020, and is suitable for covering large areas cost-effectively.

¹¹ UHF IV. band: 470-582 MHz, UHF V. band: 582-862 MHz

¹² DD: Digital Dividend

¹³ International Mobile Telecommunications 2020

¹⁴ 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.

¹⁵ RADIO SPECTRUM POLICY GROUP STRATEGIC ROADMAP TOWARDS 5G FOR EUROPE Opinion on spectrum related aspects for next-generation wireless systems (5G), 9 November 2016

3. Current use

The 700 MHz band is currently used by most countries – including Hungary – to operate terrestrial television broadcasting and wireless audio frequency PMSE equipment. The 700 MHz band has, in addition to broadcasting, also been available for mobile broadband applications, on a co-primary basis since 2015.

Some Member States have already begun, or even completed, the sales process for the use of the 700 MHz band for terrestrial wireless broadband electronic communications services, although most European countries, including Hungary, are still in the strategy development phase.

3.1. International regulation

Making the 700 MHz frequency band available for the mobile broadband applications required lengthy international preparation, the international organisations and groups responsible for frequency management (ITU¹⁶, CEPT¹⁷, European Commission, RSPG¹⁸ and RSC¹⁹) have been working since 2012 on elaborating the conditions of spectrum use and the regulatory framework.

3.1.1. ITU

Annex 1 of the NFFF contains the international allocation according to the International Radio Regulations. The currently effective NFFF has not yet implemented the results of the WRC-15; the incorporation of the amendments accepted at WRC-15 will take place at the next general revision of the NFFF.

According to the currently effective International Radio Regulations, the 694-790 MHz band is allocated for broadcasting and mobile services (with the exception of aerial mobile) on a primary basis.

The use for broadcasting was regulated by the agreement and frequency plan (GE06²⁰) approved at the Regional Radiocommunication Conference (RRC-06²¹) 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.

In Region 1 of the ITU,²² the use of the 694-790 MHz frequency band for mobile services (with the exception of aerial mobile) has been approved by WRC-15, while keeping the primary nature of broadcasting.

The conditions of use of mobile services 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)²³. See also Resolution 224. (Rev.WRC-15)²⁴. (WRC-15)*

¹⁶ ITU: International Telecommunication Union

¹⁷ CEPT: Conférence européenne des Administrations des postes et des télécommunications – European Conference of Postal and Telecommunications Administrations

¹⁸ RSPG: Radio Spectrum Policy Group

¹⁹ RSC: Radio Spectrum Committee

²⁰ 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

²¹ Regional Radiocommunication Conference (RRC-06), Geneva, 2006

²² Europe, Africa and part of Asia.

²³ 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

²⁴ RESOLUTION 224 (REV.WRC-15); Frequency bands for the terrestrial component of International Mobile

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 (IMT²⁵) – see Resolutions **224. (Rev.WRC-15), 760. (WRC-15) and 749. (Rev.WRC-15)**²⁶, 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 priority in the Radio Regulations. (WRC-15)*

Following the WRC-15 conference, the 700 MHz band became primary in all three regions of the ITU for mobile services (besides broadcasting), and may be used for broadband mobile service applications. 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 and channel arrangements identified for IMT are listed in the ITU-R M. 1036-5²⁷ recommendation. In some countries, the 700 MHz band is allocated on a primary basis for aeronautical radionavigation service (hereinafter: ARNS²⁸), based on footnote 5.312 of the International Radio Regulations:

5.312 *Additional allocation: in Armenia, Azerbaijan, Belarus, the Russian Federation, Georgia, Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, Turkmenistan and Ukraine, the band 645–862 MHz, in Bulgaria the bands 646–686 MHz, 726–758 MHz, 766–814 MHz and 822–862 MHz, and in Poland, the band 860–862 MHz until 31 December 2017, are also allocated to the aeronautical radionavigation service on a primary basis. (WRC-15)*

The use of the 700 MHz band for IMT purposes raised a number of regulatory questions, including the determination of the permissible emission levels of mobile user devices out of the 700 MHz band (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 regulation is 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 may significantly limit the use of the 700 MHz band for mobile service, therefore bilateral coordination agreements had to be concluded to allow the IMT use of the 700 MHz band to avoid the problems arising from the different bandwidth 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.

Based on footnote 5.296, the 470–698 MHz band, has been allocated, on a secondary basis in several countries for mobile service for applications assisting broadcasting and programme production.

In coherence with the allocation of the 694-790 MHz band for mobile purposes, WRC-15 also amended footnote 5.296 of the RR concerning the secondary use of the 470-698 MHz band affecting part of the 700 MHz band, to which Hungary also acceded during the conference:

Telecommunications below 1 GHz

²⁵ IMT: International Mobile Telecommunications

²⁶ 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

²⁷ 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)

²⁸ ARNS: Aeronautical Radionavigation Service

5.296 Additional allocation: in Albania, Germany, Angola, Saudi Arabia, Austria, Bahrain, Belgium, Benin, Bosnia and Herzegovina, Botswana, Bulgaria, Burkina Faso, Burundi, Cameroon, Vatican, Congo (Rep. of the), Côte d'Ivoire, Croatia, Denmark, Djibouti, Egypt, United Arab Emirates, Spain, Estonia, Finland, France, Gabon, Georgia, Ghana, Hungary, Iraq, Ireland, Iceland, Israel, Italy, Jordan, Kenya, Kuwait, Lesotho, Latvia, The Former Yugoslav Republic of Macedonia, Lebanon, Libya, Liechtenstein, Lithuania, Luxembourg, Malawi, Mali, Malta, Morocco, Mauritius, Mauritania, Moldova, Monaco, Mozambique, Namibia, Niger, Nigeria, Norway, Oman, Uganda, the Netherlands, Poland, Portugal, Qatar, the Syrian Arab Republic, Slovakia, the Czech Republic, the United Kingdom, Rwanda, San Marino, Serbia, Sudan, South Africa, Sweden, Switzerland, Swaziland, Tanzania, Chad, Togo, Tunisia, Turkey, Ukraine, Zambia and Zimbabwe, the frequency band 470–694 MHz is also allocated on a secondary basis to the land mobile service, intended for applications ancillary to broadcasting and programme-making. Stations of the land mobile service in the countries listed in this footnote shall not cause harmful interference to existing or planned stations operating in accordance with the Table in countries other than those listed in this footnote. (WRC-15).

3.1.2. CEPT

Following the decision of the WRC-12, investigations within CEPT began in order to establish the technical and regulatory conditions for the use of the 700 MHz band for terrestrial systems capable of providing wireless broadband services.

In February 2013, the European Commission mandated²⁹ CEPT to carry out the tests in connection with the technical and regulatory questions of the 700 MHz band and the preparation of the appropriate reports.

Two reports have been elaborated on the EU's mandate within CEPT:

- CEPT report 53³⁰ (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 60³¹ – (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 form the basis for the harmonised technical conditions of the use of the 700 MHz band for wireless broadband electronic communications services, and examine the technical conditions of using PMSE devices in the 700 MHz band below 694 MHz.

In connection with the use of the 700 MHz band for MFCN, further CEPT documents have been accepted with the approval of ECC³²:

- Decision ECC/DEC/15(01)³³ containing the harmonised technical conditions of the use of the 700 MHz band for MFCN purposes, for example the recommended channel arrangement for

²⁹ 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

³⁰ 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" (Report approved on 28 November 2014 by the ECC)

³¹ CEPT Report 53 - 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" (Report approved on 28 November 2014 by the ECC)

³² ECC: Electronic Communications Committee

the 700 MHz band and the maximum emission power values ensuring the coexistence of the various radio services;

- ECC Report 199³⁴ containing the examination of spectrum demand for broadband PPDR (BB-PPDR) systems, taking into account the various user requirements. Accordingly, the minimum spectrum demand of BB-PPDR networks of nationwide coverage (BB-PPDR WAN³⁵) is 2x10 MHz, which may be implemented in whole or in part, depending on the national decision, in the 700 MHz band.
- ECC Report 218³⁶ containing the frequency band options that can be designated for BB-PPDR and the harmonised technical conditions for the 700 MHz and 400 MHz bands;
- ECC Report 239³⁷ containing the compatibility tests of broadband PPDR (BB-PPDR) for the 700 MHz band;
- Decision ECC/REC/16(02)³⁸ containing the harmonised technical conditions and frequency bands for use for BB-PPDR (in the 700 MHz and 450 MHz bands);
- ECC Report 242³⁹ containing the compatibility tests and technical conditions of band allocation for the M2M applications that can be operated in the 733-736 MHz/788-791 MHz band;
- ECC Report 266⁴⁰ examining the implementation possibilities of M2M applications based on narrowband and broadband cell systems in the harmonised MFCN bands – among them the 700 MHz band – under the technical regulatory conditions accepted for MFCN. In the 700 MHz band the LTE MTC and eMTC, and the NB-IoT can be introduced within the MFCN systems.
- ECC Report 221⁴¹ containing the compatibility tests between PMSE and MFCN operating between adjacent bands;
- Recommendation ECC/REC/(15)01⁴² containing the coordination provisions concerning MFCN systems in the 700 MHz band (and the 1452-1492 MHz and 3400-3800 MHz bands);
- Recommendation ECC/REC/(16)03⁴³ containing the coordination provisions for the PPDR systems.

³³ ECC Decision (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) (06 March 2015)

³⁴ ECC Report 199: User requirements and spectrum needs for future European broadband PPDR systems (Wide Area Networks) (May 2013)

³⁵ BB-PPDR WAN: Broadband Public Protection and Disaster Relief Wide Area Network

³⁶ ECC Report 218: Harmonised conditions and spectrum bands for the implementation of future European Broadband Public Protection and Disaster Relief (BB-PPDR) systems (Approved October 2015)

³⁷ ECC Report 239 Compatibility and sharing studies for BB PPDR systems operating in the 700 MHz range (Approved 30 September 2015)

³⁸ ECC Decision (16)02: Harmonised technical conditions and frequency bands for the implementation of Broadband Public Protection and Disaster Relief (BB-PPDR) systems (Approved 17 June 2016)

³⁹ ECC Report 242: Compatibility and sharing studies for M2M applications in the 733-736 MHz/788-791 MHz band (Approved 04 March 2016)

⁴⁰ Draft 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

⁴¹ ECC Report 221: Adjacent band compatibility between MFCN and PMSE audio applications in the 700 MHz frequency band (Approved September 2014)

⁴² ECC Recommendation (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 Approved 13 February 2015

⁴³ ECC Recommendation (16)03 Cross-border coordination for Broadband Public Protection and Disaster Relief (BB-PPDR)

The CEPT regulation accepted for the 700 MHz band ensures flexible harmonisation, which provides a harmonised MFCN channel arrangement in the 694-790 MHz band and, adjusting certain sub-bands of the guard band and/or the use of the duplex gap for supplemental downlink (SDL), PMSE, PPDR or M2M applications.

The harmonised channel arrangement for MFCN and the harmonised technical conditions for MFCN use are also described in Decision CEPT ECC/DEC/15(01). Figure 1 shows the harmonised channel arrangement recommended in the decision.

694-703	703-708	708-713	713-718	718-723	723-728	728-733	733-738	738-743	743-748	748-753	753-758	758-763	763-768	768-773	773-778	778-783	783-788	788-791		
Védő sáv	Uplink						Duplex rés	Downlink						Védő sáv						
							Duplex rés	SDL												
9 MHz	30 MHz (6 db 5 MHz-es blokk)						5 MHz	20 MHz (max. 4 db 5 MHz-es blokk)						30 MHz (6 db 5 MHz-es blokk)						3 MHz

Védősáv	Guard band
Duplex rés	Duplex gap
6 db 5 MHz-es blokk	6 x 5 MHz blocks
max. 4 db 5 MHz-es blokk	max. 4 x 5 MHz blocks

Figure 1: MFCN frequency arrangement (source: ECC/DEC/(15)01)

In accordance with the flexible harmonisation according to decision ECC/DEC/15(01), the 694-790 MHz band contains a harmonised MFCN channel arrangement, which includes a paired 2x30 MHz FDD frequency arrangement and an optional unpaired arrangement for SDL purposes, containing a maximum of 4 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 bandwidths within the 5 MHz blocks.
- In case of FDD arrangement, the carrier bands of end user equipment and the base stations can be found in the frequency ranges of 703-733 MHz and 758-788 MHz 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 continuous blocks used for SDL, depending on national demand, may be made on a national level
- Besides MFCN (FDD and SDL) decision may be made on non-MFCN options (such as PPDR, PMSE, M2M) on a national level within the scope of flexible harmonisation.

Thanks to the application of the block edge mask (hereinafter: BEM) determined by CEPT, it is possible to allow more than one services use certain parts of the band, such as the undisturbed adjacent operation of PPDR and PMSE in the duplex gap, or ensuring technology neutrality during the use of the use of the bands. The use of the appropriate BEMs allows the use of the sub-bands in question by various services, depending on the demand in the various countries. BEM ensures the least restrictive technical conditions for the undisturbed operation of various MFCN networks and MFCN and other 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 band differently (e.g. PPDR and SDL). In case the terrestrial broadcasting should cause interference to MFCN, individual assessment must be carried out by using appropriate interference reduction methods at national level.

For PMSE, the guard band and the duplex gap may be used with the technical conditions published in the decision. The PMSE options available besides the “obligatory” 2x30 MHz are shown in Figure 2:

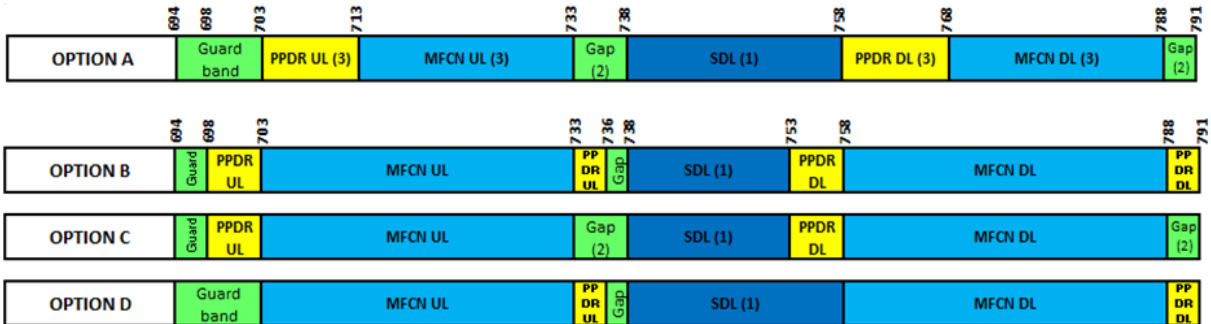


Figure 2: Options of PMSE use in the 700 MHz band

The current spectrum use of PMSE devices and future demand are described in CEPR report 204. The compatibility tests of undisturbed operation between PMSE and MFCN operating between adjacent bands are described in ECC report 221.

The frequency bands usable for the introduction of broadband PPDR (BB-PPDR) are listed in Decision ECC/DEC/(16)02 (See Figure 3). The decision is based on the results of ECC report 218 examining PPDR spectrum allocation possibilities, which originally elaborated six options for the introduction of PPDR in the 700 MHz band (option E was eventually rejected due to reasons of implementation):

PPDR dedicated spectrum



Combination of use of dedicated spectrum and MFCN band



Figure 3: Options of PPDR use in the 700 MHz band

After studying the various frequency options, Decision ECC/DEC/(16)02 identified the following bands in the 700 MHz band for purposes of BB-PPDR:

- 698-703 MHz (uplink) / 753-758 MHz (downlink);
- 733-736 MHz (uplink) / 788-791 MHz (downlink);
- 703-733 MHz (uplink) / 758-788 MHz (downlink).

If the PPDR is designated within the 703-733 MHz (uplink) / 758-788 MHz (downlink) sub-band designated for MFCN, the least restrictive technical conditions specified for MFCN in decision ECC/DEC/(15)01 must be met.

If the BB-PPDR is implemented in the dedicated 698-703 MHz (uplink) / 753-758 MHz (downlink) and/or the 733-736 MHz (uplink) / 788-791 MHz (downlink) bands, the technical conditions are described in Annex 1 of the ECC/DEC/(16)02 Decision.

The M2M systems can be implemented in the 700 MHz 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 band may also be designated for M2M in the 733-736 MHz / 788-791 MHz sub-bands (the sub-band separating the duplex sub-bands and in the guard band).

The results of the compatibility tests 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 band and the emerging compatibility cases in case of adjacent M2M and MFCN/SDL, PMSE, PPDR in the adjacent bands are summarised in Figure 4.

Bands	694-698	698-703	703-733	733-736	736-738	738-743	743-748	748-753	753-758	758-788	788-791	
PPDR 2x3 MHz			UL MFCN Band 28	UL PPDR						DL MFCN Band 28	DL PPDR	
PPDR 2x5 MHz		UL PPDR									DL PPDR	
M2M 2x3 MHz				UL M2M							DL M2M	
SDL 4x5 MHz				DL MFCN SDL								
PMSE	PMSE			PMSE								
Block Size [MHz]	4	5		30	3	2	5	5	5		5	30

Figure 4: Use options of the 700 MHz band (source: ECC Report 242)

3.1.3.EU

Based on the objectives set out for 2020 in the European Union's Digital Agenda, broadband access must be implemented in every household of the European Union by 2020, with speeds at least 30 Mbit/s and with 100 Mbit/s for at least 50% of households. Therefore, the provision of the frequency band required for the targeted data transmission speeds and coverage has become a primary aspect in Decision No 243/2012/EU of the European Parliament and of the Council of 14 March 2012 establishing a multiannual radio spectrum policy programme (hereinafter: RSPP⁴⁴) as well.

The Digital Single Market strategy of the European Commission also highlights the importance of the 700 MHz frequency band for wireless broadband electronic communications services, especially in rural areas.

In Paragraph 32 of the preamble of the RSPP, it is mentioned as an objective of public interest that the cooperation of the security and standby services must be guaranteed by technical solutions by the BB-PPDR radio applications. To ensure the mobile broadband services serving BB-PPDR, adequate harmonised spectrum must be made available in the frequency range below 1 GHz in the next 5-10 years.

With the contribution of the Commission, the member states must set as an objective that they ensure the necessary frequency band for PMSE as well, in coherence with the objectives related to improving the internal market integration of the European Union and access to culture (RSPP Section 8.5). It is a further 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 allocation for the IoT communication among member states (RSPP Section 5.6).

⁴⁴ RSPP: Radio Spectrum Policy Programme

Taking the above objectives into consideration, the decision of the Commission concerning the use of the 700 MHz 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:

- **(EU) 2016/687⁴⁵**: 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) 2017/899⁴⁶**: 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

Commission Implementing Decision (EU) 2016/687 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. Besides, in accordance with the specific national needs, it also aims to flexibly promote national usage in coherence with RSPF'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). Out of the 2x30 MHz sub-bands dedicated for MFCN, depending on national demand, it determines national options for MFCN for the so-called supplemental downlink (SDL) channels implementing asymmetrical traffic, and PPDR, PMSE or IoT applications.

Based on the Commission Implementing Decision, wireless broadband electronic communications services must provide adequate protection for television broadcasting and PMSE devices used below 694 MHz. The member states must make efforts to conclude bilateral agreements with the neighbouring countries (whether EU member states or not) to avoid harmful interference and to use the spectrum efficiently.

According to the Decision, if a member state designates the 700 MHz for use other than high power broadcasting networks, the following frequency arrangement must be used:

MFCN: in the 703–733 MHz and 758–788 MHz frequency ranges:

- The size of the designated blocks is an integer multiple of 5 MHz (5 MHz or greater; this does not hinder the application of smaller channel bandwidths within a designated block);
- The operational mode is Frequency Division Duplex (FDD); the duplex distance is 55 MHz so that the transmission of the end user station (uplink FDD) falls in the lower 703-733 MHz frequency band, while the transmission of the base station (downlink FDD) falls in the upper, 758-788 MHz frequency band;
- The lower frequency limit of a designated block coincides with the band limit of 703 MHz, or is shifted by an integer multiple of 5 MHz.
- PPDR can be implemented in the frequency band designated for MFCN, in which case the technical conditions concerning wireless broadband electronic communications services must also be applied.

SDL: In the 738-758 MHz frequency band (optional):

⁴⁵ 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)

⁴⁶ 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 upper band limit of the designated spectrum range is 758 MHz or 753 MHz; the latter can be applied when BB-PPDR is introduced from 753 MHz;
- The lower band limit if the designated spectrum range is one of the following: 738 MHz, 743 MHz, 748 MHz or 753 MHz;
- The operational mode is restricted to downlink transmission (SDL) only by the base station;
- In the designated spectrum range, the size of the designated blocks is an integer multiple of 5 MHz (1); the upper frequency limit of a designated block coincides with the upper band limit or is shifted by an integer multiple of 5 MHz.

BB-PPDR: 698-703 MHz, 733-736 MHz, 753-758 MHz and 788-791 MHz (optional)

- The operational mode is Frequency Division Duplex; the duplex distance is 55 MHz so that the transmission of the end user station (uplink PPDR) falls in one or both of the 698-703 MHz and the 733-736 MHz frequency bands, while the transmission of the base station (downlink PPDR) falls in one or both of the 753-758 MHz and the 788-791 MHz frequency bands;
- The 703-733 MHz and the 758-788 MHz frequency band or part of these may be used for PPDR applications.

M2M: 733-736 MHz and 788-791 MHz (optional)

- The operational mode is Frequency Division Duplex; the duplex distance is 55 MHz so that the transmission of the end user station (uplink M2M) falls in the 733-736 MHz frequency band, while the transmission of the base station (downlink M2M) falls in the 788-791 MHz frequency band.

PMSE: 694-703 MHz and/or 733-758 MHz (optional)

- audio frequency PMSE, indoor use;
- member states may decide on channel arrangement;
- solutions to reduce interference may have to be applied.

The technical parameters collectively known as block edge mask (BEM) for the base stations and mobile end user stations contained in the annex of the implementing decision must be used to ensure the simultaneous operation of such neighbouring networks and to protect the other services and applications using the adjacent bands.

Certain provisions of the implementing decision 2016/687EU for the 694-790 MHz also apply to the **790-791 MHz** frequency range, which overlaps the 790-862 MHz band. Therefore, the harmonised conditions of the 790-791 MHz frequency range in the present decision must be applied so as to ensure the provisions of the 2010/267/EU for the 800 MHz band (790-862 MHz) 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 band, and also includes provisions for the 470-694 MHz frequency band.

3.2. National regulation

With the amendment of the NFFF effective as of 10 October 2017, the compulsory implementation for legal harmonisation of the implementing decision corresponding to the use of the 700 MHz band in the domestic regulation has been carried out.

According to the effective NFFF, in Hungary, the 694-790 MHz frequency band is allocated besides broadcasting for mobile services (with the exception of aerial mobile services) and fixed services, on a primary basis.

Based on Annex 2, frequency may be allocated on a primary basis for terrestrial digital television broadcasting in the 694-790 MHz, according to GE06. Television stations may operate until 5 September 2020.

On a secondary basis, bands may be allocated for radio and television news transmission with territorial restrictions, and on a tertiary basis for radio microphone and radio determination applications of Short Range Devices (SRD⁴⁷) may also operate. The regulation of use is described in Annexes 2, 3 and 5 of the NFFF. According to the regulation, SRD devices may be exempt from individual licensing, with permissible powers up to 50 mW ERP in the 694-786 MHz band and 12 mW ERP in the 786-789 MHz band. Transmission of radio and television news and PMSE stations may operate until 5 September 2020.

With the compulsory implementation for legal harmonisation of the implementing decision for the use of the 700 MHz band, the 694-790 MHz band is primarily planned for terrestrial systems capable of providing wireless broadband electronic communications services electronic communications services in the 703-733/758-788 MHz bad and for broadband digital PPDR systems in the 698-703/753-758 MHz and 733-736/788-791 MHz bands.

3.3. Actual use

The 700 MHz band is primarily used in Hungary for terrestrial television broadcasting. As a result of the tendering procedure conducted in 2008, Antenna Hungária Zrt. has acquired entitlement to operate five digital broadcasting networks of nationwide coverage, in accordance with the public contract NH-31249-1/2008, with validity expiring in 5 September 2020. Upon announcement of the tender, the entire 470-862 MHz band was available (UHF IV. and V. bands, 21-60. TV channels) for broadcasting, but the migration of the digital television stations operating in the 790-862 MHz band into the 470-790 MHz band has been completed until 31 December 2013 by freeing up the 800 MHz.

A total of 12 8 MHz wide television channels may be placed in the 694-790 MHz band (49-60. TV channels), all of which are in use in Hungarian nationwide digital television networks. Currently 118 DVB-T stations operate in these channels in the nationwide network. Besides the nationwide networks, a total of 14 local DVB-T stations are also operating.

In the 700 MHz band (in the entire UHF band under 862 MHz according to the effective NFFF), the use of wireless audio frequency PMSE devices – within that mostly radio microphones that can be used without licence – is also significant. These devices may operate in a given area in the unused frequencies of the digital terrestrial broadcasting network, and in a harmonised manner in the 823-832 MHz band. As regards PMSE devices, it is difficult to establish the extent of use, as their use does not require individual licensing. Local PMSE use on a temporary basis may take place in any part of the country, but the most significant PMSE uses are expected to occur during the Hungaroring events.

⁴⁷ SRD: Short Range Device

4. Future use

Similarly to the 800 MHz band, the 700 MHz band is mainly beneficial to cover the scarcely populated rural areas because it allows for cost-effective wide area coverage using a large cell structure. In addition to its wave propagation characteristics, this band proves also advantageous for coverage within a building when considering attenuation during penetration through buildings and walls.

Based on the Commission Implementing Decision, wireless broadband electronic communications service that can be implemented by mobile and fixed communications networks (FDD and SDL based MFCN) and other non-MFCN applications (BB-PPDR, M2M, PMSE) may also be introduced in the band.

The 700 MHz band is of particular importance in 5G implementation as well. RSPG has identified three frequency bands that can soon (before the 2019 World Radiocommunication Conference) help in 5G implementation; this includes the 700 MHz band as well.

4.1. International regulation

Concerning the future use of the 700 MHz frequency band, a coordinated approach is necessary at national and international level; the smooth transition between the current broadcasting use and the introduction of the future mobile service applications must be ensured.

The decisions and examinations concerning the use of the 700 MHz band for mobile services have been concluded at an international level, therefore the most important regulatory tasks of the near future include the decisions on the future use of the band and the implementation of the corresponding amendments into the domestic regulation.

4.1.1. ITU

In accordance with the contents of Section 3.1.1., following the amendments accepted at WRC-15, the International Radio Regulations includes primary allocation in the 700 MHz band for broadcasting and mobile services (with the exception of aerial mobile) in all three regions of the ITU, and identifies the frequency band for IMT purposes. The amendment of the regulation concerning the band is not on the next WRC's agenda.

In some countries (e.g. USA, Canada, Brazil, Mexico), the 470-694 MHz frequency band was allocated after WRC-15 (in whole or in part) on a primary basis for mobile services and the introduction of the IMT became possible. The mobile service stations of the IMT system in these countries may operate according to the agreement concluded as per Paragraph 9.21 and may not cause harmful interference for the broadcasting services of neighbouring countries and may not be entitled to protection against such.

At the WRC-15, a decision in line with the EU's stance was made for ITU Region 1 regarding the 470-694 MHz range, which is to remain available for broadcasting purposes. Consequently, amendments to the Radio Regulations concerning said band is not expected before WRC-23; therefore, broadcasting will remain the primary purpose of the band below 694 MHz. The WRC-15 has decided that the review concerning the use of the 470-694 MHz for IMT purposes will only be included in the agenda for the World Radiocommunication Conference in 2023 (WRC-23).

4.1.2. CEPT

The CEPT regulation for the flexible harmonised use of the 700 MHz band for MFCN and other applications (PPDR, M2M, PMSE) has been approved. The related documents can be found in Chapter 3.1.2.

At CEPT, there are currently ongoing examinations of the possibilities of using MFCN bands – among them the 700 MHz band – for 5G purposes.

4.1.3. EU

The EU regulation for the harmonised use of the 694-790 MHz band has been realised by the approval of Commission Implementing Decision (EU) 2016/687 and Decision (EU) 2017/899 of the European Parliament and of the Council (See section 3.1.3.).

Commission Implementing Decision (EU) 2016/687 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. Besides, in accordance with the specific national needs, it also aims to flexibly promote national usage in coherence with RSPG's spectrum policy priorities.

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 band, and also includes provisions for the 470-694 MHz frequency band.

The 700 MHz band is of key significance from the perspective of introducing 5G. Based on the 5G Action Plan of the European Commission⁴⁸ and the 5G strategic agenda laid down in the RSPG expert's statement⁴⁹ the 700 MHz 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 bands ("pioneer bands").

4.2. National regulatory plans

The NFFF amendment process corresponding to the implementation of the EU law has begun. Based on the Commission Implementing Decision and Decision (EU) 2017/899 of the European Parliament and of the Council, the necessary legislative tasks are intended to be carried out in two phases. As a first step, the minimum harmonisation of technical issues has been completed through the amendment of the latest NFFF. Since the NFFF amendment related to conceptual issues of the tender procedure is still to be completed, the regulation of secondary trading options (Article 2) and the definition of the coverage and quality requirements (Article 3) are expected later.

The amended NFFF, effective as of 10 October 2017 contains the following new possibilities in the planned status:

- Terrestrial systems capable of providing wireless broadband electronic communications services in the 703-733/758-788 MHz band;
- Broadband digital PPDR systems in the 698-703/753-758 MHz, 733-736/788-791 MHz bands.

In addition, it was recorded that:

- The broadcasting stations and the stations used for transmission of radio and television news in mobile services, and the wireless audio frequency PMSE equipment may operate in the 700 MHz band until 5 September 2020;

⁴⁸ 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 Action Plan COM(2016) 588

⁴⁹ RADIO SPECTRUM POLICY GROUP STRATEGIC ROADMAP TOWARDS 5G FOR EUROPE Opinion on spectrum related aspects for next-generation wireless systems (5G), 9 November 2016

- The 470-694 MHz band is allocated for broadcasting at least until 2030 and the PMSE applications may be used until 31 December 2030.

In the course of further formulating the domestic regulation based on the EU legal regulations, the following aspects must be taken into account:

- NMHH must make available the 2x30 MHz (6 x 2x5 MHz blocks) of the spectrum within the 700 MHz frequency band for FDD based MFCN within the frame of an award procedure to ensure that from 6 September 2020 frequency use for MFCN purposes becomes possible in most areas of the country.
- In the course of licensing the use of the 700 MHz frequency band, the objectives described in Decision (EU) 2017/899 of the European Parliament and of the Council must be taken into account (including the speed and quality objectives in the radio spectrum-policy programme), determining the provisions in connection with the coverage of national priority areas (e.g. the provision of covering key terrestrial transport routes or the deliberation of other spectrum usage conditions);
- When licensing the rights for using the 700 MHz band for terrestrial systems capable of providing wireless broadband electronic communications services, the transfer of these rights in coherence with the applicable EU legislation, based on open and transparent procedures, and their leasing must also be licensed.

The introduction of the mobile service in the 700 MHz band may only take place if the broadcasting is terminated in the 49-60 television channels and the migration of the broadcasting networks is carried out in the band below 700 MHz for the 21-48 television channels. The international reconciliations and coordination processes for redesigning the television networks have begun as early as 2010 at the level of multilateral coordination conferences and fora and are expected to be concluded by the end of 2017.

The national roadmaps of the neighbouring countries for the 700 MHz band are not yet known, and therefore we have no precise information on how long the neighbouring countries will use the 700 MHz band for television broadcasting.

The national roadmaps of the neighbouring countries for the 700 MHz band are not yet known, and therefore we have no precise information on how long they will use the 700 MHz band for television broadcasting. Given that the disconnection of the broadcasting is not expected to take place simultaneously in all the countries concerned with respect to coordination, a transitional period may be necessary, in which restrictions are expected in order to protect the broadcasting stations still operating in the neighbouring countries, and interference caused by them is also expected in case of the domestic MFCN networks.

5. Frequency use and coordination beyond the borders

In Hungary and most of the neighbouring countries, the 694-790 MHz band is currently used for terrestrial broadcasting. The digital switchover of terrestrial television broadcasting has not been completed in two countries (Ukraine and Bosnia-Herzegovina), and analogue television stations are also still in operation in these countries. Among the neighbouring countries, the Ukraine has aeronautical radio navigation systems also in place.

National strategies concerning the utilisation of the 700 MHz band are still under preparation in a number of countries; the launch of MFCN is nevertheless expected for the long term.

RSPG has prepared a questionnaire for the use of the 700 MHz frequency band and the fulfilment of the implementation obligations. Some non-EU countries also responded to the questionnaire besides EU member states. The deadline of the frequency migration process concerning the clearing of the 700 MHz band is shown in Figure 5, based on the replies sent to the RSPG questionnaire with the deadline of 30 October 2017.⁵⁰



Figure 6: The date of the planned clearing of the 700 MHz 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.

⁵⁰ The document is available at: <http://rspg-spectrum.eu>

The international coordination requirements for the introduction of the 700 MHz MFCN and the PPDR have been developed in the competent CEPT working groups. The draft of the coordination agreement based on international recommendations⁵¹ was prepared by Hungary and sent to neighbouring Austria, Slovenia, Croatia, Serbia, Romania and Slovakia. The reconciliation of the draft is underway. Austria, Romania and Slovenia indicated their intention to sign; Slovakia and Serbia are not able to sign the current agreement, and Croatia indicated sending its reply soon.

The planned 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, no coordination will be necessary and broadband coverage can be ensured in the border zone. The agreement contains, for the transitional period the technical conditions of the protection of broadcasting and the list of television broadcasting regions to be protected.

Hungary has already successfully concluded an agreement with Ukraine for the coordination procedure between MFCN and the aeronautical radio navigation service⁵² regarding the 700 MHz frequency band.

⁵¹ Draft Technical Arrangement on border coordination for terrestrial systems capable of providing electronic communications services in the 700 MHz frequency band

⁵² 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

6. Other potential interference problems

One of the main goals of radio spectrum regulation is to protect various 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 bands and to avoid any interference between them, at the same time taking precautions to avoid any disturbances in landline technologies as well.

6.1. Terrestrial television broadcasting

The broadband mobile service applications in the 700 MHz band may only be introduced after terrestrial television broadcasting is terminated, therefore no in-band interference among domestic broadcasting networks and mobile networks is expected. The questions of interference between foreign broadcasting networks operating in the 700 MHz band and the mobile networks to be introduced are described in Chapter 5.

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

Commission Implementing Decision (EU) 2016/687 specifies the power thresholds for end user stations, in order to avoid undesirable emissions below 694 MHz (out-of-band). The threshold value of undesirable emissions – 42 dBm/8 MHz is based on DVB-T2 system digital terrestrial television broadcasting and 10 MHz bandwidth wireless broadband systems; the separation of the mid-band frequencies of television broadcasting and wireless broadband systems by 18 MHz (assuming an 8 MHz television channel, a 9 MHz guard band and a 10 MHz bandwidth wireless broadband system). In case of wireless broadband systems of bandwidth other than 10 MHz, the application of interference mitigation technologies may be necessary (e.g. further filtration for television, and the reduction of the in-block power or the reduction of the carrier bandwidth of end user stations). It must also be taken into account that the threshold for undesirable out-of-block emissions was determined based on fixed television reception, therefore interference mitigating techniques may have to be applied to ensure portable indoor reception.

In case of simultaneous operation of wireless broadband systems and broadcasting, the base stations of mobile networks may block the DVB-T receivers (e.g. in case of override in antenna amplifiers), and interference of the receivers of base stations may also happen by the broadcasting transmitters, due to the in-band power of the transmitter or undesirable emissions. In such cases, the base stations (fixed/central stations and repeater stations) must be planned and installed to ensure interference-free operation, or if necessary, to apply appropriate interference mitigation techniques.

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.

6.2. PMSE

Based on the National Roadmap, the PMSE use of the 700 MHz is not planned; PMSE equipment may operate in this band until 5 September 2020, based on the NFFF. The protection of PMSE devices operating in the 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 band must ensure, in accordance with their regulatory statuses, the appropriate protection of the existing wireless audio frequency 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/EU⁵³ to mitigate interference may be necessary.

6.3. Cable television

Based on the experience gained in the 800 MHz band, LTE terminal equipment can cause interference in set top boxes resulting in reduced picture 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 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 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.

⁵³ 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.



7. Frequency fees

For determining the fees to be paid after the use of the 700 MHz frequency band, the Fee Decree will have to be amended, as its Section 20 titled “Fees to be paid for service type bands with block allocation, sold at an auction or a tender” and Annex 9 do not contain this frequency band.

Related documents

- [1] The National Roadmap for the utilisation of the VHF III (174-230 MHz) and UHF (470-790 MHz) frequency bands, (Published by the NMHH on 8 September 2017 on its http://nmhh.hu/dokumentum/189921/uhf_nemzeti_utemterv.pdf website.
- [2] 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.
- [3] 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.
- [4] CEPT report 53 (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);
- [5] CEPT report 60 – (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)
- [6] 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)
- [7] ECC/DEC/(16)02: Harmonised technical conditions and frequency bands for the implementation of Broadband Public Protection and Disaster Relief (BB-PPDR) systems
- [8] ECC Report 199 User requirements and spectrum needs for future European broadband PPDR systems (Wide Area Networks) (May 2013)
- [9] ECC Report 218 Harmonised conditions and spectrum bands for the implementation of future European Broadband Public Protection and Disaster Relief (BB-PPDR) systems (Approved October 2015)
- [10] ECC Report 239 Compatibility and sharing studies for BB PPDR systems operating in the 700 MHz range (Approved 30 September 2015)
- [11] ECC Report 242 Compatibility and sharing studies for M2M applications in the 733-736 MHz / 788-791 MHz band (Approved 04 March 2016)
- [12] ECC Report 221 Adjacent band compatibility between MFCN and PMSE audio applications in the 700 MHz frequency band (Approved September 2014)
- [13] ECC Recommendation (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 Approved 13 February 2015
- [14] Radio Regulations (RR)
- [15] 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)
- [16] 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):



[17]Budapest (2015): Minutes of the UKR – HNG radiocommunications expert meeting on the use of frequency band 694-790 MHz for terrestrial systems Budapest, 5 – 6 October 2015), 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)