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**NATIONAL ROADMAP  
FOR THE ALLOTMENT AND FUTURE USE  
OF THE 470-790 MHz FREQUENCY BAND**

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## 1. INTRODUCTION

In the context of the rapid growth of wireless broadband data traffic and of the economic, industrial and social importance of the digital economy, expanding the capacity of wireless electronic communications networks has become a necessity. Ensuring adequate and sufficient radio spectrum resources for the effective deployment and enhanced capacity of broadband wireless networks is paramount for meeting the growing demand for broadband data traffic and fostering the development of innovative digital communications services.

In the multiannual Radio Spectrum Policy Programme ("RSPP"), established by Decision no. 243/2012/EU<sup>1</sup>, the European Parliament and the Council have set the policy objectives to identify, by 2015, at least 1200 MHz of spectrum suitable (including frequencies already in use) for broadband wireless electronic communication services in the Union, to support the further development of innovative broadcasting services by ensuring there is sufficient spectrum available for satellite and terrestrial provision of such services, if the need is clearly substantiated, as well as sufficient spectrum for programme-making and special event ("PMSE").

Moreover, the RSPP has empowered the European Commission (COM), in cooperation with the Member States, to ensure spectrum availability for PMSE, for the development of public safety services and the free circulation of related devices as well as the development of innovative interoperable solutions for public protection and disaster relief (PPDR) and for the Internet of Things (IoT).

The 694-790 MHz frequency band (the "700 MHz band") is a valuable resource due to the advantages given by the physical characteristics of radio waves in this band, respectively propagation over longer distances and better indoor penetration compared to higher frequency bands, enabling both the provision of additional capacity for mobile/fixed wireless communications networks ("MFCN"<sup>2</sup>) and the cost-efficient implementation of MFCN networks with wide area coverage, including good indoor coverage.

The 700 MHz frequency band is very important for the provision of universal coverage, in particular for the economically challenging areas, such as rural, mountainous or other remote areas, predetermined in accordance with areas that are a national priority, including along major terrestrial transport paths, and for indoor use and for wide-range machine-type communications (M2M/IoT<sup>3</sup>).

At international level, for Region 1, which includes the Member States of the European Union, the Radio Regulations of the International Telecommunication Union (ITU) adopted by the World Radiocommunications Conference in 2015 provides for the allocation of the 694-790 MHz band to the broadcasting service and the mobile service (except aeronautical mobile service), on a co-primary basis, and its identification for IMT (International Mobile Telecommunications) systems. The 470-694 MHz frequency band ("the sub-700 MHz band") remains exclusively allocated to the broadcasting service on a primary basis and to wireless audio PMSE use on a secondary basis.

The 700 MHz frequency band is suitable both for the roll-out and for improving the quality of mobile communications services offered by 4G technologies, as well as for the deployment of next-generation mobile communications technologies known as 5G or IMT-2020.

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<sup>(1)</sup>Decision No 243/2012/EU of the European Parliament and of the Council of 14 March 2012 establishing a multiannual radio spectrum policy programme (OJ L 81, 21.3.2012, p. 7).

<sup>(2)</sup> Concerning the convergence of wireless fixed and mobile communications, the regulations within the European Conference of Postal and Telecommunications Administrations (CEPT) has introduced the wording MFCN (Mobile/Fixed Communications Networks), including IMT networks (International Mobile Telecommunications) as well as other communications networks belonging to the fixed and mobile service.

<sup>(3)</sup> M2M/IoT: Machine-to-machine communications/Internet of Things

The new generation of communications technologies will enable the provision of a seamless, highly reliable mobile connectivity, with very high data rates and very low latency, capable of supporting the transmission of increasing amounts of data, connecting millions of users and smart objects in the IoT sector, as well as a wide range of new innovative applications such as: self-driving car and connected vehicles, advanced industrial manufacturing and robotics, tele-surgery, virtual or augmented reality, intelligent agriculture, intelligent energy grids, intelligent homes and cities.

5G technologies are currently in the process of being standardized and tested at an international level. At present, international regulatory organizations (ITU, CEPT), the European Commission, RSPG<sup>4</sup>, RSC<sup>5</sup>, standardization bodies, industry and academia work together to complete the technical specifications of IMT-2020 systems and the regulations required for the global operation of these systems. The regulatory process includes the identification of additional internationally harmonized frequency bands in the frequency spectrum between 24 GHz and 86 GHz, which can be used to foster the deployment of 5G technologies.

RSPG has identified the 700 MHz, 3400-3800 MHz and 26 GHz<sup>6</sup> frequency bands as priority bands for the introduction of 5G mobile communications systems at European level. The 700 MHz frequency band is considered an important band for ensuring coverage over wide areas, as well as indoor coverage, whereas the 3400-3600 MHz frequency band is considered to be a primary band suitable for the introduction of 5G services before 2020, the latter offering relatively large bandwidths and a good compromise between coverage and capacity. The 26 GHz band is considered a "pioneer" band for early 5G harmonization in the European Union, by 2020, with a view to promoting new innovative 5G applications and services, as it offers more than 3 GHz of contiguous frequency spectrum while enabling increased capacities and high, 5G-specific data transfer rates.

Decision (EU) 2017/899 of the European Parliament and of the Council on the use of the 470-790 MHz frequency band in the Union, published on 17 May 2017, regulates both making available the 694-790 MHz band for use by terrestrial systems capable of providing wireless broadband electronic communications services, and ensuring the availability of the 470-694 MHz frequency band, at least until 2030, for the provision of terrestrial broadcasting services, including free television, and for use by wireless audio PMSE equipment, according to national needs.

The above-mentioned Decision also establishes the EU Member States' obligation to adopt and publish, not later than 30 June 2018, their national plan and schedule ("national roadmap"), a document containing detailed measures for fulfilling their obligations as regards the allotment and use of the radio spectrum in the 470-790 MHz frequency band in accordance with the provisions of the Decision, after consulting all relevant stakeholders.

Those that are potentially interested in the future use of the 470-790 MHz band and the measures to be taken by the Authority in pursuit of the obligations laid down in Decision (EU) 2017/899 are:

- **users**, who will benefit from new applications and innovative mobile services;
- **mobile communications services providers**, who will have access to a valuable additional spectrum resource below 1 GHz, in order to meet the increasing demand for mobile data traffic and provide efficient coverage over extended areas, as well as improved indoor coverage ;

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(<sup>4</sup>) RSPG: The Radio Spectrum Policy Group, established under Commission Decision 2002/622/EC of 26 July 2002, assisting the Commission in the development of radio spectrum policy in the Community

(<sup>5</sup>) RSC: The Radio Spectrum Committee, established under Decision No 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community

(<sup>6</sup>) The 26 GHz frequency band: the frequencies between 24.25 and 27.5 GHz.

- **digital terrestrial television (DTT)** service providers and audio PMSE users, who will need alternative frequency bands after the allotment of the 700 MHz band for wireless broadband communications services;
- **Government and society** in general, who will benefit from the economic opportunities of this spectrum and new technologies.

Given the importance of the limited spectrum resource available, of the impact of the decision on the future use of the spectrum band 470-790 MHz and of its implications on the electronic communications market, on the communications of governmental interest and on society in general, ANCOM deemed it useful to consult all interested parties, in order to ensure transparency and impartiality in the decision-making process and predictability for the adopted regulatory measures.

With a view to identifying the optimal allotment solution for the 470-790 MHz band and especially for the 700 MHz band, taking into account the national needs, a solution which should ensure the achievement of the objectives of efficient spectrum use and of maximizing the economic and social benefits for all, ANCOM invited all the interested parties to express their views on the "National Roadmap for the Allotment and Future Use of the 470-790 MHz Frequency Band", during a public consultation held between 22 May and 22 June 2018.

7 respondents (5 electronic communications networks operators, one equipment manufacturer and one state institution) sent their answers. The reasoned opinions expressed during the public consultation served to substantiate the Authority's decision on planning spectrum management activities undertaken for the optimal spectrum allotment in the 470-790 MHz band, which should lead to the most efficient use of the radio spectrum resource and should best meet the spectrum needs at a national level.

ANCOM hereby thanks to all the respondents for their contribution to this Roadmap.

The annex to the document contains the list of actions to be taken to fulfil the obligations laid down in Decision (EU) 2017/899 together with the deadlines for these actions.

## 2. EUROPEAN REGULATORY FRAMEWORK

### 2.1. Decision (EU) 2017/899 of the European Parliament and of the Council

The main objective of Decision (EU) 2017/899 of the European Parliament and of the Council on the use of the 470-790 MHz frequency band in the Union ("the Decision") is adopting a coordinated approach at European Union level regarding the use of the 470-790 MHz frequency band, to ensure the provision of innovative broadband electronic communications services and to guarantee access and connectivity across the Union, to support the further provision of terrestrial broadcasting services and the use of wireless audio PMSE equipment, based on the national needs.

It aims also to provide, through concrete and coordinated measures towards achieving wireless terrestrial coverage throughout the European Union, for facilitating the fulfilment of the RSP objective that all citizens throughout the Union should have access both indoors and outdoors, to broadband communications services with a data transfer rate of at least 30 Mbps/s by 2020.

In this respect, the Decision establishes a series of obligations for the Member States of the European Union, which must be implemented within certain deadlines. These obligations are set out below:

1. By 30 June 2020, Member States shall allow the use of the 700 MHz frequency band for terrestrial systems capable of providing wireless broadband electronic communications services under the harmonised technical conditions established by the Commission pursuant to Article 4 of Decision No 676/2002/EC on a regulatory framework for radio spectrum policy in the European Community (Radio Spectrum Decision). Member States may, however, delay allowing the use of the 700 MHz frequency band for up to two years on the basis of one or more of the duly justified reasons set out in the Annex to the Decision. The justified reasons for such a delay are limited to:
  - unresolved cross-border coordination issues resulting in harmful interferences;
  - the need to ensure, and the complexity of ensuring, the technical migration of a large amount of the population to advanced broadcasting standards;
  - the financial costs of transition exceeding the expected revenue generated by award procedures;
  - *force majeure*.
2. In order to allow the use of the 700 MHz frequency band, Member States shall conclude all the necessary cross-border frequency-coordination agreements within the Union.
3. Member States will conduct cross-border coordination activities with third countries (non-EU countries) on the use of frequencies in the 470-790 MHz band both for terrestrial broadcasting services and for wireless broadband electronic communications services.
4. When authorising the use of the 700 MHz band, Member States shall take due account of the need to achieve the target speed and the quality objectives set out in Article 6(1) of the RSP, including coverage in predetermined national priority areas, such as along major terrestrial transport paths.
5. Member States shall ensure availability at least until 2030 of the 470-694 MHz ('sub-700 MHz') frequency band for the terrestrial provision of broadcasting services, including free television, and for use by wireless audio PMSE on the basis of national needs, while taking into account the principle of technological neutrality.

6. No later than 30 June 2018, Member States shall adopt and make public their national plan and schedule ('national roadmap'), including detailed steps for fulfilling their obligations under Articles 1 and 4 of the Decision. Member States shall draw up their national roadmaps after consulting all relevant stakeholders.

## **2.2. Commission Implementing Decision (EU) 2016/687**

Commission Implementing Decision (EU) 2016/687 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, adopted on 28 April 2016, harmonises the technical conditions for the availability and efficient use of the 694-790 MHz ('700 MHz') frequency band in the Union for terrestrial systems capable of providing wireless broadband electronic communications services. It aims also to facilitate flexible national use in response to specific national needs in accordance with RSPP spectrum policy priorities.

For these purposes, Commission Implementing Decision (EU) 2016/687 defines the following:

1. 'wireless audio PMSE equipment' means radio equipment used for transmission of analogue or digital audio signals between a limited number of transmitters and receivers, such as radio microphones, in-ear monitor systems or audio links, used mainly for the production of broadcast programmes or private or public social or cultural events;
2. 'public protection and disaster relief (PPDR) radio communications' means radio applications used for public safety, security and defence used by national authorities or relevant operators responding to the relevant national needs in regard to public safety and security including in emergency situations;
3. 'machine-to-machine (M2M) radio communications' means radio links for the purpose of relaying information between physical or virtual entities that build a complex ecosystem including the internet of Things; such radio links may be realised through electronic communications services (e.g. based on cellular technologies) or other services, based on licensed or unlicensed use of spectrum.

Commission Implementing Decision (EU) 2016/687 set out the following obligations for the Member States:

1. When Member States designate and make available the 700 MHz frequency band for use other than high-power broadcasting networks, they shall:
  - (a) designate and make available the 703-733 MHz and 758-788 MHz frequency bands, on a non-exclusive basis, for terrestrial systems capable of providing wireless broadband electronic communications services in compliance with the parameters set out in Sections A.1, B and C of the Annex to the Decision;
  - (b) subject to national decisions and choice, designate and make available the portions of the 700 MHz frequency band other than those referred to in paragraph 1(a), for use in compliance with the parameters set out in Sections A.2 to A.5 of the Annex to the Decision.
2. Member States shall facilitate coexistence among different uses referred to in paragraph 1.
3. Member States shall ensure that the systems referred to in Article 3(1) (a) and (b) give appropriate protection to existing systems in the adjacent 470-694 MHz band, namely digital

terrestrial television broadcasting services and wireless audio PMSE equipment in accordance with their regulatory status.

4. Member States shall facilitate cross-border coordination agreements with the aim of enabling operation of the systems referred to in Article 3(1) (a) and, where appropriate, of those referred to in Article 3(1) (b), taking into account existing regulatory procedures and rights as well as relevant international agreements.
5. Member States shall monitor the use of the 700 MHz frequency band and report their findings to the Commission upon request or at their own initiative in order to allow timely review of the Decision, as appropriate.

Therefore, Commission Implementing Decision (EU) 2016/687 designates the frequency bands 703-733 MHz and 758-788 MHz (2x30 MHz) for terrestrial systems capable of providing wireless broadband electronic communications services in the Union, on a non-exclusive basis.

The decision also provides that such designation should be without prejudice to the right of Member States to organise and use their spectrum for public safety and public security purposes and for defence. The frequency bands 703-733 MHz and 758-788 MHz, or a subset thereof, may also be used for PPDR radio communications. If PPDR radio communications are implemented, the technical conditions for wireless broadband electronic communications services in the annex to the Decision should be used.

As for the other parts of the 700 MHz band, the Commission Implementing Decision (EU) 2016/687 lays down several options for use which the Member States may choose based on their national needs:

- the 738-758 MHz frequency band (up to 20 MHz of spectrum) may be allotted in full or in part for use by terrestrial systems capable of providing wireless broadband electronic communications services, as a supplementary downlink band (limited to base station transmission);
- the paired frequency bands 698-703 MHz and 753-758 MHz (2x5 MHz) and the paired frequency bands 733-736 MHz and 788-791 MHz (2x3 MHz) may be allotted for use in full or in part for PPDR radio communications;
- the paired frequency bands 733-736 MHz and 788-791 MHz (2x3 MHz) may be allotted for use for M2M radio communications, as well;
- the paired frequency bands 694-703 MHz and 733-758 MHz may be allotted for use in full or in part for wireless audio PMSE equipment (such as radio microphones).

### Harmonised plan of the 700 MHz band according to Decision 2016/687/EU

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	UL PPDR						DL MFCN	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								
Bandwidth (MHz)	4	5		30	3	2	5	5	5		5	30



### 3. ALLOTMENT OF THE RADIO SPECTRUM IN THE 700 MHz BAND

#### 3.1. Terrestrial systems capable of providing wireless broadband electronic communications services

##### 3.1.1. Additional spectrum requirements for mobile communications networks

With the growing demand for connectivity and access to a wider range of communications services and applications that require intensive data traffic, including new services and innovative applications provided by 5G technologies, making available suitable radio spectrum in a timely manner has become essential for enhancing the future development of mobile broadband systems.

5G technologies will enrich the global communications ecosystem in the future for enhanced mobile broadband communications, expanding the range of possible applications by increasing the data transfer rate and reducing the latency, on the one hand, and through the ability to integrate IoT devices on the other.

The new generation of mobile communications technologies will enable the provision of seamless mobile coverage with very high data transfer rates (peak data rates above 10 Gbps) and very low response time (latency below 5 ms), a very high reliability of communications and low power consumption. These performances will make it possible to transmit an increasing amount of data, connect millions of users and smart objects in the IoT sector, as well as a number of innovative applications that require very high data transfer rates and very low latency. These objectives will be achieved by adopting new, more efficient radiocommunications techniques and system architectures that use a wide range of radio spectrum bands, from the traditional mobile communications bands (below 3 GHz) up to the frequency bands in the millimetre range (above 20 GHz).

Radio spectrum requirements identified at industry level to support the development of 5G technologies are a combination of frequency bands below 1 GHz, between 1 GHz and 6 GHz and over 6 GHz, with different propagation characteristics that offer various advantages.

At European level, the RSPG identified the following bands as priority bands for the early introduction of 5G mobile communications systems in the Union: the 700 MHz (694-790 MHz) band, the 3400-3800 MHz band and the 26 GHz (24.25-27.5 GHz) band.

The **700 MHz band** is considered an important frequency band because, similarly to the 800 MHz band, it is suitable to provide efficient coverage over wide areas, as well as improved indoor coverage, due to the propagation of radio waves over longer distances and to better indoor penetration compared to higher frequency bands.

The frequency spectrum available in the 700 MHz band, in addition to that in the 800 MHz band, provides the opportunity for MFCN networks to ensure a cost-effective coverage in rural areas.

Moreover, the 700 MHz band, similarly to other bands below 1 GHz, is suitable for the provision of narrowband IoT services, which require wide area coverage and very good indoor penetration.

The **3400-3800 MHz band** is deemed an appropriate primary band for the introduction of 5G services before 2020, as it offers large radio channel bandwidths and a good coverage/capacity balance, ensuring significant capacity growth and supporting enhanced broadband communications, as well as applications requiring low latency and high reliability, such as mission critical applications (industrial automation and robotics).

The **26 GHz band** is considered to be a "pioneer" band for early 5G harmonization in the EU by 2020, as it offers more than 3 GHz of contiguous spectrum and enables the provision of ultra-high-density and very high-capacity networks over short distances, as well as revolutionary 5G

applications and services, which involve very high data transfer rates, increased capacity and very low latency.

Usually, the frequency spectrum below 1 GHz is used to provide coverage, while the frequency spectrum above 1 GHz is used to provide capacity for mobile communications networks.

The 700 MHz band is an extremely useful frequency band for the implementation of MFCN networks, due to the benefits of its intrinsic physical characteristics, which enable cost-effective (including indoor) coverage with broadband services as well as promoting new services and broadband radio communications technologies. The frequencies in the 700 MHz band will expand the spectrum resources below 1 GHz already used for the provision of broadband mobile communications services through LTE technology and will facilitate the deployment of 5G networks, and the widespread introduction of innovative digital services.

### **3.1.2. Allocation of the 700 MHz band in Romania**

According to the National Table of Frequency Allocations (NTFA), the frequency band 694-790 MHz is allocated to the broadcasting service, on a primary basis. Taking into account that, in ITU Region 1 (where Romania belongs), the band was allocated also to the land mobile service, on a primary basis, by Note 5.312A under Article 5 in the 2016 edition of the ITU Radiocommunications Regulations (RR-ITU), having been identified at the 2015 World Radiocommunications Conference (WRC-15) for IMT systems, according to the provisions of Note 5.317A, the band allocation in Romania will be updated by amending the NTFA in accordance with the RR-ITU provisions.

*ANCOM will propose to amend the NTFA by allocating the 694-790 MHz frequency band to the land mobile service, on a primary basis, and designating the 703-733 MHz and 758-788 MHz bands for use in FDD<sup>7</sup> mode by terrestrial systems capable of providing wireless broadband electronic communications services (IMT), as well as the 738-753 MHz band for use in SDL<sup>8</sup> mode, by IMT systems.*

### **3.1.3. Availability of the 700 MHz band in Romania**

The 700 MHz band is already available in Romania, but its use by MFCN networks on the national territory without major restrictions depends on the actual use of broadcasting services in the neighbouring countries and on other radiocommunications services to which the band is allocated in these countries (both EU Member States and non-EU countries).

Since the 700 MHz band is allotted and used for digital terrestrial television (DTT) in the neighbouring countries, in line with the provisions of Geneva Agreement 2006, where some of these countries will keep using DTT services in the 694-790 MHz frequency band after 30 June 2020, the use of the band by the land mobile service and, respectively, by IMT systems in Romania would be severely restricted by the technical conditions of coexistence with the broadcasting service, in order to ensure mutual protection against harmful interference.

Although the EU Member States have the obligation to release the 694-790 MHz band and to make it available for the provision of mobile communications services by 30 June 2020, with the possibility of extending the deadline by up to two years, on the basis of one or more duly justified reasons set out in the Annex to the Decision no. 2017/899/EU of the European Parliament and of the Council, 70% of the Romanian border is with non-EU countries, which are not bound by this

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<sup>7</sup> FDD: Frequency Division Duplex

<sup>8</sup> SDL: Supplemental Downlink

obligation. It is therefore difficult to estimate a date from which the band may be available for use by the mobile service on a national level, without restrictions.

For the effective deployment of MFCN networks in the 700 MHz band, this frequency band had to be refarmed in the neighbouring countries in order to relocate DTT services in the 470-694 MHz band and to release the 694-790 MHz band. Further information on this process is available in Section 4.1.3 of this document.

### 3.1.4. International frequency coordination for MFCN networks

In order to ensure radio coexistence and to avoid harmful interference between the various systems using the 694-790 MHz band on the territory of two neighbouring countries, and to ensure the efficient use of radio spectrum and equitable access to the radio spectrum resource in border areas, it is necessary to conclude bilateral agreements on cross-border frequency use coordination, setting out the principles, technical conditions and coordination procedure for the use of frequencies in border areas by each of the systems involved.

In this respect, Romania has concluded an agreement with Ukraine on the coordination of the use of frequencies in border areas, in the 694-790 MHz band, by terrestrial systems capable of providing broadband electronic communications services that will operate on the territory of Romania and the aeronautical radionavigation systems in the aeronautical mobile service operating on the territory of Ukraine.

Commission Implementing Decision no. (EU) 2016/687 allows Member States to decide on the use of the 700 MHz band, in addition to that for terrestrial systems capable of providing broadband electronic communications services (MFCN networks), and for other applications such as PPDR, PMSE, M2M, based on national needs.

For the purpose of coordinated introduction of terrestrial systems capable of providing broadband electronic communications services in the 700 MHz band, starting from September 2020, Romania has concluded an agreement with Hungary, regarding the cross-border coordination of frequency use for MFCN networks in the 700 MHz band.

ANCOM will continue the activities of coordinating the use of frequencies in the 700 MHz band with neighbouring countries, in order to ensure the adequate conditions for the introduction and development of terrestrial systems capable of providing electronic communications services in this band, starting from 2020.

<b>Completing coordination, with neighbouring countries, on the use of frequencies in the 700 MHz band, for MFCN networks</b>	
<i>Concluding bilateral agreements with the neighbouring countries on the cross border coordination of frequency use in the 700 MHz band, for MFCN networks</i>	<i>30 June 2019</i>

### 3.1.5. Allotment of the radio spectrum for MFCN in the 700 MHz band

The applications that may be implemented in the 694-790 MHz band, within the European Union, as well as the harmonised technical conditions for the use of this frequency band are laid down by the provisions of Commission implementing Decision no. (EU) 2016/687.

Commission Implementing Decision no. (EU) 2016/687 harmonizes the frequency bands 703-733 MHz and 758-788 MHz (2x30 MHz) for use by terrestrial systems capable of providing wireless broadband electronic communications services in the Union. The Decision also provides that up to

20 MHz in the duplex gap of the 700 MHz band – i.e. in the 738-758 MHz sub-band – may be used as a national option for the supplemental downlink (limited to base station transmission).

The harmonised channelling arrangement for MFCN networks in the 694-790 MHz band is flexible and includes:

- a) a paired frequency arrangement (2x30 MHz FDD):
  - the frequency sub-bands 703-733 MHz and 758-788 MHz shall be used in the frequency division duplex (FDD) operation mode;
  - the frequency sub-band 703-733 MHz shall be used for terminal station transmission (uplink);
  - the frequency sub-band 758-788 MHz shall be used for base station transmission (downlink);
  - the duplex spacing shall be 55 MHz;
  - the bandwidths of the assigned blocks shall be multiples of 5 MHz.
- b) an optional unpaired frequency arrangement (supplemental downlink - SDL):
  - the frequency sub-band 738-753 MHz shall be additionally used for the supplemental downlink (limited to base station transmission).;
  - the bandwidths of the assigned blocks shall be multiples of 5 MHz.


The frequency sub-band 753-758 MHz shall be reserved for the base station transmission of PPDR systems that will operate in the FDD frequency sub-bands 698-703 MHz/753-758 MHz.

Base stations and terminal stations shall comply with the relevant harmonised technical conditions provided in sections B and C of the Annex to Commission Implementing Decision no. (EU) 2016/687.

The channelling arrangement in the 700 MHz band, harmonised at European level, is presented in Annex 1 to ECC/DEC/(15)01, ECC Decision on the harmonized technical conditions for mobile/fixed communications networks (MFCN) in the band 694-790 MHz is available below.

### Harmonised Frequency Arrangement for MFCN in the 694-790 MHz band, by 5 MHz blocks

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
Guard band	Uplink						Guard band	SDL (A)			Reserved for PPDR systems	Downlink						Guard band
9 MHz	30 MHz (6 blocks x 5 MHz) FDD						5 MHz	15 MHz (3 blocks x 5 MHz)			5 MHz	30 MHz (6 blocks x 5 MHz) FDD						3 MHz

 Guard band  
 Reserved for PPDR systems

*ANCOM will make available 2 x 30 MHz (6 blocks of 2x5 MHz) in the 700 MHz band, respectively the paired frequency bands 703-733 MHz and 758-788 MHz for the provision of MFCN networks in FDD operation mode, as well as 15 MHz, i.e. the 738-753 MHz sub-band, for SDL MFCN, through a competitive selection procedure for awarding the frequency use rights in these bands, which will provide for the use of these frequency bands by technologically neutral MFCN networks starting from 30 June 2020.*

**Note:** If the adoption of the decision at national level on the deployment of a BB-PPDR network triggers a different allotment arrangement for the frequency bands 703-733 Mhz, 758-788 MHz and 738-758 MHz for MFCN networks, ANCOM will consequently amend this arrangement.

### 3.1.6. Allotment of additional radio spectrum for MFCN in harmonised frequency bands

Along with the 700 MHz band, ANCOM intends to make available additional radio spectrum resources to the providers of public electronic communications networks and services in European harmonised frequency bands for terrestrial systems capable of providing wireless broadband electronic communications services, as follows:

- the 1427-1518 MHz band (extended 1500 MHz band);
- the sub-bands in the frequency bands 800 MHz (2x5 MHz), 2600 MHz (2x40 MHz) and 3400-3600 MHz (2x10 MHz + 2x15 MHz) not yet awarded in the previous selection procedures;
- the 26 GHz frequency band, where licences for the use of radio frequencies have been awarded in the fixed service (in the 24.5 – 26.5 GHz band), valid until end-2021.

The Authority also envisages awarding rights of use for the frequencies in the 2100 MHz band, for which the licenses in force will expire in 2020 and 2022.

The additional radio spectrum to be made available to providers of public electronic communications networks and services will contribute to ensuring the spectrum resources needed for the efficient development of broadband communications services both through the use of existing technologies and through the deployment of new generation technologies.

In order to prepare for awarding the frequency use rights in the bands concerned, ANCOM conducted a public consultation in 2017 on awarding the rights of radio spectrum use in the frequency bands newly harmonized at European level for terrestrial systems capable of providing wireless broadband electronic communications services, i.e. 694-790 MHz and 1452-1492 MHz (the 1500 MHz band), as well as in the frequency sub-bands that were not awarded in the 800 MHz, 2600 MHz and 3400-3600 MHz bands following the selection procedures organised in 2012 and 2015.

The consultation was aimed at obtaining, from the interested parties, relevant information on the degree of interest in acquiring rights of frequency use in these bands and on the suitable timing of organising a selection procedure. The consultation was also aimed at expressing the views and opinions of interested parties on a range of technical and economic issues regarding access to spectrum resources and the awarding conditions, i.e. certain elements that may influence the results, such as the type of selection procedure, the minimum spectrum requirements, the maximum amounts of spectrum that may be held by a single operator in different frequency bands (below 1 GHz and above 1 GHz), the period of validity of the frequency usage rights, service coverage obligations or the access obligations associated to licenses and the reserve prices.

The Authority will grant new frequency usage rights for the radio spectrum available in the 700 MHz, 800 MHz, 1500 MHz, 2600 MHz, 3400-3600 MHz and 26 GHz bands, following a competitive selection procedure to be organized in the year 2019.

**Timetable for awarding new frequency usage rights in the MFCN harmonised radio spectrum bands**

<p><i>Draw up and adopt the national position on awarding the rights of use for the radio spectrum available in the frequency bands 700 MHz, 800 MHz, 1500 MHz, 2600 MHz, 3400-3600 MHz and 26 GHz for wireless broadband electronic communications systems</i></p>	<p><i>30 December 2018</i></p>
<p><i>Conduct a campaign for monitoring the radio spectrum in the frequency bands to be auctioned out and provide a report on the status of the radio signals identified on the territory of Romania in these bands, coming from the territory of foreign states</i></p>	<p><i>30 June 2019</i></p>
<p><i>Adopt the decision on the organization of the selection procedure (set out the conditions for granting the frequency usage rights) and other necessary normative acts</i></p>	<p><i>31 July 2019</i></p>
<p><i>Conduct the selection procedure for awarding frequency usage rights in the 700 MHz band and in the other bands envisaged for MCFN</i></p>	<p><i>15 December 2019</i></p>

## 3.2. PPDR applications

### 3.2.1. Additional radio spectrum requirements for BB-PPDR

Public protection and disaster relief (PPDR) radio communications are radio applications used for public safety, security and defence used by national authorities or relevant operators responding to the relevant national needs in regard to public safety and security including in emergency situations.

PPDR services are provided by a service or agency, recognised as such by the national administrations, that provides immediate and rapid assistance in situations where there is a direct risk to life or limb, individual or public health or safety, to private or public property, or the environment but not necessarily limited to these situations. (Source: Commission Recommendation C(2003)2657<sup>9</sup>).

Moreover, Resolution ITU 646 (Rev. WRC-15) defines the purposes of PPDR radiocommunications systems. These include two distinct categories of uses. The first category is dedicated to Public Protection (PP) and covers radiocommunications used by agencies and organizations responsible for the maintenance of law and order, protection of life and property and emergency situations. The second category is dedicated to Disaster Relief (DR) and covers radiocommunications used by agencies and organizations dealing with a serious disruption of the functioning of society, posing a significant, widespread threat to human life, health, property or the environment, whether caused by accident, natural phenomena or human activity, and whether developing suddenly or as a result of complex, long-term processes. The nature and purpose of PPDR communications varies depending on the event from basic voice communications to complex data and video communications. It is expected that voice service will remain a primary component of PPDR communications in the future, while data and video services will play an increasingly important role. PPDR communications needs have been raising during the last few years, with organizations in charge of emergency situations requiring access to broadband services such as real-time video transmissions. Furthermore, PPDR communications have specific requirements in terms of priority, availability and security.

PPDR networks have different requirements from commercial networks, as well as different design. According to ITU-R Report M.2377, defining radiocommunications objectives and requirements for Public Protection and Disaster Relief, a PPDR communications network must: i) be available for most of the time with minimal downtime, especially in emergency situations; ii) have sufficient capacity and redundancy to handle traffic during the peak operational conditions; iii) provide coverage throughout the whole served geographical area, including indoors and in basements or in large or crowded infrastructures; iv) be easily and rapidly deployable; v) be interoperable with other PPDR networks for the effective and efficient operation and cooperation between PPDR agencies; (vi) ensure real-time communications and low latency; (vii) meet very high quality service standards so that missions should be not affected by poor quality; (viii) be very reliable as it would be required to operate in hostile environments; (ix) be capable of being received only by the intended recipient, for safety and confidentiality purposes, and (x) be easily reconfigurable and scalable to accommodate the nature and scale of each PPDR mission.

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<sup>9</sup> <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32003H0558>.

For enhanced capacity of coordination, co-operation and effective intervention of competent organizations in emergency situations, PPDR communications services need to be provided by the most advanced technologies available at national as well as international level (regional or global).

PPDR applications such as high-resolution image transmissions and real-time video transmissions require higher data transmission rates and capacities than those achievable by the currently deployed PPDR networks, using narrow band technologies (TETRA or TETRAPOL).

To meet today's PPDR communications needs, broadband networks are required, which could support improved data and multimedia transmission capabilities, increased data rates and capacities, as well as widely differing requirements in terms of capacity, availability and robustness. To this end, an adequate amount of radio spectrum needs to be made available for broadband PPDR systems (BB-PPDR).

The Electronic Communications Committee (ECC) within the CEPT investigated various solutions for satisfying the spectrum requirements of BB-PPDR systems, and subsequently adopted and published, in 2016: ECC Decision (16)02 on the harmonised technical conditions and frequency bands for the implementation of Broadband Public Protection and Disaster Relief (BB-PPDR) systems and ECC Report 218 on the harmonised conditions and spectrum bands for the implementation of future European Broadband Public Protection and Disaster Relief (BB-PPDR) systems. These documents identify the spectrum options available for BB-PPDR systems and provide that interoperability between different BB-PPDR systems can be ensured through the availability of BB-PPDR user equipment operating in multiple frequency bands (400 MHz and 700 MHz) and the adoption of common technical standards (i.e. LTE and its evolutions).

### **3.2.2. Allotment of radio spectrum for BB-PPDR systems**

Commission Implementing Decision (EU) 2016/687 provides as an option the Member States' use of the paired frequency bands 698-703 MHz and 753-758 MHz (2x5 MHz) and of the paired frequency bands 733-736 MHz and 788-791 MHz (2x3 MHz), in full or in part, for PPDR radio communications.

ECC Decision (16)02 identifies the frequency bands for broadband BB-PPDR wide area networks and establishes the least restrictive technical conditions for the deployment of BB-PPDR radio systems in the 400 MHz and 700 MHz frequency bands in order to ensure coexistence with other services. The decision also regulates the free circulation and use of BB-PPDR user equipment operating under the control of a network.

The ECC Report 218, grounding the adoption of the ECC Decision (16)02, concluded that the 700 MHz range can provide the core spectrum requirements for the terrestrial broadband networks and can be considered as a stand-alone solution for the BB-PPDR requirements as calculated in ECC Report 199.

The 400 MHz range does not offer enough available spectrum to provide a stand-alone solution for the deployment of BB-PPDR networks. However, this band offers national flexibility in the use of additional spectrum besides that of the 700 MHz range. Furthermore, the 400 MHz band has the advantage of more favourable propagation characteristics, which allow reducing the number of base stations required to provide coverage at national level, especially in rural areas.

In accordance with the provisions of ECC Decision (16)02, administrations wishing to introduce BB-PPDR in parts of the 700 MHz range shall apply the least restrictive technical conditions (LRTC) within the following paired frequency arrangements:

- a) a) 698-703 MHz (uplink) / 753-758 MHz (downlink) those specified in Annex 1;
- b) b) 703-733 MHz (uplink) / 758-788 MHz (downlink) those specified in ECC/DEC/(15)01;



c) c) 733-736 MHz (uplink) / 788-791 MHz (downlink) those specified in Annex 1.

Moreover, administrations wishing to introduce additional spectrum for BB-PPDR in parts of the 400 MHz range shall apply LRTC with channelling arrangements 1.4 MHz, 3 MHz or 5 MHz within the following paired frequency ranges:

a) 450.5-456.0 MHz (uplink) / 460.5-466.0 MHz (downlink) those specified in Annex 2;

b) 452.0-457.5 MHz (uplink) / 462.0-467.5 MHz (downlink) those specified in Annex 2.

ECC Report 218 proposes the concept of "flexible harmonisation" to enable an efficient implementation of BB-PPDR within CEPT. This includes three major elements:

- common technical standard (i.e. LTE and its evolutions);
- national flexibility to decide how much spectrum and which specific frequency ranges should be designated for BB-PPDR networks within harmonised tuning range(s), according to national needs;
- national choice of the most suitable implementation model (either dedicated, commercial or hybrid).

The BB-PPDR services could be provided by means of three infrastructure implementation models:

- i) dedicated network infrastructure for BB-PPDR - a mobile broadband network: a broadband communications network dedicated exclusively to providing BB-PPDR services;
- ii) public electronic communications network(s) infrastructure providing broadband services to PPDR users – the state purchases BB-PPDR services from one or several public electronic communications network operators (MFCN);
- iii) hybrid solutions with partly dedicated and partly public electronic communications network infrastructure – the services are provided partly through a dedicated network infrastructure and partly through public electronic communications network infrastructure.

Thus, the BB-PPDR service requirements at national level can be accommodated in the 700 MHz range either by allotting spectrum for dedicated BB-PPDR networks, either by using commercial mobile/fixed communications network (MFCN) or by a combination of the two.

Each of the three alternatives for the development of a strategy for BB-PPDR in the 700 MHz band has advantages and disadvantages.

In assessing BB-PPDR network implementation models and choosing the most appropriate one, the following aspects should also be taken into account:

- Deployment of dedicated mission critical networks requires dedicated frequency spectrum exclusively for the operation of these networks;
- Exclusive use of spectrum also entails additional financial burden, especially when the opportunity costs are factored into;
- Dedicated networks that are deployed exclusively by PPDR agencies will require huge capital investments. Moreover, future technological developments will require periodic investment in network infrastructure;
- Choosing solutions based on the use of public electronic communications networks (MFCN) or hybrid solutions leads to a more efficient use of spectrum resources and reaping the associated benefits of available technologies;
- Reserving parts of the frequency bands harmonized for MFCN networks for use by dedicated BB-PPDR networks results in a decrease in revenues that the state could charge for awarding rights of frequency use for the provision of public electronic communications networks MFCN in the 700 MHz band.

ANCOM deems necessary to consult all the interested parties with a view to adopting the best solutions for the deployment of BB-PPDR networks and to achieving the most efficient use of the frequency spectrum in the 700 MHz band, which should not lead to an economic constraint for PPDR agencies while maximizing – insofar as possible – the commercial value of the frequency spectrum for MFCN networks.

It is also to be considered whether the solution of integrating PPDR networks within the commercial networks, with the desired functionalities, could be better exploited for enhancing the spectrum use efficiency.

In order to identify the optimal solution, it is needed to weigh the losses generated by the possible non-commercial use of a valuable amount of spectrum versus the socio-economic benefits of effective PPDR operations and to achieve at the right balance.

*ANCOM proposes to allot 2x8 MHz in the 700 MHz range, respectively the paired sub-bands 698-703 MHz and 753-758 MHz (2x5 MHz) and the paired sub-bands 733-736 MHz and 788-791 MHz (2x3 MHz), for the deployment of a dedicated BB-PPDR communication network, in addition to the 2x30 MHz available for MFCN networks in the 700 MHz range, which can be partially used to provide BB-PPDR services through the public electronic communications network infrastructure.*

*If the adoption of the decision at national level on the deployment of a BB-PPDR network triggers a different allotment arrangement for BB-PPDR in the 700 MHz band, ANCOM will consequently amend this arrangement for BB-PPDR radiocommunications.*

With a view to identifying the most appropriate solution for the deployment of BB-PPDR networks, with a view to adopting the decision on the allotment of spectrum for BB-PPDR systems in the 700 MHz band.

<b>Adoption of the decision on the use of BB-PPDR systems in the 700 MHz band</b>	
<i>Consult the interested parties on the implementation model of BB-PPDR networks in the 700 MHz band</i>	<i>30 September 2018</i>
<i>Adopt - on government level - the decision on the allotment of the frequency spectrum for BB-PPDR in the 700 MHz range and the mechanisms for making available the frequency spectrum suited to the chosen implementation model; designate in the NTFA the frequency bands for BB-PPDR in the 700 MHz band</i>	<i>30 December 2018</i>

### 3.3. Other categories of applications

#### 3.3.1. PMSE

As shown in Chapter 2, Section 2.2, Commission Implementing Decision (EU) 2016/687 provides for flexibility to use parts of the 700 MHz frequency band (guard bands and duplex spacing) at national level, for several categories of applications, laying down a set of national options available to the Member States for the use of this frequency spectrum, as follows:

- the 738-758 MHz frequency band (up to 20 MHz of spectrum) can be allotted in full or in part for terrestrial systems capable of providing wireless broadband electronic communications services, for use as a supplemental downlink (SDL) band only (base station transmission);
- the paired frequency bands 698-703 MHz and 753-758 MHz (2x5 MHz) and the paired frequency bands 733-736 MHz and 788-791 MHz (2x3 MHz) can be allotted in full or in part for PPDR radio communications;
- the frequency bands 694-703 MHz and 733-758 MHz can be used in full or in part for wireless audio PMSE equipment;
- the frequency bands 733-736 MHz and 788-791 MHz (2x3 MHz) can be used, as well, for M2M radio communications.

Equipment for programme making and special events (PMSE) cover a wide range of video and audio transmission applications that are more and more important for the development of the media and entertainment industry in the European Union.

Wireless audio PMSE equipment are radio equipment used for transmission of analogue or digital audio signals between a limited number of transmitters and receivers, such as radio microphones, in-ear monitor systems or audio links, used mainly for the production of broadcast programmes or private or public social or cultural events.

PMSE equipment is usually capable of operating over a several frequency bands or tuning ranges. However, the use of such equipment in a given country is limited to certain frequency bands identified at national level for PMSE, and their operation is allowed subject to the conditions and requirements of the relevant national regulations. The list of frequencies identified at the CEPT level for the use of audio and video PMSE equipment is contained in Annexes 2 and 3 of ERC Recommendation 25-10 (as amended on 18 October 2016). The 470-694 MHz band is part of the bands identified for PMSE.

Taking into account the spectrum identified for use by PMSE on a tuning range basis, there may seem to be a large amount of spectrum available, but the use of spectrum by PMSE is always shared with other services and, in order to manage its use so as to avoid interference, individual licensing for a specific use is necessary, in some cases, in a given location and for a certain period of time. In this case, spectrum sharing conditions in a given country depend on the licenses issued for the use of frequencies for new services on a primary basis (protection against harmful interference is provided). The available frequency spectrum within the PMSE tuning range in a particular country is determined on a national basis; a tuning range may be available, in whole or in part, or may not be available in a given period, in a given area, in a given country.

In the UHF bands, PMSE equipment and in particular radio microphones used to operate on frequencies unused by the broadcasting service for television networks, in certain areas of interest to PMSE. The use of the 800 MHz band on a primary basis for MFCN networks has led to a significant reduction in the amount of spectrum available for PMSE. Moreover, the future use of the 700 MHz band for MFCN will further reduce the spectrum available for use by PMSE equipment.

However, spectrum requirements for audio PMSE are steadily growing due to the increasing use of PMSE equipment in urban areas, especially in locations where various sports, cultural, social, and other events take place.

Following an impact assessment on spectrum use and future spectrum requirements for the use of PMSE equipment, the European Commission adopted Commission Implementing Decision 2014/641/EU on harmonised technical conditions of radio spectrum use by wireless audio programme making and special events equipment in the Union, which sets out the obligation for Member States to designate and make available, on a non-interference and non-protection basis, the 823 to 832 MHz and 1785 to 1805 MHz bands for wireless audio PMSE equipment, as well as an additional amount of at least 30 MHz, subject to user demand. This spectrum will be selected within the tuning ranges to be established by Member States, preferably in the 470-790 MHz frequency range, by using white spaces (unused DTT spectrum in certain geographical areas).

Non-interference and non-protection status provides that no harmful interference may be caused to any radio communication service and that no claim may be made for the protection against harmful interference originating from radiocommunications services.

According to the European Commission Decision no. (EU) 2016/687, the bands where PMSE applications can be used are adjacent to the FDD bands in which MFCN networks will operate and overlap the SDL band for the supplemental downlink of MFCN networks and the bands designed for PPDR applications.

In order to avoid the risk of harmful interference to MFCN and PPDR networks, ANCOM will not allow the use of PMSE equipment in the 700 MHz band.

*ANCOM will not designate the 694-703 MHz and 733-758 MHz bands for use by wireless audio PMSE equipment, in order to protect against harmful interference the MFCN and PPDR networks to be operated in the 700 MHz band.*

The use of audio PMSE equipment may be continued in the frequency band 470-694 MHz (the sub-700 MHz band).

### **3.3.2. M2M**

Machine-to-machine (M2M) radio communications means radio links for the purpose of relaying information between physical or virtual entities that build a complex ecosystem including the Internet of Things (IoT). Such radio links may be realised through electronic communications services (e.g. based on cellular technologies) or other services, based on licensed or unlicensed use of spectrum.

The radio spectrum is essential for ensuring the connectivity of IoT/M2M devices. Affordable and ubiquitous high-speed broadband and narrowband connections using radio frequencies are essential in meeting the needs of consumers and of the public and private sectors throughout the IoT/M2M ecosystem.

Mobile communications services play an important role in the M2M and IoT market and evolve rapidly to keep up with the widest possible range of requirements. Although it is estimated that approximately 70% of M2M devices will use unlicensed short range connections (e.g. Wi-Fi), much of M2M communications will rely heavily on connectivity through cellular mobile communications networks.

M2M communications cover a wide range of applications with different requirements (e.g. in terms of data transfer rate, number of devices and latency), which gives rise to a wide range of technical solutions having - in turn - various spectrum requirements. Mobile communications technologies have evolved to meet all the demands of wide-area IoT services, notably through GSM systems for narrowband applications and through 3G and 4G-LTE technologies for broadband applications (e.g. video streaming and applications for automotive industry). Since M2M communications have a set of specific requirements that are very different from traditional mobile services, cellular technology standards have evolved to support all use cases. A mobile ecosystem based on global standards is already providing solutions to support the development of IoT services. 3GPP is already developing standards for NB-IoT and LTE-M systems, both narrowband (200 kHz) and broadband (1.4 MHz and 3 MHz), to allow operators and regulators to maximize use the spectrum resource.

Taking into account the principle of network and service neutrality, technological advances will enable operators to implement the latest technologies in their licensed frequency bands. The latest mobile cellular technology standard (3GPP Release 13) provides for GSM and LTE networks to support LPWA IoT (Low Power Wireless Access IoT) applications in almost all the frequency bands used by cellular mobile communications networks. With a view to ensuring the amount of spectrum required to provide network coverage (below 1 GHz) and capacity (over 1 GHz), steps are being taken by speeding up the harmonization efforts for additional frequency bands. The harmonized spectrum will allow the development of a mass market for IoT devices with a large enough addressability to support manufacturing economies of scale.

The 700 MHz band offers the opportunity to use an additional 2x3 MHz amount of harmonized spectrum (733-736 MHz and 788-791 MHz) at European level, suitable for M2M applications with low data rates. The emerging LPWA IoT market will especially benefit from the use of this harmonized spectrum to reduce the costs of terminals and speed up their adoption.

Without prejudice to the above principles, Member States may choose to allot the above-mentioned frequency bands for PPDR applications, if deemed necessary.

*ANCOM will not allot the frequency sub-bands 733-736 MHz and 788-791 MHz for M2M applications, choosing to allot them for PPDR applications.*

## **4. ALLOCATION OF RADIO SPECTRUM IN THE 470-694 MHz FREQUENCY BAND**

### **4.1. Digital Terrestrial Television**

#### **4.1.1. Background**

The UHF band (470-862 MHz), most of which had been used by analogue terrestrial television before 17 June 2015, was planned for digital terrestrial television (DTT) at the ITU Regional Radiocommunications Conference at Geneva, in 2006 (RRC06). The agreement signed by the Romanian State, including the associated frequency plan, was ratified by Law no.378/2009 on ratifying the Final Acts of the Regional Radiocommunications 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, and of those for reviewing the Stockholm Agreement of 1961, signed in Geneva, on 16 June 2006.

The RRC06 Plan approved by the Conference included 6 (six) national DTT multiplexes in the UHF band and 1 (one) in the VHF band, as well as a number of regional multiplexes.

The digital switchover and the evolution of digital terrestrial television from the DVB-T to the DVB-T2 system have made it possible to use the spectrum considerably more efficiently. This, along with the growing need for additional spectrum for broadband technologies, resulted in looking at the upper UHF band as a good candidate for the development of mobile services.

The first step was releasing the 800 MHz band (a process known as the Digital Dividend I – DD I), by which 72 MHz were allocated to the mobile service following the 2007 World Radiocommunications Conference. The impact of DD I on the DTT frequency plan was that 1.5 national multiplexes of the 6 planned ones could no longer be used.

The next frequency band made available to mobile services was the 700 MHz band (Digital Dividend II – DD II), following the World Radiocommunications Conference of 2012 (WRC12), where an item introduced on the agenda of the next WRC proposed that the 694-790 MHz band (channels 49-60) could be used for the same type of services as the 790-862 MHz band on a primary basis, the European trends being to give up the use of this band for DTT. The implementation of DD II in Romania triggered the further clearance of 96 MHz in the UHF band and the impossibility of using two more DTT layers in the RRC06 Plan.

The release of DD I on the DTT Plan had a moderate impact in most European countries, given that the deployment of digital television was at an early stage, whereas the release of DD II had a major impact, given the period of more than ten years lapsed since the planning Conference and the fact that the implementation of the DTT system had already been completed in many European countries.

#### **4.1.2. Current use of the 470-694 MHz frequency band**

With a view to ensuring a reasonable number of national coverage layers in the UHF band, ANCOM initiated, immediately after WRC12, a process of re-planning and coordinating with the neighbouring countries the 470-694 MHz band (channels 21-48), so that when the Decision (EU) 2017/899 of the European Parliament and of the Council was published, the 700 MHz band was available in Romania from the point of view of national use.

Taking into account the obligations assumed by the Romanian State and in pursuit of implementing the measures necessary for the analogue switch-off and the authorization of digital terrestrial broadcasting, Government Decision no. 403/2013 for the approval of the Strategy regarding the digital switchover and the implementation of digital multimedia services on a national level (the Strategy) was issued. According to the Strategy, subsequently amended by Government

Decision no.733/2017, Romania has 4 DTT multiplexes in the UHF band (470-694MHz) and one in the VHF band (174-230 MHz), one of the UHF multiplexes being designed for broadcasting public television programmes (free-to-air). The imposition by strategy of the DVB-T2 technology for implementing DTT multiplexes has enabled both the optimization of the transmission capacity - so that the impact of the implementation of the two digital dividends, i.e. diminishing the spectrum resources available in the band, be minimized – and the end-user protection by avoiding subsequent costs on the receiving equipment upgrade.

In order to implement the provisions of the Strategy, between March 2014 and June 2017, ANCOM organised a series of competitive procedures with a view to awarding rights of frequency use for DTT. These resulted in the issuance of the following licences:

- one national license in the UHF band - Multiplex No. 1, intended for the transmission of public television programs;
- two national licenses in the UHF band - Multiplex No. 2 and Multiplex No. 4, intended for the transmission of commercial programs;
- thirteen regional licenses and two local licenses.

The expiry term of these licenses for the use of radio frequencies in a DTT system ranges from **17.06.2025**, for national multiplexes and some regional multiplexes, to **13.07.2027** for the local multiplex awarded most recently, in 2017. Two regional licences and one local one have been withdrawn upon request.

The current implementation status of the licenses is presented below:

- national Multiplex No. 1 has been 90% implemented as regards the coverage obligations in the licence, providing coverage for more than 80% of the population of Romania;
- Multiplexes 2 and 4 are at an early stage of implementation;
- three regional multiplexes have been thoroughly implemented.

Following negotiations with the neighbouring countries and the re-planning of the 470-694 MHz band one national multiplex and several regional ones that can be merged into a national one are now available in this frequency band. The public consultation on the destination of the radio spectrum available in the broadcasting bands that took place between March and April 2018 (<http://www.ancom.org.ro/formdata-269-49-351>), revealed no clear interest in acquiring these multiplexes.

Both the delay in the DTT implementation and the low interest in the future development of the DTT service can be explained by the minor share held by terrestrial reception of television programs in Romania. Thus, according to ANCOM statistics, Romanian users have many options now in order to receive television programs. In mid-2017, around 98% of the households in Romania benefited from paid audio-visual programme retransmission services (cable retransmission services, satellite reception services – DTH, and IPTV), with over 7.3 million subscribers being registered, + 2.5% y.o.y. However, the role of the DTT service cannot be minimized as a strategic alternative platform, providing countrywide access to public and commercial TV programmes in hard-to-reach areas, at lower investment costs than fibre optic roll-out.

#### **4.1.3. International frequency coordination**

The international coordination of digital terrestrial television was a complex and iterative process, involving both coordination through correspondence and direct coordination meetings with ANCOM's fellow authorities in the neighbouring countries.

Although the 694-790 MHz band is not used for digital terrestrial television in Romania, ANCOM has coordinated with the neighbouring countries the DTT frequencies in the 470-694 MHz

band, in the framework of the SEDDIF (South European Digital Dividend Forum) – a regional coordination platform set up through the participation of 13 countries – in order to optimize the use for DTT of the frequencies in this band and to facilitate the migration from the 694-790 MHz band of the DTT assignments in the Geneva 2006 Plan.

In December 2017, ANCOM signed a Multilateral Framework Agreement with all the neighbouring countries that were members of SEDDIF (EU Member States and non-EU countries) on the re-planning of digital terrestrial television in the 470-694 MHz band. ANCOM also signed bilateral agreements with Bulgaria, Hungary and Serbia, stipulating compliance with the deadlines laid down in Decision (EU) 2017/899 of the European Parliament and of the Council for making available the 700 MHz frequency band for use by terrestrial systems capable of providing wireless broadband electronic communications services in the Union (30 June 2020 and, respectively, 6 September 2020 for Hungary).

Negotiations with Ukraine and the Republic of Moldova on the new DTT Plan in the 470-694 MHz band are in the final stage. However, the agreements could not be finalized because the administrations of the respective countries were not able to provide a firm deadline for the switch-off of broadcasting in the 700 MHz band. Negotiations will continue by the participation of ANCOM in the BSDDIF regional group (Black Sea Digital Dividend Implementation Forum), in which the Ukrainian and Moldavian administrations are members, as well as by bilateral meetings, so as to reach an agreement with these administrations on the release of the 700 MHz band.

*ANCOM will continue the process of international coordination on the use of frequencies in the 470-694 MHz band with Ukraine and the Republic of Moldova, with the aim of concluding bilateral agreements in order to facilitate the clearance of the 700 MHz band for MFCN within the deadline stipulated in Decision (EU) 2017/899 of the European Parliament and of the Council or close to this deadline.*

#### **4.1.4. Future use of the 470-694 MHz band**

In accordance with Article 4 of Decision (EU) 2017/899 of the European Parliament and of the Council, Member States shall ensure availability at least until 2030 of the 470-694 MHz frequency band for the terrestrial provision of broadcasting services, including free television, and for use by wireless audio PMSE on the basis of national needs, while taking into account the principle of technological neutrality.

At national level, according to the provisions of Article 61 of Law no. 504/2002 as amended and supplemented (The Audio-visual Law), a license for the use of radio frequencies in digital terrestrial system may be extended by 10 years.



*Considering the expiry date of current licenses and the provisions of the legislation in force on the possibility of extending them by 10 years, the protection of the digital terrestrial television service in the 470-694 MHz band can be ensured until 2035, subject to the implementation of the harmonization objectives at European level.*

*Taking into account the frequency spectrum availability presented above, ANCOM will organize a selection procedure for awarding rights of use for such frequencies for 10 years, subject to the principles, conditions and limits set by the legislative acts adopted within the European Union. Amendments will be proposed to the legislation, so that the validity extension of these licenses should not exceed 2035.*

## **4.2. Audio PMSE**

*ANCOM will allow wireless audio PMSE equipment to continue using the 470-694 MHz band, on a tuning range basis, in accordance with Recommendation ERC/REC 70-03, Annex 10, at least until 2030.*

## ANNEX

### Action plan for fulfilling the obligations provided by Decision (EU) 2017/899

<b>Awarding new frequency use rights in harmonised MFCN bands, including the 700 MHz frequency band</b>	
<i>Develop and adopt the national position on awarding rights of use for the radio spectrum available in the frequency bands 700 MHz, 800 MHz, 1500 MHz, 2600 MHz, 3400-3600 MHz and 26 GHz for wireless broadband electronic communications systems</i>	<i>30 December 2018</i>
<i>Finalize the conclusion of bilateral agreements with the neighbouring countries on cross-border coordination of frequency use for MFCN networks</i>	<i>30 June 2019</i>
<i>Conduct a campaign for monitoring the radio spectrum in the frequency bands to be auctioned out and provide a report on the status of the radio signals identified on the territory of Romania in these bands, coming from the territory of foreign states</i>	<i>30 June 2019</i>
<i>Adopt the decision on organising the selection procedure (establish the conditions for awarding frequency usage rights) and other necessary normative acts</i>	<i>31 July 2019</i>
<i>Conduct the selection procedure for awarding the frequency usage rights in the 700 MHz band and in the other frequency bands envisaged for MFCN</i>	<i>15 December 2019</i>

<b>Adoption of the decision on the use of BB-PPDR systems in the 700 MHz frequency band</b>	
<i>Consult the interested parties on the implementation model for BB-PPDR networks in the 700 MHz band</i>	<i>30 September 2018</i>
<i>Adopt - on government level - the decision for the allotment of spectrum for BB-PPDR networks in the 700 MHz band and the mechanisms for making available the frequency spectrum suited to the chosen implementation model, and designate the NTFA frequency bands for BB-PPDR in the 700 MHz band</i>	<i>30 December 2018</i>

<b>Use of the 470-694 MHz frequency band for DTT</b>	
<i>Propose amendments to the legislation on extending the licences for the use of frequencies in DTT system in the 470-694 MHz band, correlated with the deadline assumed for the ensuring the protection of DTT - 2035.</i>	<i>30 September 2018</i>

<i>Finalize the DTT coordination agreements with Ukraine and the Republic of Moldova</i>	<i>30 June 2019</i>
<i>Launch the selection procedure for awarding frequency use rights for DTT in the yet unawarded radio spectrum bands</i>	<i>30 June 2019</i>