

Disclaimer: This is a Romanian to English translation meant to facilitate the understanding of this document. Should differences appear between the Romanian and the English version, following translation, the Romanian version shall prevail.

CONSULTATION
on awarding the spectrum use rights
in the frequency bands
694-790 MHz,
791-796 MHz/832-837 MHz,
1452-1492 MHz,
2530-2570 MHz/2650-2690 MHz,
3410-3420 MHz/3510-3520 MHz,
3450-3465 MHz/3550-3565 MHz

26 June 2017

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I. Purpose of the consultation

The public consultation initiated through this document is aimed at collecting the opinions of the interested parties on the need and opportunity of organising a competitive selection procedure for awarding the rights of radio spectrum use in the new frequency bands harmonised on a European level for broadband mobile communications systems, i.e. 694-790 MHz and 1452-1492 MHz, as well as in the frequency sub-bands 791-796 MHz/832-837 MHz, 2530-2570 MHz/2650-2690 MHz, 3410-3420 MHz/3510-3520 MHz and 3450-3465 MHz/3550-3565 MHz, not awarded during the selection procedures held in 2012 and 2015. The consultation also focuses on these rights' awarding manner and conditions.

Moreover, the National Authority for Management and Regulation in Communications of Romania (ANCOM) seeks to find the intentions of the existing market players or of potential new entrants on their participation in a competitive selection procedure that could be organised for awarding spectrum usage rights in the bands under consultation.

The opinions and comments expressed in this consultation will serve as grounds for the decision to be taken related to awarding the rights of use for the frequencies available in these bands.

Taking into account the importance of the limited spectrum resource available, the impact of the decision on the future use of these frequency bands, as well as its effect on the Romanian electronic communications market, ANCOM deems necessary to consult all the interested parties, in order to ensure a transparent and fair decisional process, and the predictability of the adopted measures.

II. Brief history and current status of the spectrum usage rights in the bands under consultation

1. 800 MHz and 2600 MHz bands

During August - September 2012, ANCOM held the competitive selection procedure organised for awarding the spectrum usage rights in the 800 MHz, 900 MHz, 1800 MHz and 2600 MHz bands.

The respective selection procedure enabled simultaneously auctioning out frequency blocks in all the available spectrum bands and acquiring spectrum portfolios that included frequency blocks in various spectrum bands, adequate for providing broadband mobile public electronic communications networks and services on a national level.

The radio frequency spectrum auctioned out was organised as follows:

- a) for awarding the spectrum usage rights valid from **01.01.2013** to **05.04.2014**:
 - the paired frequency bands 890-915 MHz/935-960 MHz, corresponding to 2 x 25 MHz bandwidth, split into 10 duplex blocks of 2 x 2.5 MHz each;
 - the duplex frequency bands 1722.7–1752.7 MHz/1817.7-1847.7 MHz, corresponding to 2 x 30 MHz bandwidth, split into 6 duplex blocks of 2 x 5 MHz each.
- b) for awarding the spectrum usage rights valid from **06.04.2014** to **05.04.2029**:
 - the paired frequency bands 791-821 MHz/832-862 MHz (*800 MHz band*), corresponding to 2 x 30 MHz bandwidth, split into 6 duplex blocks of 2 x 5 MHz each;
 - the paired frequency bands 880-915 MHz/925-960 MHz (*900 MHz band*), corresponding to 2 x 35 MHz bandwidth, split into 7 duplex blocks of 2 x 5 MHz each;
 - the paired frequency bands 1710-1785 MHz/1805-1880 MHz (*1800 MHz band*), corresponding to 2 x 75 MHz bandwidth, split into 15 duplex blocks of 2 x 5 MHz each;
 - the paired frequency bands (FDD) 2500-2570 MHz/2620-2690 MHz, corresponding to 2 x 70 MHz bandwidth, split into 14 duplex blocks of 2 x 5 MHz each;

- the unpaired frequency band (TDD) 2570-2615 MHz, corresponding to 45 MHz bandwidth, split into 3 TDD blocks of 15 MHz each.

The auction produced the following outcomes, as regards the allotment of the radio frequency spectrum:

a) for the period **01.01.2013 – 05.04.2014**:

- in the frequency bands 890-915 MHz/935-960 MHz:
 - Orange Romania (*Orange*) acquired 5 blocks of 2 x 2.5 MHz each, standing for 2 x 12.5 MHz bandwidth;
 - Vodafone Romania (*Vodafone*) acquired 5 blocks of 2 x 2.5 MHz each, standing for 2 x 12.5 MHz bandwidth.
- in the frequency bands 1722.7-1752.7 MHz/1817.7-1847.7 MHz:
 - Orange acquired 3 blocks of 2 x 5 MHz each, standing for 2 x 15 MHz bandwidth;
 - Vodafone acquired 3 blocks of 2 x 5 MHz each, standing for 2 x 15 MHz bandwidth.

b) for the period **06.04.2014 – 05.04.2029**:

- **in the 800 MHz band:**
 - Telekom Romania Mobile Communications (former Cosmote Romanian Mobile Telecommunications), hereinafter referred to as *Telekom Mobile*, acquired one 2 x 5 MHz block;
 - Orange acquired 2 blocks of 2 x 5 MHz each, standing for 2 x 10 MHz bandwidth;
 - Vodafone acquired 2 blocks of 2 x 5 MHz each, standing for 2 x 10 MHz bandwidth.
- in the 900 MHz band:
 - Telekom Mobile acquired 2 blocks of 2 x 5 MHz each, standing for 2 x 10 MHz bandwidth;
 - Orange acquired 2 blocks of 2 x 5 MHz each, standing for 2 x 10 MHz bandwidth;
 - Vodafone acquired 2 blocks of 2 x 5 MHz each, standing for 2 x 10 MHz bandwidth;
 - RCS&RDS acquired one 2 x 5 MHz block.
- in the 1800 MHz band:
 - Telekom Mobile acquired 5 blocks of 2 x 5 MHz each, standing for 2 x 25 MHz bandwidth;
 - Orange acquired 4 blocks of 2 x 5 MHz each, standing for 2 x 20 MHz bandwidth;
 - Vodafone acquired 6 blocks of 2 x 5 MHz each, standing for 2 x 30 MHz bandwidth.
- in the **2500-2570 MHz/2620-2690 MHz (FDD)** bands:
 - Telekom Mobile acquired 2 blocks of 2 x 5 MHz each, standing for 2 x 10 MHz bandwidth;
 - Orange acquired 4 blocks of 2 x 5 MHz each, standing for 2 x 20 MHz bandwidth;
- in the 2570-2615 MHz (TDD) band:
 - 2K Telecom acquired 2 blocks of 15 MHz each, standing for 30 MHz bandwidth;
 - Vodafone acquired one 15 MHz block.

Thus, in the 800 MHz band, ANCOM awarded 5 of the 6 duplex 2 x 5 MHz blocks auctioned out, **one 2 x 5 MHz block** remaining unacquired. The paired frequency sub-bands corresponding to the remaining block in the 800 MHz band are: **791-796 MHz/832-837 MHz**.

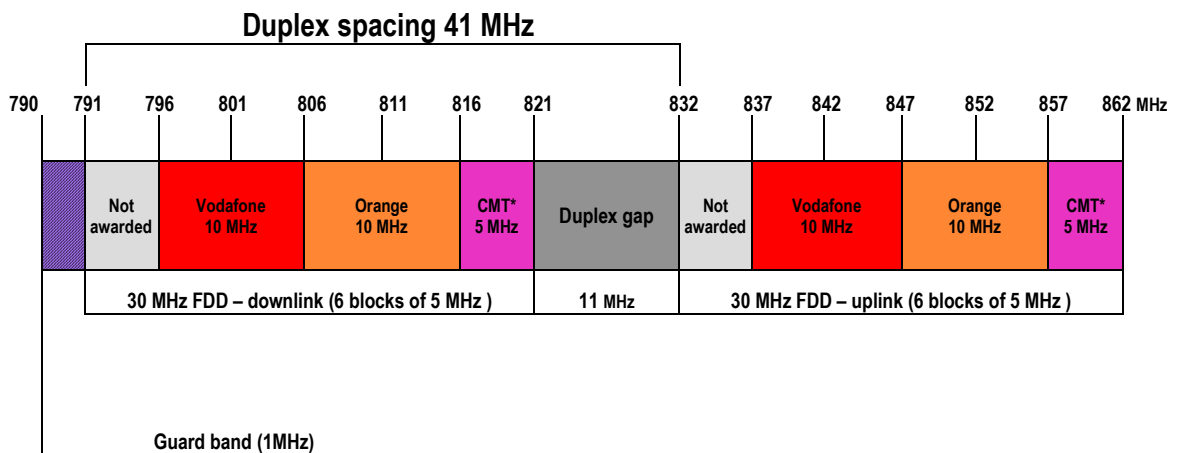
In the 2600 MHz FDD band, ANCOM awarded **6 blocks of 2 x 5 MHz** out of the available 14, **8 blocks of 2 x 5 MHz** remaining unacquired. The paired frequency sub-bands corresponding

to the remaining 8 blocks of 2 x 5 MHz in the 2600 MHz FDD band are: **2530-2570 MHz/2650-2690 MHz**.

Upon completing the auction for awarding the rights of spectrum use in the 800 MHz, 900 MHz, 1800 MHz and 2600 MHz bands, ANCOM issued the licences for granting new spectrum usage rights in the 800 MHz, 900 MHz, 1800 MHz and 2600 MHz bands. The licences issued to Telekom Mobile, Orange, RCS&RDS, 2K Telecom and Vodafone are valid for a 15-year period, from 06.04.2014 to 05.04.2029.

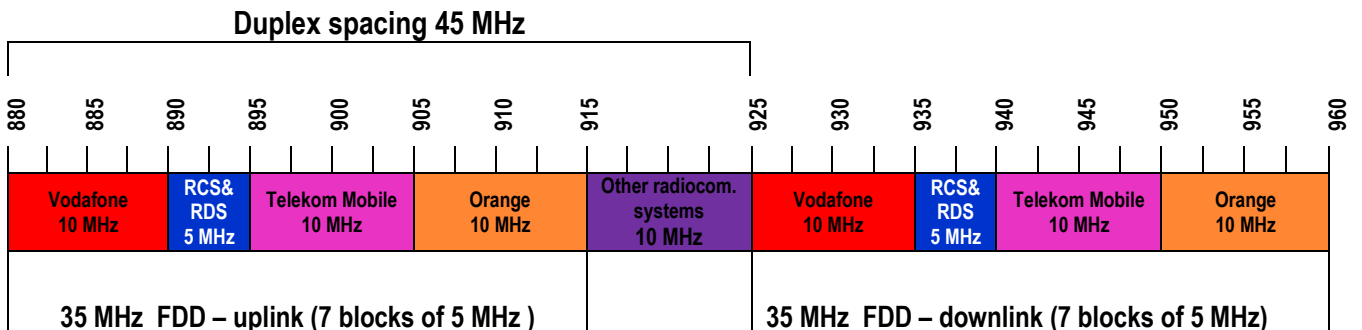
The allotments of each mobile communications operator in the frequency bands auctioned out are illustrated below:

**791-821 MHz/832-862 MHz bands
- allotments valid during 06.04.2014 – 05.04.2029 -**



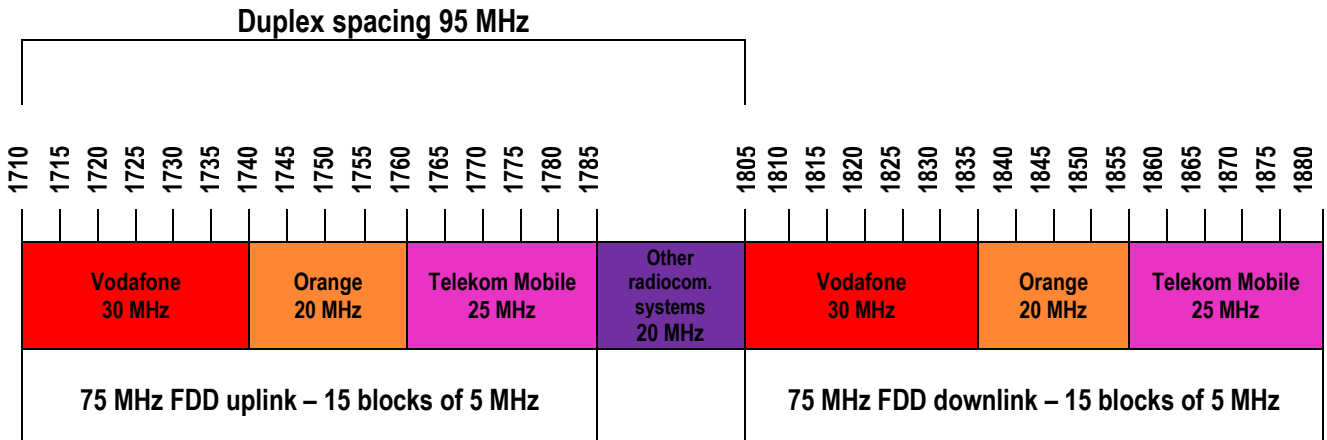
*CMT – Telekom Mobile

**880-915 MHz/925-960 MHz bands
- allotments valid during 06.04.2014 – 05.04.2029 -**

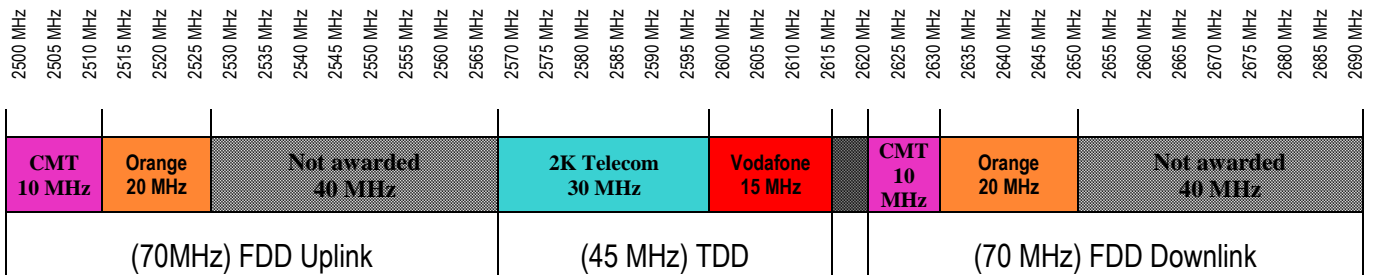


CMT – Telekom Mobile

1710 - 1785 MHz / 1805 - 1880 MHz bands
- allotments valid during 06.04.2014 – 05.04.2029 -



2500 – 2690 MHz band
- allotments valid during 06.04.2014 – 05.04.2029



CMT – Telekom Mobile

The spectrum portfolios currently held by mobile communications networks operators in all the frequency bands designated for the provision of public electronic communications networks and mobile electronic communications services are illustrated below:

Spectrum portfolios by bands and holders

800 MHz (FDD)	Not awarded 5 MHz	Vodafone 2x10 MHz	Orange 2x10 MHz	Telekom Mobile (CMT*) 2x5 MHz
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900 MHz (FDD)	Vodafone 2x10 MHz	RCS&RDS 2 x 5 MHz	Telekom Mobile 2 x 10 MHz	Orange 2x10 MHz
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1800 MHz (FDD)	Vodafone 2x30 MHz	Orange 2x20 MHz	Telekom Mobile 2 x 25 MHz
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2100 MHz (FDD)	RCS&RDS 2 x 15 MHz	Telemobil 2 x 14.8 MHz	Orange 2x14.8 MHz	Vodafone 2x14.8 MHz
2100 MHz (TDD)	Telemobil 5 MHz	ORO* 5 MHz	VDF** 5 MHz	RCS&RDS 5 MHz

Not auctioned

2600 MHz (FDD)	Telekom Mobile 2 x 10 MHz	Orange 2x20 MHz	Not awarded 2 x 40 MHz (8 blocks)
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2600 MHz (TDD)	RCS&RDS (transferred by 2K Telecom) 1x30 MHz	Vodafone 1x15 MHz
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*ORO - Orange
**VDF - Vodafone

2. The 3400-3800 MHz band

2.1. The 3400-3600 MHz band

The 3400-3600 MHz band (*3.5 GHz band*) was used for the first time in Romania, for commercial data transmissions, starting from 2001, following the comparative selection procedure organised in the second half of 2000, for awarding national and local licences, in the fixed service, for point-to-multipoint wireless data transmission networks, for FWA (fixed wireless access) applications.

Following the selection procedure, ANCOM issued both national and local licenses.

The spectrum not awarded at that time in the 3.5 GHz band was made available to the interested parties through further comparative selection procedures, in 2003 and 2004 - for national licenses only - and in 2004 - for local licenses only.

All national licenses were issued - irrespective of the selection procedure by which they were obtained - for a validity period of 10 years, while local licenses were issued for 5 years. Each national license contained an allotment of 2 x 7 MHz sub-bands, whereas local licenses contained an allotment of 2x1.75 MHz frequency sub-bands.

As a result, at the end of 2005, the following licences were in force:

- 10 national licenses held by seven operators;
- 175 local licenses held by five operators.

No significant changes occurred in the band 3400-3600 MHz between 2006 and 2014 (except for some license transfers and license withdrawals upon their holders' request). Over time, the operators' interest in this band started declining, with local operators giving up on their local licenses.

In 2006, the regulatory authority started a public consultation process on the future of the entire 3400-3800 MHz band (not only the 3.5 GHz band), which proved to be a complex and lengthy one, due to the occurrence of objective circumstances, which were out of the authority's control. Among these, we count:

- the slow pace of adoption (in 2011) and of updating (in 2014) the technical regulations at European level (CEPT) designating the 3.5 GHz band for broadband communications networks (thus broadening the range of applications that could be implemented in this frequency band);
- the fact that the abovementioned regulations have failed to fully harmonize the technical provisions for the use of the 3.5 GHz band (namely the permission to use two types of channel arrangements in this band, the FDD type, respectively TDD type, even if the raster used was the same, i.e. 5 MHz / radio channel);
- the international economic downturn since 2008, which was effective also in Romania starting from 2009;
- the need to reform spectrum use in the 3600-3800 MHz band, as a result of the fact that high capacity fixed links had to leave this band and to be relocated, as specified in Section 2.2 on the history of the 3600- 3800 MHz band.

In 2011, the authority's efforts to carry out this consultation process were partially successful, as the draft strategy paper for the 3400-3800 MHz band, developed and submitted to public consultation, was well received by the communications market.

However, the project - in its entirety - was postponed at the very request of the national electronic communications market, the reasons being among the ones listed above. Nevertheless, all the parties involved agreed that some of the provisions of this document should already be implemented by ANCOM.

Thus, in 2013, the validity of all existing national licenses in the 3.5 GHz band (no local licenses being in force at that time) was extended until 31.12.2015 as their validity expired on 30.09.2013. This measure was necessary to ensure the continuity of the provision of electronic communications services to end-users in this band, temporarily, over a transitional period, pending the completion of the European regulatory process for the respective band.

In 2013, following the above-mentioned public consultation, it was also established that the selection procedure to be organized for this band would be a competitive one, and that it would be held in 2015.

The consultation with the electronic communications market, initiated in 2006, successfully ended in 2015, when the draft strategy document was updated (compared to the previous 2011 version). Subsequently, the ANCOM President's Decision no. 390/2015 on the adoption of the strategy and action plan for the deployment and development of broadband communications

systems at national level in the 3400-3800 MHz frequency band for the period 2015-2025 was adopted.

Decision no. 390/2015 set out the deadlines and the timetable for the follow-up actions of the Authority's main resolution, adopted through the aforementioned decision, i.e. the organization of a selection procedure in the 3400-3800 MHz band. The strategy and the action plan also included all the technical and administrative elements necessary for the proper conduct of the future selection procedure.

Subsequently, ANCOM implemented the relevant elements of the adopted strategy through the elaboration, the public consultation and the adoption of the necessary documents for organising the selection procedure:

- the draft decision on the organization of the selection procedure;
- the draft decision on the amendment and completion of some provisions related to the tariff for the use of spectrum in the respective band;
- draft terms of reference of the selection procedure,
- draft Government Decision on the licence fee.

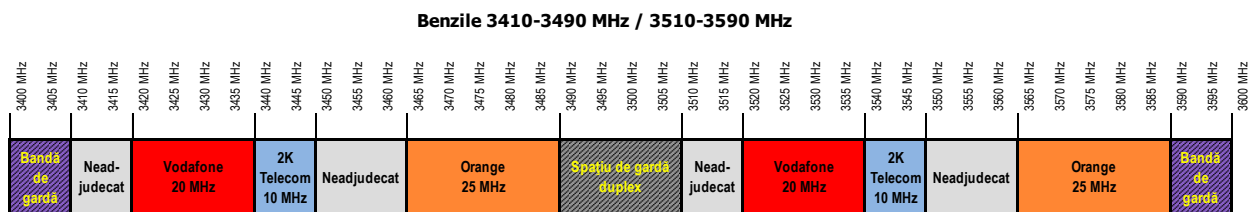
The selection procedure was held between September and October 2015, being completed before the start of the World Radiocommunication Conference organized by the International Telecommunication Union (ITU) in November 2015.

The licences were issued to the winners of the selection procedure in December 2015 and entered into force on 1 January 2016.

Currently, the frequency spectrum in the 3.5 GHz band is allotted, according to the results of the competitive selection procedure held in 2015, as follows:

- 3420-3440 MHz/3520-3540 MHz sub-bands, to Vodafone;
- 3440-3450 MHz/3540-3550 MHz sub-bands, to 2K Telecom;
- 3465-3490 MHz/3565-3590 MHz sub-bands, to Orange.

These allotments are graphically illustrated below:



The licenses issued in favour of the winners of the 2015 selection are valid between 01.01.2016 and 31.12.2025. The spectrum usage rights in the licences were granted for the provision of national public MFCN (fixed / mobile communications networks) electronic communications networks, with due regard to the technological neutrality principle.

The currently available spectrum resources in the 3.5 GHz band consist of 5 duplex 2x5 MHz channels that do not form contiguous bands, as follows:

- sub-bands 3410-3420 MHz / 3510-3520 MHz,
- sub-bands 3450-3465 MHz / 3550-3565 MHz.

The graphic representation of the spectrum not yet awarded is presented in the diagram above (in light grey colour).

2.2. The 3600-3800 MHz band

Allocated to the fixed service on a primary basis, according to the National Table of Frequency Bands Allocations (*NTEFA*), the 3600-3800 MHz band (*3.7 GHz band*) used to be

designated for highcapacity fixed links, as part of the 3600-4200 MHz range, a traditionally fixed service band.

Nevertheless, the public consultation initiated in 2006 (see section 2.1.), indicated the need for reformatting the 3.7 GHz band, with a view to designating it to BWA (broadband wireless access) systems.

Thus, throughout 2007, the regulatory authority held numerous negotiations with the Ministry of Communications and Information Society, on the one hand, and with the company operating - at that time a national network of highcapacity digital fixed links that also used, among others, frequency assignments in the 3600-4200 MHz band, with a view to establishing:

- the 3.7 GHz band release schedule (sine qua non for the implementation of the future strategy paper), which also provided for the migration of the fixed links in the 3800-4200 MHz band;
- the compensation mechanisms for that operator, and
- the amount of such compensation.

The process of reorganizing the use of the 3.7 GHz band at that time proved to be particularly difficult, due to many practical elements and technical, financial and administrative constraints that had to be considered.

During 2008, the negotiation process with the operator which owned equipment in the 3.7 GHz band was completed, and the following were adopted:

- Government Emergency Ordinance no. 18/2008 on the establishment of some measures for reformatting the spectrum use in the 3600-3800 MHz band, approved, as amended, by Law no. 259/2008, with subsequent amendments;
- Government Decision no. 638/2008 on setting of the amount of the licence fee for granting the right to use the radio frequencies in the 3600-3657 MHz and 3700-3757 MHz bands.

On grounds of the above-mentioned normative acts, the regulatory authority prepared and adopted, during 2008, the special legislation necessary to organize the comparative selection procedure for granting two national licenses in the 3600-3800 MHz band for BWA systems. Each licence was issued for the allotment of a duplex radio channel of 2x28 MHz, on a national level. The documents of the selection procedure included:

- the decision on the organization of the comparative selection procedure in the 3.7 GHz band;
- the decision on the amendment and completion of certain provisions related to the spectrum usage tariff for the respective band;
- the terms of reference for the selection procedure.

On this occasion, the operator who had to reorganize its frequency assignments for highcapacity fixed links, as a result of leaving the 3.7 GHz band for the 3800-4200 MHz band, received in November 2008, by direct awarding, on grounds of the specific provisions of the aforementioned normative acts, - a licence for the provision of a national public electronic communications network.

This licence had the same validity term as the other licences held by the operator in the fixed service for fixed links (July 2011). The holder was allotted, by licence, a 2x28 MHz duplex radio channel in the 3.7 GHz band (the same amount of spectrum as for the rights of use subject to the selection procedure). For that licence, the holder had to pay a licence fee set by the regulatory authority, as stipulated in the relevant primary legislation.

The selection procedure in the 3.7 GHz band was launched in November 2008, the deadline for submitting bids being at the beginning of February 2009. The procedure was foreseen to be completed in March 2009, upon the designation of winners.

No bids were submitted in the selection procedure within the above-mentioned term, despite the fact that six companies purchased the Terms of Reference (three of which were large operators).

The failure of the 3.7 GHz selection procedure led the Authority to launch a public consultation in 2009, exclusively for this band. One of the conclusions was that, given the technical and regulatory problems encountered at that moment, an adequate timing for a public consultation on that issue was in 2011, in order to assess the national electronic communications market preparedness for resuming the process.

The public consultation held in 2011 covered the entire 3400-3800 MHz band. On this occasion, taking into account the results of the public consultation, the validity of the existing licence in the 3.7 GHz band was extended until 31.12.2015.

From that moment on, the consultation process and the steps taken in respect of the 3.7 GHz band were common to those for the 3.5 GHz band (the 2011 consultation, the adoption of the 2015 strategy and action plan, the 2015 selection procedure), these issues being described in section 2.1. on the 3.5 GHz band history.

ANCOM's drafting of the strategy paper for the 3400-3800 MHz band was based on the provisions of Art. 5 of Government Emergency Ordinance no. 18/2008 on the establishment of some measures for reforming the spectrum use in the 3600-3800 MHz frequency band.

This strategy paper established the principles, conditions, procedure for granting the rights for the use of radio frequencies with a view to providing broadband electronic communications services, as well as the method of reorganizing the entire 3400-3800 MHz band.

The strategy adopted by the ANCOM President's Decision no. 390/2015 also aimed at avoiding the risk of wasting or excessively fragmenting the radio spectrum allotments, ensuring the principle of technological neutrality and attracting those market players who have the necessary financial and technical capabilities to maximize the potential of these frequency bands.

Currently, the radio spectrum in the 3.7 GHz band is allotted, according to the results of the competitive selection procedure conducted in 2015, as follows:

- the 3600-3645 MHz sub-band, to Orange;
- the 3700-3750 MHz sub-band, to RCS & RDS;
- the 3750-3800 MHz sub-band, to S.N. Radiocomunicații S.A.

The licences issued in favour of the 2015 selection procedure winners are valid for the period 01.01.2016 - 31.12.2025. The usage rights in the licences were granted for the provision of national public MFCN (fixed/mobile communication networks) electronic communications networks, with due regard to the principle of technological neutrality.

The 3680-3700 MHz sub-band was not subject to the 2015 selection procedure due to the fact that the 3685-3700 MHz sub-band already had a non-governmental / governmental shared use status as of 2010, according to the NTFA.

In 2016, upon the request of the institutions which are part of the national defence, public order and national security system, the spectrum not awarded in the 3.7 GHz band following the 2015 selection procedure (the 3645-3685 MHz sub-band) was allotted for use by governmental networks until 31.12.2025.

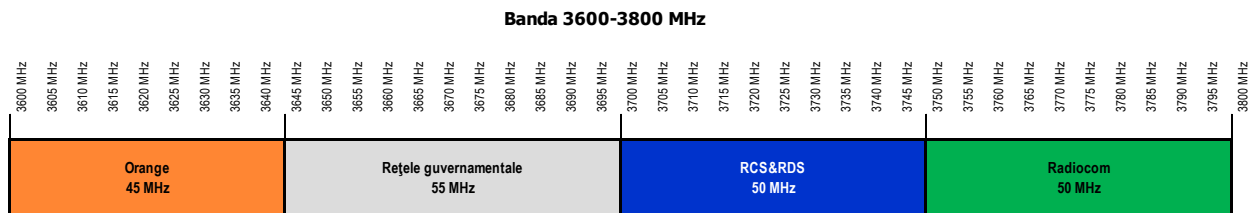
The allotment was made based on the provisions of Article 1 of the Decision No. 243/2012/EU of the European Parliament and of the Council establishing a multiannual radio spectrum policy programme. The European Commission was duly informed of the measure taken by the Authority.

The spectrum thus allotted in 2016 is adjacent to the 3685-3700 MHz sub-band, totalling 55 MHz, currently designated for use by governmental networks.

The 3645-3700 MHz sub-band is allotted for use by networks operated by institutions that are part of the national defence, public order and national security system.

At this point, there is no spectrum available in the 3.7 GHz band.

The current allotment status in this band is graphically illustrated below (governmental networks in light grey colour):



III. Regulatory framework

1. Applicable legislation

The legal provisions in force that are relevant in this public consultation procedure are the following:

- Government Emergency Ordinance no.111/2011 on electronic communications, approved with amendments and completions by Law no.140/2012, with the subsequent amendments and completions (*Framework-Ordinance*);
- Government Emergency Ordinance no. 11/2012 on the release of the 830-862 MHz, 1747.5-1785 MHz, 1842.5-1880 MHz and 2500-2690 MHz frequency bands approved by Law no. 165/2012, with the subsequent amendments and completions;
- Government Emergency Ordinance no. 18/2008 establishing certain measures for reforming the use of the radio spectrum in the 3600-3800 MHz frequency band, approved, with amendments, by Law no. 259/2008, with the subsequent amendments;
- Decision No. 243/2012/EU of the European Parliament and of the Council establishing a multiannual radio spectrum policy programme;
- 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;
- Commission Decision 2010/267/EU on harmonised technical conditions of use in the 790-862 MHz frequency band for terrestrial systems capable of providing electronic communications services in the European Union;
- Commission Decision 2008/477/EC on the harmonisation of the 2500-2690 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community;
- 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;
- Commission Implementing Decision (EU) 2015/750 on the harmonisation of the 1452-1492 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Union;
- Commission Decision 2008/411/EC on the harmonisation of the 3400-3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community, amended by Commission Implementing Decision 2014/276/EU;
- Order of the Minister for Communications and Information Society no. 789/2009 on approving the National Table of Frequency Allocations, with the subsequent amendments;
- ANCOM President's Decision no. 390/2015 on the approval of the Strategy and of the action plan for the implementation and development of broadband communications systems in the 3400-3800 MHz band, on a national level, for 2015-2025.

The specialized legislation in the field of electronic communications stipulates that the individual spectrum usage rights are granted for one of the following purposes: i) to ensure the efficient use of the limited radio spectrum resource, ii) to avoid harmful interferences on the networks operated by other persons using the radio spectrum in accordance with the legal provisions, iii) to ensure the technical quality of the service provided, or iv) to fulfil other general interest objectives.

Furthermore, the electronic communications regulatory framework permits a holder of spectrum usage rights to use any technology available for each type of application established in the NTFA, in accordance with the requirements of the European Union legislation or to provide any electronic communications service, as established in the NTFA, in accordance with the requirements of the European Union legislation. Exceptions from the principle of technological or service neutrality will need to be clearly defined.

In accordance with Article 26(1) of the Framework Ordinance, licenses for the use of radio frequencies shall be granted through an open, objective, transparent, non-discriminatory and proportionate procedure.

Moreover, according to Article 25 of the Framework Ordinance, ANCOM may decide to limit the number of licences to be granted in a radio frequency band, when it is necessary to ensure the efficient use of radio frequencies or to avoid the occurrence of harmful interferences. Where ANCOM resorts to this measure, it must also: consider the need that this measure should bring the users maximum benefits and foster competition; give all stakeholders - including users and consumers - the opportunity to express their views on this measure; publish any decision limiting the number of licenses, together with the reasons for the measure.

In the case of licenses whose number has been limited, ANCOM grants the right of use through a procedure that must fulfil – as well – a number of conditions, set out in Article 26(2) of the Framework Ordinance. Thus:

- a) the procedure type must be competitive or comparative selection;
- b) the procedure must be objective, transparent, non-discriminatory and proportionate;
- c) the procedure must not result into restricting, preventing or distorting competition;
- d) the granting of rights of use must normally take place within eight months from the receipt of a request therefor, which may be amended if necessary to comply with an international agreement on the use of the radio spectrum or of the orbital positions in which Romania is a party.

Paragraphs (2) and (3) of Article 28 in the Framework Ordinance define the types of selection procedures that can be used, i.e.:

- competitive selection – is the procedure whereby the right to use the radio frequencies is awarded to the winner of an auction, as a result of offering a maximum amount as a licence fee, starting from the reserve price set by the Government Decision, while ensuring the fulfilment of technical, administrative or financial pre-qualification criteria, as appropriate;
- comparative selection – is the procedure whereby the right to use the radio frequencies is granted to the applicant ranking first following the evaluation of the bids submitted on the basis of a set of pre-established technical, administrative or financial criteria, as appropriate.

2. Technical regulation on a national and European level

2.1. Technical regulations for using the 800 MHz band

According to the provisions of the NTFA, corroborated with the provisions of Government Emergency Ordinance no. 11/2012, the 790-862 MHz frequency band is allocated for non-governmental use.

Concerning the applications allowed in the 790-862 MHz band and the harmonized technical conditions for the use of this band, the provisions of the Commission Decision no. 2010/267/EU on harmonised technical conditions of use in the 790-862 MHz frequency band for terrestrial systems capable of providing electronic communications services in the European Union (TRA-ECS) shall apply.

Thus, the electronic communications systems that can use the 790-862 MHz band are terrestrial systems complying with Decision 2010/267/EU. Any available technology that complies with the harmonized technical conditions established by the above-mentioned Decision may be used.

The frequency arrangement in the 790-862 MHz band, in accordance with Decision 2010/267/EU, is presented below:

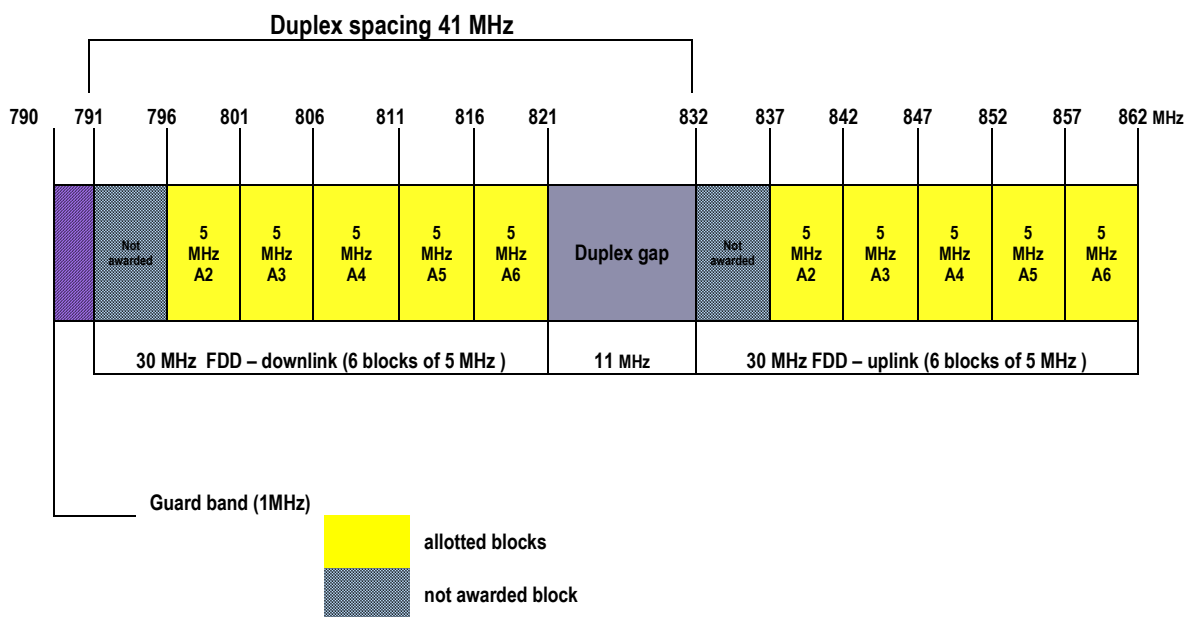
- the 790-791 MHz sub-band is kept as a guard band to the adjacent band and will not be used;
- the operation mode in the 790-862 MHz band is Frequency Division Duplex (FDD);
- the sub-band 791-821 MHz is used for base station broadcast (downlink);
- the sub-band 832-862 MHz is used for terminal station emission (uplink);
- the duplex spacing is 41 MHz;
- the allotted blocks sizes shall be in multiple of 5 MHz.

The spectrum mask relative to the edge of a 5 MHz block (block-edge mask) in the 790-862 MHz band defined in the Annex to Decision 2010/267/EC shall be observed.

The layout for the 800 MHz band frequency arrangement harmonized at European level is set out in Annex 1 to Decision ECC/DEC/(09)03 on harmonized technical conditions for systems operating in the 790-862 MHz band and is further represented below.

The diagram below also highlights the 5 MHz blocks allotted in the 2012 auction and the block remained unacquired.

Harmonised frequency arrangement in the 790-862 MHz band, in 5 MHz blocks



For the use of radio frequencies in the bands 791-821 MHz / 832-862 MHz in border areas, the provisions of the following bilateral technical agreements are applicable:

- *Technical arrangement between the national frequency management authorities of Hungary and Romania on border coordination for terrestrial systems capable of providing electronic communications services in the 790-862 MHz frequency band, concluded in 2013;*
- *Technical Agreement between the telecommunications administrations of Romania and Ukraine on the coordination of the use of the frequency band 790-862 MHz by mobile radiocommunications networks with respect to the aeronautical radionavigation and fixed services, concluded at Geneva in February 2012;*
- *Technical Agreement between the telecommunications administrations of Romania and Ukraine on the coordination of DVB-T frequency assignments in the 470-790 MHz band and the technical criteria for the coordination of the broadcasting service in Ukraine in the 790-862 MHz band with respect to the land mobile service in Romania, concluded in Geneva in February 2012 .*

In the absence of bilateral agreements with the neighbouring countries, the provisions of Notes 5.316B and 5.317A of Article 5 of the ITU Radio Regulations and Recommendation ECC/REC/(11)04 on cross-border coordination for Mobile/Fixed Communications Networks (MFCN) in the frequency band 790-862 MHz shall apply.

2.2. Technical regulations for the use of the 2600 MHz band

According to the provisions of the NTFA, corroborated with the provisions of Government Emergency Ordinance no. 11/2012, the 2500-2690 MHz band (*2600 MHz band*) is allocated for non-governmental use.

Concerning the applications allowed in the 2500-2690 MHz band and the harmonized technical conditions for the use of this band, the provisions of the Commission Decision 2008/477/EC on the harmonisation of the 2500-2690 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community (TRA-ECS) shall apply.

The electronic communications systems that can use the 2500-2690 MHz band are terrestrial systems that comply with the block edge masks (BEM) as set out in the Annex to Decision 2008/477/EC. Any available technology that complies with the harmonized technical conditions established by the above-mentioned Decision may be used.

The frequency arrangement in the 2500-2690 MHz band, in accordance with Decision 2008/477/EC, is the following:

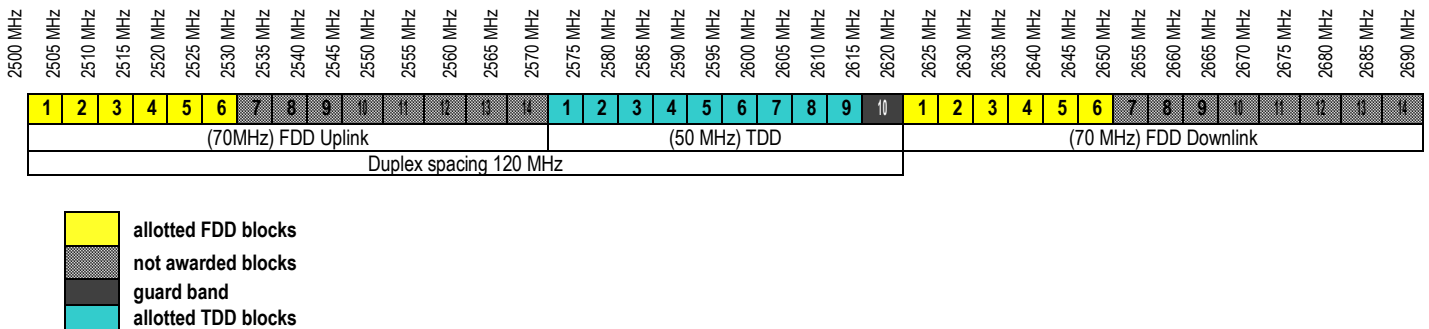
- the 2500-2570 MHz/2620-2690 MHz sub-bands are intended for Frequency Division Duplex (FDD) operation mode;
- the 2500-2570 MHz sub-band is used for terminal station emission and base station reception (uplink);
- the 2620-2690 MHz sub-band is used for base station emission and terminal station reception (downlink);
- the duplex spacing is 120 MHz;
- the 2570-2620 MHz sub-band is intended for Time Division Duplex (TDD) operation mode;
- the allotted blocks shall be in multiple of 5 MHz.

For the use of the FDD 2650-2690 MHz sub-band, the conditions for unrestricted blocks shall be applied to all 5 MHz FDD blocks. The block edge mask of a 5 MHz block for unrestricted blocks: Maximum EIRP = 61 dBm / 5 MHz.

The layout for European harmonized frequency arrangement in the band 2600 MHz is set out in Decision ECC/DEC/(05)05 on harmonised utilization of spectrum for Mobile/Fixed Communications Networks (MFCN) operating in the 2500-2690 MHz band and is represented in the diagram below.

The diagram also highlights the 5 MHz blocks allotted and the block remaining unacquired in the 2012 auction.

Harmonised frequency arrangement in the 2500 – 2690 MHz band, in 5 MHz blocks



For the use of radio frequencies in the 2500-2570 MHz/2620-2690 MHz bands in the border areas, the provisions of the *"Technical arrangement between the national frequency management authorities of Hungary and Romania on border coordination for terrestrial systems capable of providing electronic communications services in the 2500-2690 MHz band, concluded in 2013"*, shall apply.

In the absence of bilateral agreements with neighbouring countries, the provisions of Note 5.384A of Article 5 of the ITU Radio Regulations and Recommendation ECC/REC/(11)05 Cross-border Coordination for Mobile/Fixed Communications Networks (MFCN) in the frequency band 2500-2690 MHz shall apply.

2.3. Technical regulations for the use of the 700 MHz band

According to the NTFA, the 694-790 MHz frequency band (*the 700 MHz band*) is allocated to the broadcasting service on a primary basis. Taking into account that the band was allocated in the ITU Region 1 (of which Romania is part) also to the land mobile service on a primary basis, by No. 5.312A of Article 5 of the ITU Radiocommunication Regulation - 2016 edition (RR-ITU), being identified at WRC-15 for IMT systems, according to the provisions of No. 5.317A, the band allocation in Romania will be updated by amending the NTFA in accordance with RR-ITU.

The 700 MHz band is not used in Romania, but its use by future IMT systems on the national territory is severely restricted by the existing uses in the broadcasting service in neighbouring countries. Thus, 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 (DTT license expiry dates: Hungary - 2020, Bulgaria - 2025, Serbia - 2025, Ukraine - not specified, the country still uses analogue television, as well, Republic of Moldova – the same situation as in Ukraine).

The use of the band by the land mobile service and, respectively, by IMT systems is restricted by the technical conditions of coexistence with the broadcasting service, in order to ensure mutual protection against harmful interferences.

Effective deployment of IMT broadband mobile communications systems in the 700 MHz band requires releasing the band for the mobile service, which involves intense international replanning and coordination of DTT frequency assignments in the 470-694 MHz band. In this respect, regional coordination meetings are ongoing for DTT re-planning in the 470-694 MHz band and for the release of the 694-790 MHz band by all neighbouring countries, for mobile communications.

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

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.

As regards the applications allowed within the European Union in the band 694-790 MHz and the harmonized technical conditions for the use of this band, Commission Implementing Decision 2016/687/EU 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 is applicable.

Thus, electronic communications systems that can use the 694-790 MHz band are terrestrial systems complying with the provisions of Decision 2016/687/EU.

The harmonised frequency arrangement in the 694-790 MHz band is flexible and includes:

- a) a paired) frequency arrangement (2x30 MHz FDD):
 - the 703-733 MHz and 758-788 MHz sub-bands will be used in frequency division duplex mode (FDD);
 - the 703-733 MHz sub-band will be used for terminal station emission (uplink);
 - the 758-788 MHz sub-band will be used for base station emission (downlink);
 - the duplex spacing is 55 MHz;
 - the allotted block sizes shall be in multiple of 5 MHz.
- b) an unpaired frequency arrangement (supplemental downlink – SDL) on optional basis:
 - the 738-753 MHz sub-band will be used additionally for the base station emission (for the downlink only);
 - the allotted block sizes shall be in multiple of 5 MHz.

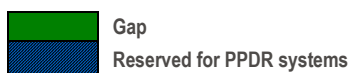
The 753-758 MHz sub-band will be reserved for the emission of base stations of the PPDR systems operating in the FDD 698-703 MHz/753-758 MHz sub-bands.

Base stations and terminal stations shall comply with the relevant harmonized technical conditions contained in Sections B and C of the Annex to Decision 2016/687/EU.

The frequency arrangement layout for the 700 MHz band harmonized at European level is set out in Annex 1 to Decision ECC/DEC/(15)01 on the harmonised technical conditions for mobile/fixed communications networks (MFCN) in the 694-790 MHz band and is represented below.

Harmonised frequency arrangement in the 694 – 790 MHz band, in 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						Gap	SDL (A)			Reserved for PPDR systems	Downlink						Guard band
9 MHz	30 MHz (6 blocks of 5 MHz) FDD						5 MHz	15 MHz (3 blocks of 5 MHz)			5 MHz	30 MHz (6 blocks of 5 MHz) FDD						3 MHz



2.4. Technical regulations for the use of the 1500 MHz band

In accordance with the provisions of the NTFA, the 1452-1492 MHz band (*the 1500 MHz band*) is allocated to the broadcasting service and to the mobile service – excepting the aeronautical mobile service – on a primary basis.

The 1452-1492 MHz band was not identified at WRC-15 for IMT systems in the countries of the European Conference of Post and Telecommunications Administrations (CEPT) because of

opposition from the countries of the Regional Commonwealth in the field of Communications (RCC), which were against the use of these systems in the respective band, for reasons related to the protection of the aeronautical mobile service used for aeronautical telemetry. Consequently, the identification of the 1452-1492 MHz band for IMT in Region 1 of the ITU is limited to some countries in Africa and the Middle East (according to No 5.346 of Article 5 of the RR-UIT).

However, the band is harmonized in the European Union for terrestrial systems capable of providing electronic communications services within the Union, in accordance with the provisions of Commission Implementing Decision (EU) 2015/750.

Furthermore, the provisions of ECC/DEC/(13)03 Decision on the harmonized use of the 1452-1492 MHz band for the supplemental downlink of mobile/fixed communications networks (MFCN - SDL) are applicable at CEPT level.

The harmonised frequency arrangement in the 1452-1492 MHz band is as follows:

- the usage the 1452-1492 MHz band is limited to base station emission (downlink);
- the allotted block sizes in the 1452-1492 MHz band will be in multiple of 5 MHz.

The base station emission must comply with the harmonized technical conditions on block edge masks contained in Section B of the Annex to the Commission Implementing Decision 2015/750/EU.

The layout of the 1452-1492 MHz frequency band arrangement harmonized at European level is set out in Annex 1 to ECC/DEC/(13)03 Decision and is presented below.

Harmonised frequency arrangement in the 1452-1492 MHz band for SDL, in 5 MHz blocks

1452-1457	1457-1462	1462-1467	1467-1472	1472-1477	1477-1482	1482-1487	1487-1492
Downlink (base station transmit)							
40 MHz (8 blocks of 5 MHz)							

In Romania, the 1452-1492 MHz band is not used by the broadcasting service, being available for use by IMT systems.

The CEPT/ECC is currently discussing Ukraine's proposal on the technical criteria for coordinating the use of the 1427-1518 MHz band by IMT systems in the land mobile service with the aeronautical telemetry systems in the aeronautical mobile service in Ukraine, which should support the conclusion of bilateral technical agreements between Ukraine and the neighbouring countries.

2.5. Technical regulations for the use of the 3400-3800 MHz band

2.5.1. The 3.5 GHz band

According to the NTFA, the 3.5 GHz band has a non-governmental use status and is allocated mainly to fixed and mobile services, both on a primary basis.

It is worth mentioning that the 3400-3410 MHz sub-band is allocated, on a secondary basis, to the radiolocation service.

In the 3.5 GHz band, there is also an allocation, on a primary basis, to the fixed satellite service (space-to-Earth).

The use of this frequency band is currently regulated by:

- Decision ECC/DEC/(11)06 on harmonised frequency arrangements for mobile/fixed communications networks (MFCN) operating in the 3400-3600 MHz and 3600-3800 MHz bands, adopted on 09.12.2011, and amended on 14.03.2014,

- Commission Implementing Decision no. 2014/276/EU on amending the EC Decision no. 2008/411/EC on the harmonisation of the 3400-3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community.

Electronic communications systems that can use the 3.5 GHz band are terrestrial systems that comply with the BEM for the allotted blocks, established in the annex to the Commission Decision no. 2008/411/EC, as amended by Commission Implementing Decision no. 2014/276/EU. Any available technology that complies with the harmonized technical conditions established by the said Decisions may be used.

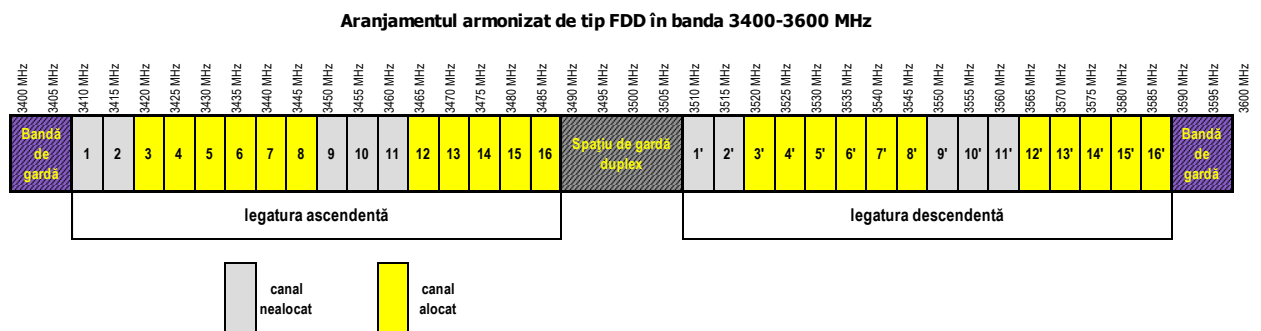
In the 3.5 GHz band, an FDD arrangement consisting of 2x5 MHz duplex channels is currently in force. Larger radio channels can also be used by joining adjacent 2x5 MHz channels.

Sub-bands 3410-3490/3510-3590 MHz are available for use, the respective capacity of the band being 2x80 MHz. The duplex spacing is 100 MHz.

The capacity of the band consists of 16 duplex channels of 2x5 MHz. The duplex gap is 20 MHz (3490-3510 MHz) and the two side guard bands are 10 MHz (3400-3410 MHz and 3590-3600 MHz). The subband 3400-3410 MHz is also allocated to other radiocommunications services, according to the NTFA.

Emissions of base stations (downlink) are in the upper half-band while subscribers' terminal emissions (uplink) are in the lower half-band.

The layout of the alternative radio channel arrangement in the 3.5 GHz band, harmonized at European level, is set out in Annex 2 to ECC/DEC/(11)06 Decision and is presented below (light grey – not used, yellow - used).



From the point of view of spectrum use in border areas, we mention that at this moment there are no bilateral or multilateral technical agreements concluded with the authorities of neighbouring countries.

ANCOM's efforts in this regard are ongoing, and drafts of such agreements are currently under review, for the time being with the authorities of Hungary and the Republic of Moldova. Romania and Hungary intend to extend the debate on this issue with the authorities of Ukraine and Serbia, but discussions thereon are at an early stage.

In the absence of bilateral agreements with neighbouring countries, the provisions of No. 5.430A of Article 5 of the ITU Radio Regulations and of Recommendation ECC/REC/(15)01 on Cross-border coordination for mobile / fixed communications networks (MFCN), amended in 2016, shall apply.

2.5.2. The 3.7 GHz band

According to the provisions of the NTFA, the 3.7 GHz band has a non-governmental use status, except for the 3685-3700 MHz sub-band, which has a non-governmental/governmental shared use status.

The 3.7 GHz band is mainly allocated to fixed service (on a primary basis) and mobile service (on a secondary basis).

In the 3.7 GHz band, there is also an allocation on a primary basis for the Fixed Satellite Service (space-to-Earth).

The use of this frequency band is currently regulated by:

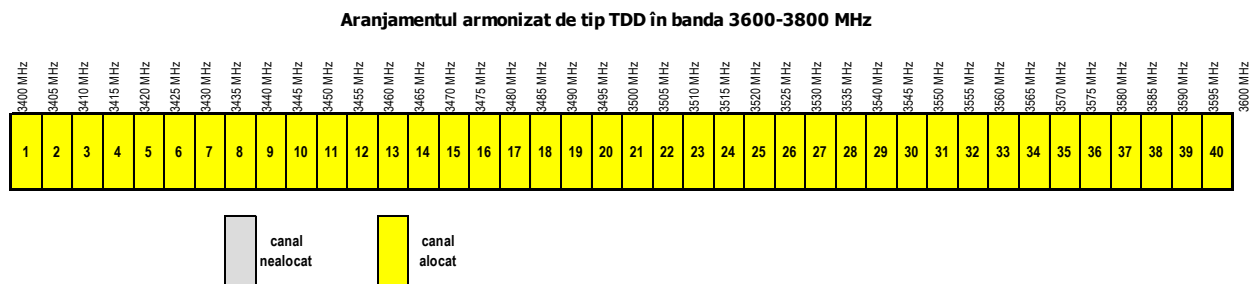
- Decision ECC/DEC/(11)06 on harmonised frequency arrangements for mobile/fixed communications networks (MFCN) operating in the 3400-3600 MHz and 3600-3800 MHz bands, adopted on 09.12.2011, and amended on 14.03.2014;
- Commission Implementing Decision no. 2014/276/EU on amending the EC Decision no. 2008/411/EC on the harmonisation of the 3400-3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community.

Electronic communications systems that can use the 3.7 GHz band are terrestrial systems that comply with the BEM for the allotted blocks, established in the annex to the Commission Decision no. 2008/411/EC, as amended by Commission Implementing Decision no. 2014/276/EU. Any available technology that complies with the harmonized technical conditions established by the said Decisions may be used.

In the 3.7 GHz band, a TDD arrangement consisting of unpaired 5 MHz channels is currently in force. Larger radio channels can also be used by joining adjacent 5 MHz channels.

The capacity of the band consists of 40 unpaired 5 MHz channels, i.e. a total of 200 MHz, that is standing for the total available capacity of the respective band, since the TDD type arrangement does not require a duplex gap, noting also that side guard bands as to the adjacent, upper and lower bands, are not provided within this frequency band, according to the provisions of the Commission Implementing Decision no. 2014/276/EU.

The layout of the channel arrangement in the 3.7 GHz band, harmonized at European level, is set out in Annex 3 to ECC/DEC/(11)06 Decision and is presented below (light grey – not used, yellow - used).



Regarding the use of the radio spectrum in border areas, we mention that at this moment there are no bilateral or multilateral technical agreements concluded with the authorities of neighbouring countries. ANCOM's efforts in this regard are ongoing, and drafts of such agreements are currently under review, for the time being only with the authorities of Hungary and the Republic of Moldova. Romania and Hungary intend to extend the debate on this issue with the authorities of Ukraine and Serbia, but discussions thereon are at an early stage.

The 3.7 GHz band agreements will be concluded simultaneously with similar agreements for the 3.5 GHz band, which were mentioned in the previous section.

In the absence of bilateral agreements with neighbouring countries, the provisions of Article 5 of the ITU Radio Regulations, which establishes an allocation on a secondary basis for the mobile service in the 3.7 GHz band, and of Recommendation ECC/REC/(15)01 on Cross-border coordination for mobile / fixed communications networks (MFCN), amended in 2016, shall apply.

IV. Objectives of granting the rights of spectrum use

In identifying the optimal solution for granting the spectrum usage rights in the 694-790 MHz, 791-796 MHz / 832-837 MHz, 1452-1492 MHz, 2530-2570 MHz / 2650-2690 MHz, 3410-3420 MHz / 3510-3520 MHz and 3450-3465 MHz / 3550-3565 MHz bands, ANCOM pursues the following objectives for the rational and efficient management of the radio spectrum resource:

- ensuring the conditions for efficient allotment and optimal use of the radio spectrum resource;
- ensuring conditions of fair and non-discriminatory access to the radio spectrum resource;
- ensuring the conditions for fostering competition in the mobile communications market and avoiding spectrum hoarding;
- ensuring the conditions for efficient use of allotted spectrum and development of mobile broadband services;
- ensuring flexibility in the use of spectrum, technological neutrality and services provided and promoting new technologies;
- ensuring the technical conditions for the coexistence between the systems to be implemented in the subbands concerned, between these systems and other radiocommunication systems in the adjacent bands, as well as systems operating on the same frequency bands in the neighbouring countries, in order to avoid harmful interferences.

V. Next generation technologies - 5G

"5G" is the term used with reference to the next (fifth) generation of mobile telecommunication technologies, also known as **IMT-2020** (International Mobile Telecommunications - 2020) in ITU terms.

The "5G" concept stands for both an evolution of radio networks to meet future demand for data transmissions, but also a revolution in architecture to enable the development of flexible and cost efficient network. The 5G network will give the users the perception of infinite Internet or of endless capacity on the network, which means that there will always be enough available capacity for any kind of data transfer required. With the flexibility of configuring and allocating limited resources/capacity both in time and in space, the network will be able to respond to local data demand by providing enough capacity to meet real-time service needs.

There is no official definition of 5G yet, but progress has already been made in setting targets, defining applications for a new generation of connectivity and in testing technologies. 5G is expected to integrate the new radio access networks seamlessly with previous generation radio access technologies (3G, 4G, Wi-Fi). Thus, 5G means represents a convergence of a previous technology generations. This is the first time when a new generation of technologies will incorporate the preceding ones to create a new integrated and dynamic radio access network, through connectivity management mechanisms.

5G will enable connecting with networks of billions of users and smart objects in the Internet of Things (IoT), the transmitting of high amounts of data with very little delay, the provision of secure and reliable transmissions anywhere. Also, 5G technologies will be more efficient and will allow cost savings per unit of transported data.

At present, regulatory and standardization bodies, industry and academia work together to develop the 5G technologies. 5G aims to provide seamless coverage, very high data rate, low latency, highly reliable communications and low power consumption. Use cases under considerations include enhanced mobile broadband communications, massive machine-to-machine (M2M) communications, Internet of Things (IoT), healthcare applications, home automation, industrial automation and sensors.

5G technologies will further enrich the global communications ecosystem for enhanced mobile broadband communications, expanding the range of possible applications through advances in high data rate communications, on the one hand, and the ability to integrate IoT devices, on the

other hand. 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 up to the frequency bands so-called "millimeter wave" (above 20 GHz).

1. Categories of 5G uses

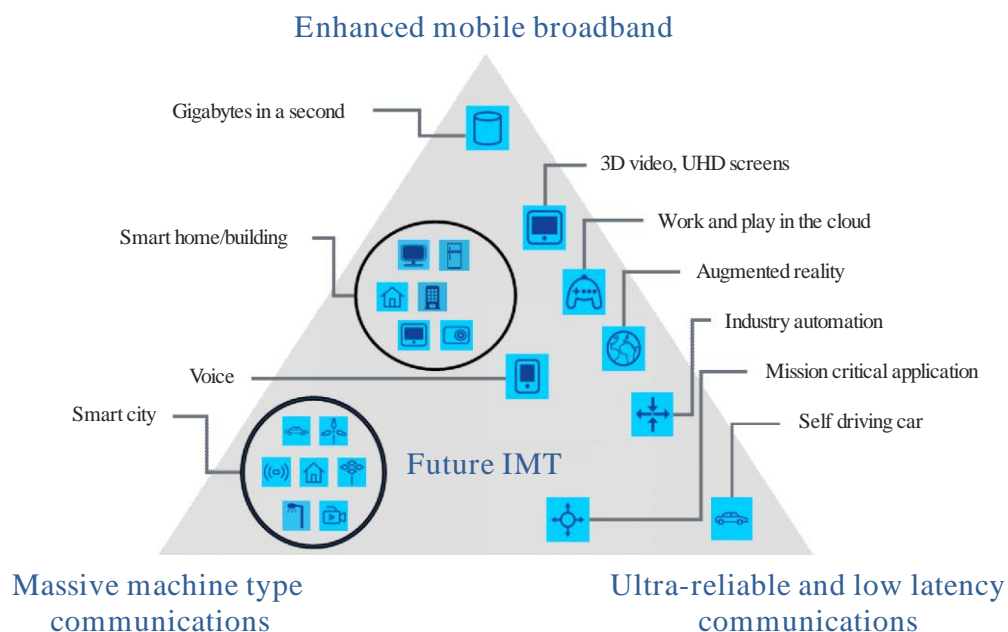
Compared with previous generations, 5G will be different due to the new and enhanced capabilities that enable a wide range of use cases and applications. The usage scenarios for IMT for 2020 and beyond include:

- **Enhanced Mobile Broadband:** Mobile broadband addresses the human-centric use cases for access to multi-media content, services and data. The demand for mobile broadband communications will continue to increase, leading to enhanced mobile broadband communications. The enhanced mobile broadband usage scenario will bring along new application areas and additional requirements to existing mobile broadband applications. This usage scenario covers a range of cases, including wide-area coverage or limited areas coverage ("hotspot"), which have different requirements. For the "hotspot" case, i.e. for an area with high user density, a very high traffic capacity is needed, while the requirement for mobility is low and user data rate is higher than that of wide area coverage. For the wide area coverage case, seamless coverage and medium to high mobility are desired, with an increased user data rate compared to existing data rates. However, the data rate requirement may be relaxed compared to the "hotspot".
- **Ultra-reliable and low-latency communications:** This use case has stringent requirements for capabilities such as high throughput, low latency and high availability. Some examples are the wireless control of industrial manufacturing or production processes, remote medical surgery, of distribution automation in a smart grid, transportation safety, etc.
- **Massive machinetype communications:** This use case is characterized by a very large number of connected devices, typically transmitting a relatively low volume of nondelay-sensitive data. Devices are required to be low cost and have a very long battery life.

Additional use cases, not yet foreseen, are expected to emerge. It is therefore necessary for future IMT systems to have the flexibility to adapt to new use cases that come with a wide range of requirements.

Figure 1 illustrates examples of envisioned IMT usage scenarios for 2020 and beyond.

Figure 1
Usage scenarios of IMT for 2020 and beyond



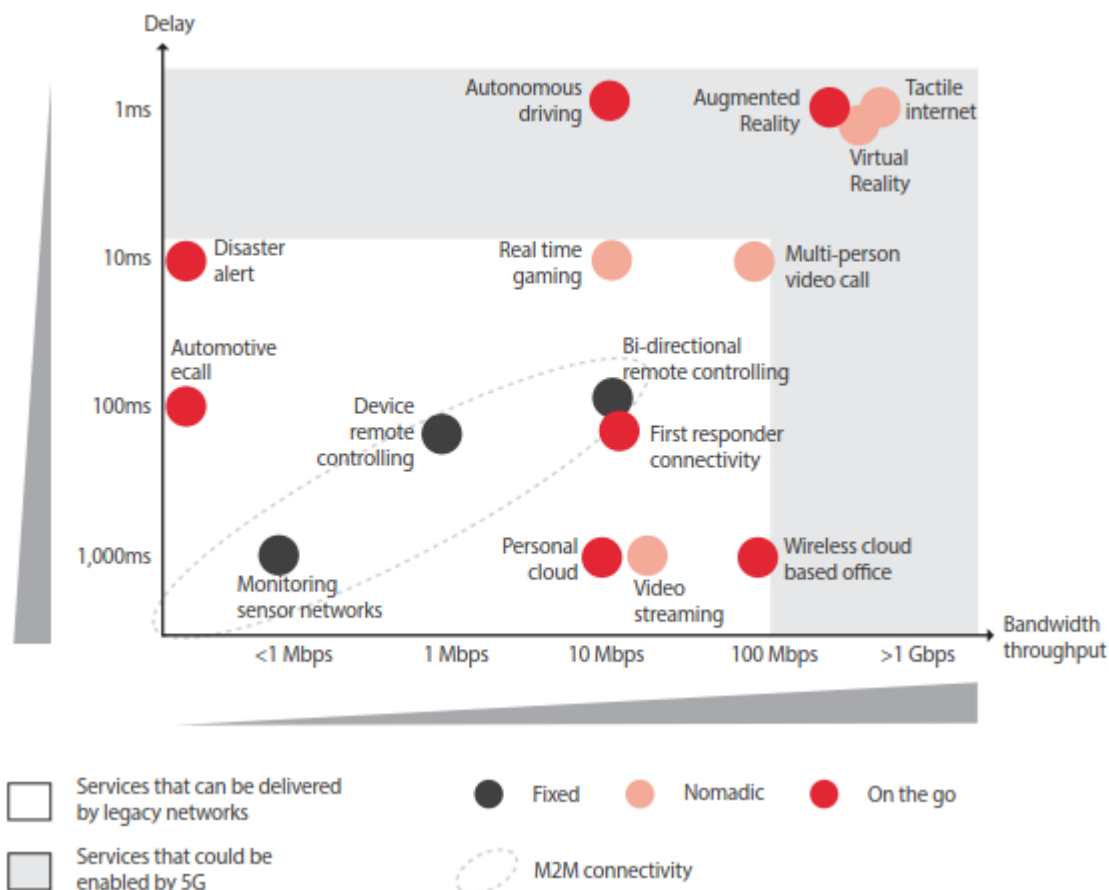
M.2083-02

Source: Recommendation UIT-R M.2083-0 – IMT Vision – General Framework and overall objectives of the the future development of IMT for 2020 and beyond

Not all applications have the same requirements and need the same performance of 5G networks. Future Internet network services need to respond to a range of needs, from low data transmission rates (e.g. sensors and IoT data) to very high rates (e.g. high definition video streaming) and with various latencies (e.g. delays are less well tolerated in video conference calls than in video streaming where buffering can be used). With the exception of autonomous vehicles, augmented reality and tactile internet, it is considered that many of the applications could be provided, at least theoretically, by existing networks. Networks will have to meet different Quality of Service requirements for different types of applications (e.g. a few seconds delay in a telesurgery application could prove fatal), given that the traditional internet does not provide any guarantee of when, or even if, transmitted data will be delivered.

Figure 2 illustrates the bandwidth (throughput) and latency requirements for generic applications.

Figure 2 – Bandwidth (throughput) and latency requirements for generic applications



Source: GSMA Intelligence, 2015

2. Capabilities and technical requirements for 5G technologies (IMT-2020)

In order to support all types of 5G services and applications, and in particular of futuristic ones such as virtual reality, augmented reality, tactile internet or autonomous driving and connected cars, 5G technologies will have to meet a number of technical requirements to ensure the improvement of the performance of previous generation systems. 5G objectives, in terms of general performance, are quantified as follows:

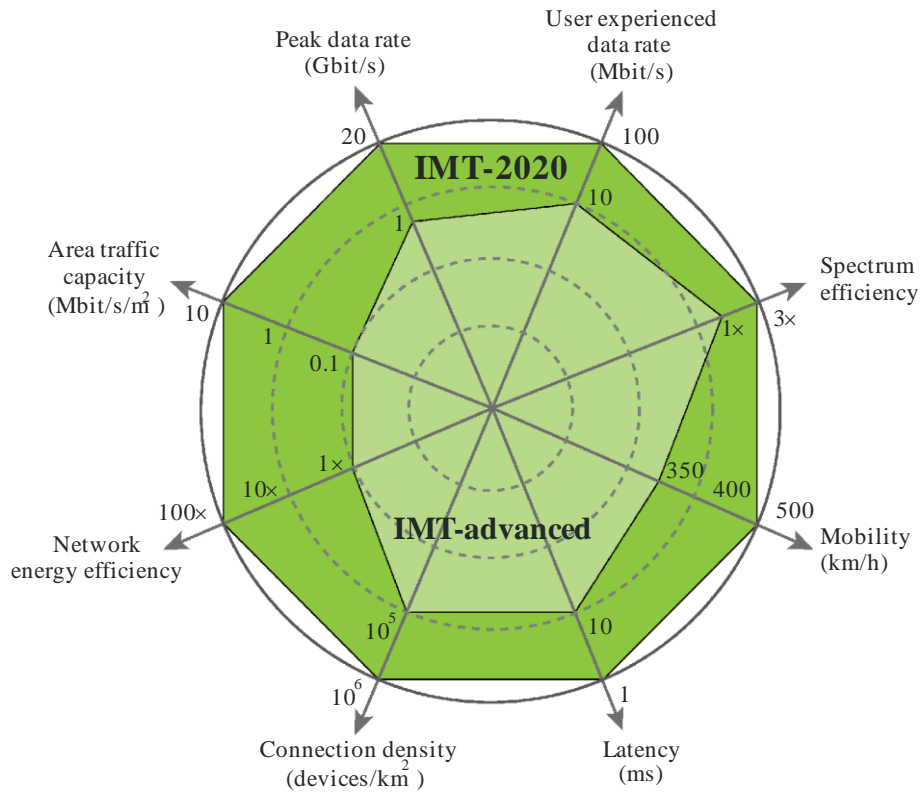
- Peak data rate: tens of Gbit/s;
- User experienced data rate : 100 Mbit/s to 1 Gbit/s;
- Connection density: at least 1 million devices per km²;
- Traffic volume density: 10 Mbit/s/m²;
- Aggregate bandwidth: from 100 MHz to 1 GHz;
- End-to-end latency: millisecond level;
- Mobility: up to 500 km/h.

A number of 5G challenges have also been identified, as follows:

- 100 times higher area traffic capacity (traffic volume density) ;
- 10-100 times higher number of connected devices;
- 100 times enhanced energy efficiency;
- 10 times longer battery life;
- End-to-end latency: less than 5 ms;
- providing a perceived connection reliability of 99.999%.

Figure 3 presents the improved key capabilities of IMT-2020 (5G) systems compared to those of IMT-Advanced (4G)

Figure 3

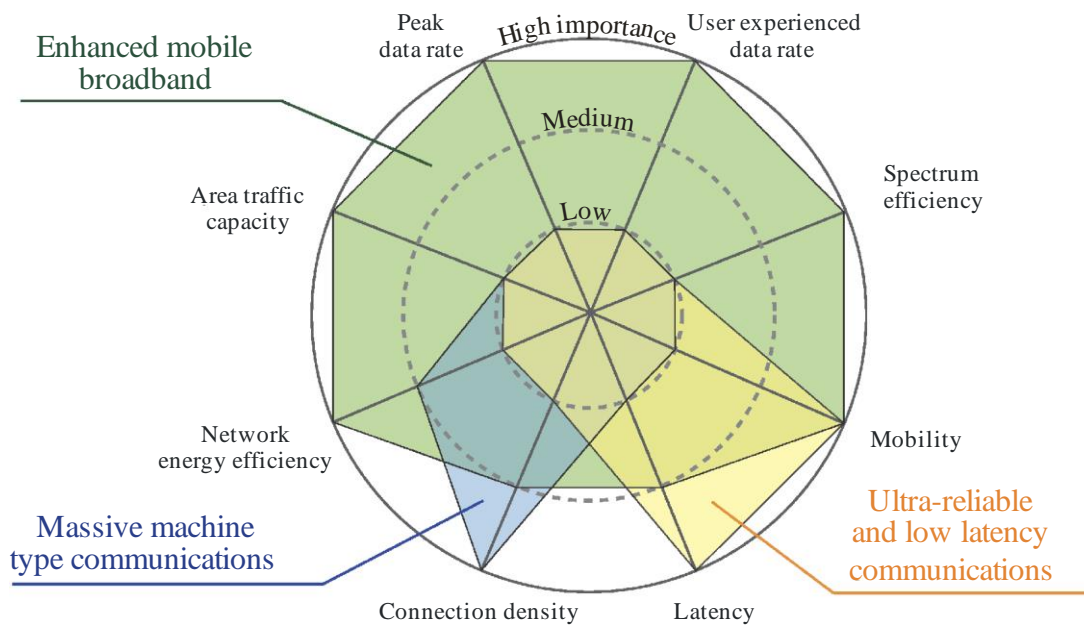


M.2083-03

Source: ITU-R Recommendation M.2083-0 - IMT Vision - Framework and overall objectives of the future development of IMT for 2020 and beyond

The importance of each key capability for each of the usage scenarios presented above is illustrated in Fig. 4.

Figure 4



M.2083-04

Source: ITU-R Recommendation M.2083-0 - IMT Vision - Framework and overall objectives of the future development of IMT for 2020 and beyond

3. The 5G standardization process

Currently used 3G and 4G mobile communications systems are based on IMT standards developed by the ITU. Detailed specifications for IMT-2000 (3G) have been in force since 2000, while IMT-Advanced (4G/LTE) specifications have been approved by the ITU - Radiocommunications Sector (ITU-R) in 2012. The next step is the development of a complete specifications for 5G (under the ITU name IMT-2020) to support the next generations of broadband communications and Internet connectivity (IoT). The completion of these specifications at international level is planned for 2020, while the implementation of the 5G is foreseen to start in 2020.

ITU's work on IMT-2020 systems has resulted in a vision and action plan for 5G development. In 2015, the ITU-R published the Recommendation on the vision of future IMT systems. At present, the process of defining technology is under way.

The ITU launched the invitation for submission of proposals for candidate radio interface technologies for the terrestrial component of the radio interface(s) for IMT-2020, as well as the invitation to participate in their subsequent evaluation.

In the next phase, during 2017, the ITU working group responsible for IMT systems (ITU-R Working Party 5D) will finalize the performance requirements, evaluation criteria and methodology for the assessment of the new IMT radio interface.

Furthermore, the ITU-R will address spectrum issues for IMT, both for the frequency bands already identified for IMT systems and for the bands that are under consideration for future use. The entire process is scheduled to be completed in 2020, when an ITU-R Recommendation containing the detailed technical specifications of the IMT-2020 (5G) systems is to be issued.

It is important to underline that the development of IMT standards is not carried out by ITU alone. It is an extensive international collaboration and coordination process, in which, besides the ITU Member States, numerous other stakeholders take part: equipment manufacturers, communication networks operators, relevant international, regional and national standards development organizations, partnerships and fora.

Proposals for 5G standards are expected to be submitted from October 2017 to mid-2019. The 3GPP (Third Generation Partnership Project - a consortium of industry associations and standardization organizations, including the European Telecommunications Standards Institute - ETSI) standards for 5G will be published starting 2018 or 2019.

ITU will undertake an evaluation considering the defined criteria, assisted by independent evaluation groups established for this purpose. The participation in these groups is not limited to the ITU members. The evaluation reports from the evaluation groups will be presented and considered in the ITU responsible working group and will be the basis of the consensus decision on the proposed radio interfaces to be included in the IMT-2020 standard.

4. Radio spectrum for 5G

4.1. 5G spectrum harmonisation on a global level

5G networks will operate in a wide range of frequency bands. In addition to the traditional, below 3 GHz, frequency bands (to which the 700 MHz band will be added), 5G will use the higher frequencies of spectrum in the millimetre wave range (roughly from 20 to 300 GHz), which can provide much larger bandwidths, although propagating over short distances. Decisions on the global harmonization of radio spectrum use are made at the World Radiocommunication Conference (WRC) meetings, which the ITU hosts every four years, the allocations of the frequency bands for different radiocommunication services and systems being established by the ITU Radio Regulations adopted during the WRC.

As regards the radio spectrum for IMT systems, once with the progress made by the WRC of 2015 (WRC-15) in identifying globally harmonized additional frequency bands and arrangements in the spectrum below 6 GHz for the operation of IMT systems, WRC-15 also recognized potential future requirements for large and contiguous spectrum blocks at higher frequency bands, needed to develop 5G technologies.

In order to meet the very high data rate 5G requirements, bandwidths much larger than those currently available in 3G and 4G frequency bands are required, which are achievable only in higher frequency bands.

Consequently, WRC-15 decided to introduce the issue of identifying spectrum for 5G in the high frequency bands on the agenda of the next WRC, of 2019 (WRC-19), and proposed 11 frequency bands above 24 GHz to be analysed for the purpose of identifying additional frequency bands for the future development of IMT-2020 systems.

The candidate frequency bands for the introduction of IMT-2020 (5G) are the following:

24.25-27.5 GHz; 31.8-33.4 GHz; 37-40.5 GHz; 40.5-42.5 GHz; 42.5-43.5 GHz; 45.5-47 GHz; 47-47.2 GHz; 47.2-50.2 GHz; 50.4-52.6 GHz; 66-76 GHz and 81-86 GHz.

At present, for the preparation of this topic on the WRC-19 agenda, studies are in progress at the ITU level, on the sharing and compatibility of IMT-2020 systems with other radiocommunication services and systems for which these bands are already allocated on the international level and with those operating in the adjacent bands, in order to identify new frequency bands for IMT systems in the 24 GHz to 86 GHz frequency spectrum. The globally harmonised frequency bands to be used for the development of 5G technologies will be established at the WRC-19.

4.2. 5G spectrum harmonisation measures, on a European level

The following frequency bands harmonised on a European level for terrestrial systems capable of providing broadband electronic communications services are already potentially available for future 5G use:

- **Below 1 GHz:** 694-790 MHz (700 MHz band), 790-862 MHz (800 MHz band), 890-915 MHz and 925-960 MHz (900 MHz band);

- **Above 1 GHz:** 1452-1492 MHz (1500 MHz band), 1710-1785 MHz and 1805-1880 MHz (1800 MHz band), 1920-1980 MHz and 2110-2170 MHz (2100 MHz band), 2500-2690 MHz (2600 MHz band), 3400-3800 MHz.

The frequency bands considered as a priority for the introduction of 5G mobile communications systems on a European level are as follows:

1. the **3400-3800 MHz** band - **primary band** suitable for the introduction of 5G services before 2020, given that it is already harmonized at European level for mobile communications networks by Decision no. 2014/276/EU and offers wide radio channel bandwidth;
2. the **694-790 MHz** band - needed to ensure nation-wide and indoor 5G coverage ;
3. the **24.25-27.5 GHz** band (the 26 GHz band) – a **pioneer band** for the introduction of 5G systems in Europe, which is planned to be harmonized by 2020.

In December 2016, the European Commission issued a mandate to CEPT to develop harmonised technical conditions for spectrum use in support of the introduction of 5G in the European Union.

Thus, CEPT was mandated to carry out a series of actions with a view to defining harmonized technical conditions that are sufficiently precise to foster the development of equipment at European level for the introduction of 5G systems in the Union, as follows:

1. Review the harmonized technical conditions applicable to the **3400-3800 MHz frequency band**, as a primary 5G band, with view to their suitability for 5G technologies and amend them, if necessary;
2. Study and assess the **24.25-27.5 MHz frequency band** as a 5G pioneer band for use under relevant 5G usage scenarios, taking into account radio co-existence with existing services and systems in the same band or in adjacent bands; in this respect, identify and study common sharing scenarios with incumbent radio services and applications;
3. The opportunities for interoperability and economies of scale of equipment such as the common tuning range, including the 26 GHz band, with possible 5G use outside Europe shall be taken into account. The impact of activities carried out outside Europe in the frequency band adjacent to that already considered for 5G use - i.e. 27.5-29.5 GHz (the 28 GHz band) - shall be considered, including a wide range of sharing scenarios to ensure protection of existing and future satellite services in the 28 GHz band.
4. Develop channelling arrangements and harmonized minimal (least restrictive) technical conditions for spectrum use in **the 26 GHz frequency band**, which are suitable for 5G terrestrial wireless systems, taking into account the relevant usage and sharing scenarios;
5. Assess requirements for cross-border coordination, including with non-EU countries.

The deadline for the submission of CEPT final reports to the EC, for the actions for which it was mandated, is June 2018.

The Electronic Communications Committee (ECC) within the CEPT, at its meeting of November 2016, adopted the CEPT roadmap for 5G, which outlines the main targets to be pursued with a view to harmonising spectrum use for 5G and to preparing for WRC-19 agenda item regarding the identification of frequency bands for IMT systems above 24 GHz. The CEPT roadmap also identifies the related ECC activities aimed at accomplishing these objectives.

In line with the CEPT Roadmap, the ECC working group dedicated to IMT systems initiated work on harmonization measures for 5G in a first set of frequency bands:

- **3400-3800 MHz:** this band is already harmonized within Europe for Mobile/Fixed Communications Networks (MFCN) through Decision ECC/DEC/(11)06. Currently, activities are ongoing to assess the suitability to 5G of the harmonized technical conditions contained in this Decision. This process is also intended to develop guidelines for helping administrations in solution for defragmentation the 3.4 - 3.8 GHz band, as licences for the

use of this band are in force in many CEPT countries -, and for developing plans and intended timescale for the future use of this band by 5G systems.

- **24.25-27.5 GHz:** CEPT has identified the 26 GHz band for early European harmonization as it offers over 3 GHz of contiguous spectrum and more favourable propagation than the higher frequency bands under consideration. Studies are in progress on the compatibility of IMT systems with all existing services in the same band and in adjacent bands, in particular for ensuring the protection of existing and future earth stations in Earth Exploration Satellite Services (EESS) and in Space Research Services (SRS). The ECC working group dedicated to IMT issues (ECC PT1) was tasked to start developing a decision setting the harmonized technical conditions for the introduction of 5G in the 26 GHz band.

The ECC PT1 is also responsible for preparing the WRC-19 agenda item for identifying the frequency bands for IMT 2020/5G above 24 GHz. Discussions have already started in this working group on the prioritization of these frequency bands and on the contributions to relevant ITU-R activities on this subject. The works are aimed at developing compatibility and sharing studies, at European level, between IMT-2020 systems and other systems in various radiocommunications services operating in the frequency bands identified by WRC-15 as candidate bands for future 5G use: 24,25-27, 5 GHz; 31.8-33.4 GHz; 37-43.5 GHz; 45.5-50.2 GHz; 50.4-52.6 GHz; 66-76 GHz; 81-86 GHz.

4.3. European proceedings for awarding new spectrum usage rights for the 5G technologies

On a European level, proceedings have already been considered for the provision of additional spectrum for the development of 5G networks. Some administrations have already launched public consultations on the use and awarding of new usage rights in different frequency bands with a view to the provision of 5G networks and services.

Thus, the German Regulatory Authority (BNetzA) held a public consultation, in the first quarter of 2017, on the awarding of spectrum usage rights in the bands 700 MHz SDL (738-753 MHz), 2.1 GHz, 3.4-3.8 GHz and 26 GHz. The 700 MHz FDD and 1500 MHz bands have already been awarded in Germany, following a 2016 auction.

France (ARCEP) has consulted the market on granting usage rights in the bands: 700 MHz SDL, 1.5 GHz, 2.3 GHz, 2.6 GHz TDD, 3.4 - 3.8 GHz and 26 GHz bands. The 700 MHz FDD band has already been awarded in 2015.

UK (OFCOM) is in process of releasing the 700 MHz band for the introduction of mobile communications services in 2020. Moreover, OFCOM has also publicly consulted its intention to grant rights of use in the 2.3 GHz and 3.4-3.6 GHz bands, this year.

In June 2017, Switzerland (BAKOM) launched a public consultation on granting new rights of use in the 700 MHz, 1.5 GHz and 3.4-3.8 GHz bands, with the spectrum use rights in the bands 800 MHz, 900 MHz, 1800 MHz, 2100 MHz and 2600 MHz having been granted in 2012, similarly to Romania (except for the 2100 MHz band).

References:

- ITU-R, *Recommendation ITU-R M.2083-0: IMT Vision – Framework and overall objectives of the future development of IMT for 2020 and beyond*, 2015
- ITU News Magazine, *Forging paths to 5 G*, 2017
- European Commission, DG Communications Networks Content & Technology Directorate - General, *Opinion of the RSC pursuant to Advisory Procedure under Article 4 of Regulation 182/2011/EU and Article 4.2 of Radio Spectrum Decision 676/2002/EC – Mandate to CEPT to develop harmonised technical conditions for spectrum use in support of the introduction of next-generation (5G) terrestrial wireless systems in the Union*, 2016
- CEPT/ECC, <http://www.cept.org/ecc/topics/spectrum-for-wireless-broadband-5g>, *Spectrum for wireless broadband – 5G*, 2017

In the context presented above regarding the availability of national spectrum resources and taking into account the national and international regulatory framework, as well as the objectives pursued by ANCOM in respect of granting the rights of frequency use in the bands under consultation, please answer the following questions, with arguments in favour of your answers.

VI. Questionnaire

1. Necessity and opportunity of organising a competitive selection procedure

Question no. 1

In the context of the technological developments and of the relevant international regulations, in order to be up to the increasing and ever more diversifying demand for mobile broadband services and applications and to the 5G challenges, and given the structure of the mobile broadband market in Romania, as well as the current situation of spectrum allotments in the frequency bands for the provision of public mobile/fixed broadband communications networks,

do you consider the organisation of a competitive selection procedure for granting spectrum usage rights in the frequency bands 694-790 MHz, 791-796 MHz/832-837 MHz, 1452-1492 MHz, 2530-2570 MHz/2650-2690 MHz, 3410-3420Mz/3510-3520 MHz and 3450-3465 MHz/3550-3565 MHz to be necessary and timely?

Please provide a rationale for your answer.

Question no. 2

If your answer to the previous question is affirmative, which of the following time options for the organization of the competitive selection procedure is considered to be appropriate:

A) during 2017;

B) during 2018.

Please provide rationale for your answer.

Question no. 3

If your answer to question no. 1 is affirmative, would you participate in a competitive selection procedure organized in 2017, for the purpose of granting spectrum usage rights in the frequency bands nominated under question no. 1? What about in a competitive selection procedure organized in 2018?

Question no. 4

If your answer to question no. 3 is affirmative, which bands would you potentially be interested in?

Please provide rationale for your answer.

Question no. 5

If your answer to question no. 1 is negative, when do you consider that the selection procedure for granting the spectrum usage rights in the frequency bands nominated under question no. 1 should be organised?

Please provide rationale for your answer.

Question no. 6

Following the expiry of Telemobil's licence to provide a cellular mobile broadband communications network in CDMA 450 technology, in 2013, the 453-457.5 MHz/463-467.5 MHz paired bands (450 MHz band) have become available.

In accordance with Art. 5 of the ITU Radio Regulations - 2016 edition, the 450-470 MHz band is allocated to the mobile service, on a primary basis, in all three regions of the globe, being identified by No. 5.286AA of ITU-RR for IMT systems, in accordance with Resolution 224 revised at WRC-15. This identification does not preclude the use of the band by any application of the service to which the band is allocated and does not establish priority for IMT in Radio Regulations.

The 453-457.5 MHz/463-467.5 MHz bands are, however, not harmonized at European level for use by IMT systems, being designated for other types of applications, including for broadband PPDR applications (public protection and disaster relief).

In the case of organizing the competitive selection procedure for granting spectrum usage rights in the bands under question no. 1, do you think that the 453-457.5 MHz/463-467.5 MHz bands should also be included in the selection procedure?

Please provide rationale for your answer.

Question no. 7

Leaving aside your particular interest in one particular frequency band or another, how do you assess the (commercial, technical, etc.) attractiveness of each of the bands mentioned in this document?

Please provide rationale for your answer.

Question no. 8

Do you consider that frequencies in different bands could be substitutable and/or complementary? If so, which?

Please provide rationale for your answer, considering the bands mentioned in this document and, if applicable, those you already have in your spectrum portfolio.

Question no. 9

Considering in particular the SDL mode, with what frequency bands could these be best associated?

Please provide rationale for your answer.

Question no. 10

With which of the following options for organizing the competitive selection procedure do you agree:

- a) the organization of a competitive selection procedure should be initiated only after the prior expression of interest and firm commitment to participate in a possible selection procedure by submitting applications with a view to being granted spectrum usage rights in the concerned bands. The selection will only be organized if the aggregate spectrum demand exceeds the amount of spectrum available in at least one spectrum category in the bands under the selection procedure (e.g. FDD below 1 GHz, FDD above 1 GHz, SDL below 1 GHz, SDL above 1 GHz);**
- b) the organization of the competitive selection procedure should be initiated without prior expression of interest and firm commitment to participate in the selection procedure by submitting applications with a view to being granted spectrum usage rights in the concerned bands?**

2. Applicable type of competitive selection procedure

For granting spectrum usage rights in the 800 MHz, 900 MHz, 1800 MHz and 2600 MHz bands, in 2012, ANCOM applied a competitive selection procedure consisting of a stage of clock auction primary rounds, followed by one or two additional sealed bidding rounds for the blocks still not awarded in the primary rounds and one sealed bidding round for awarding concrete blocks within each block category for the previous stages' winners of generic blocks.

Clock auction:

- iterative bidding procedure, in multiple rounds, where multiple abstract (generic) spectrum blocks are auctioned out simultaneously, by various categories, at pre-set prices announced by the organizer at the beginning of each round;
- within each round, participants submit bids indicating the amount of generic blocks they want to acquire in each category, at the price set for that category in that round;
- the price is gradually rising from one round to another, for the block categories where demand exceeds the offer;
- the process is repeated until the demand no longer exceeds the offer for any block categories;
- allows package bidding for spectrum licences;
- ensures the flexibility of participants to submit bids for different spectrum combinations, across multiple bands;
- participants can change the distribution of bids for the various blocks, each round, in compliance with an activity rule designed to stimulate participation during the auction and discourage strategic bidding behaviour;
- leads to the participants' jointly discovery the price that reflects the market value;
- determines the number of generic blocks obtained by winners in each category;
- may be followed by a sealed bid auction stage whereby the concrete spectrum blocks are established for each of the winners of the clock auction stage.

The actual auction was preceded by a qualification stage, during which – upon assessment of the initial demand of frequency blocks within each category – the following decisions could have been taken:

- a) to organize the auction stage starting with the primary rounds, if the aggregate demand had exceeded the number of frequency blocks available under the selection procedure in at least one category;
- b) to organize the auction stage starting with the additional round/rounds, if the aggregate demand had not exceeded the number of blocks available under the

selection procedure in any category and there were blocks for which there was no demand ;

- c) to organize only the assignment round of the auction stage, if the aggregate demand had not exceeded the number of frequency blocks available under the selection procedure in any category and there were no blocks for which there was no demand.

In the primary rounds of the auction stage (principal stage), the bidders competed to obtain abstract frequency blocks within one or more spectrum block categories (spectrum packages), specifying the number of generic blocks they wanted to acquire in each of the available block categories.

All bids in the principal stage were submitted for frequency block packages, valid only in its entirety. Generic blocks in all categories were auctioned out simultaneously, which allowed spectrum package bidding, blocks within a category being rated with the same number of eligibility points and being substitutable during the auction.

The maximum amount of spectrum that a bidder could acquire was limited by the total number of eligibility points available to each bidder (determined by the bidder's initial eligibility and its activity in each subsequent primary round) and by the restrictions and conditions applicable in the selection procedure.

The primary rounds were intended to determine the winning bids, respectively the winning bidders and the spectrum package acquired by each of them, as well as the reserve prices the winners had to pay for the respective package.

In the event that – following the submission of initial bids or following the primary rounds - abstract frequency blocks remained unacquired, ANCOM could decide to hold an additional bidding round, and if and after it some blocks still remained unacquired, it could decide to organize a second additional round.

After the additional round/rounds, the winning bids for the blocks unacquired in the primary rounds, respectively the winning bidders, as well as the reserve prices of the winning bids - which the bidders had to pay - were determined.

Primary and additional round/rounds were aimed at determining the winning bidders and the number of generic blocks they acquired in each block category.

After the primary and additional rounds/rounds stage, an assignment round was carried out to determine the individual position of the abstract blocks obtained by each winner in the previous stage, within each frequency band, i.e. the assignment of the concrete frequency blocks.

Question no. 11

Taking into account the experience gained by ANCOM and by the providers of public electronic communications networks and services following the 2012 spectrum auction,

do you consider it appropriate that, if aggregate spectrum demand exceeds the amount of spectrum available in at least one of the spectrum categories in the auctioned bands, the spectrum usage rights in these bands should be granted through a competitive selection procedure similar to the one organized in 2012?

If you do not, please give rationale for your answer and propose a viable alternative solution.

3. Conditions for acquiring spectrum usage rights

3.1. Minimum spectrum requirements

Question no. 12

In the case of a new entrant participating in the competitive selection procedure, do you consider that obtaining spectrum blocks in the bands below 1 GHz should be

bound by obtaining a certain amount of spectrum in the bands above 1 GHz, in order to ensure a minimum spectrum portfolio for efficient implementation of a public mobile broadband network at a national level?

Question no. 13

If your answer to question no. 12 is affirmative, what minimum spectrum amount would you consider that a new entrant should acquire in the bands below 1 GHz and, respectively, above 1 GHz, in order to be able to provide an efficient public mobile broadband network at national level, in pursuit of meeting the 5G requirements?

3.2. Spectrum caps

Since the frequency spectrum below 1 GHz offers advantages in terms of coverage efficiency compared to the spectrum above 1 GHz and given the small amount of spectrum available in the frequency bands below 1 GHz, in order to prevent anticompetitive results, such as excessive concentration or excessive asymmetry of spectrum holdings below 1 GHz, in the 2012 selection procedure ANCOM imposed caps on the spectrum amount that an operator may hold in the frequency bands below 1 GHz.

By imposing such a cap, ANCOM aimed at ensuring the conditions for:

- equitable access to the spectrum resources below 1 GHz, which is more appropriate for providing indoor and rural coverage, involving lower costs for infrastructure roll-out,
- encouraging efficient investment in infrastructure;
- promoting sustainable competition, based on equitable access to spectrum resources.

Thus, in the 2012 selection procedure for granting spectrum usage rights in the 800 MHz, 900 MHz, 1800 MHz and 2600 MHz bands, the following caps were imposed on the maximum spectrum amounts that a bidder could acquire in the bands below 1 GHz, following the selection procedure, during 06.04.2014-05.04.2029:

- a) the total maximum amount of spectrum in the (cumulated) 800 MHz and 900 MHz bands, over which a bidder could hold usage rights, following the selection procedure, during 06.04.2014-05.04.2029, was 2 x 20 MHz;
- b) the total maximum amount of spectrum in the 800 MHz band, over which a bidder could hold usage rights, following the selection procedure, during 06.04.2014-05.04.2029, was 2 x 10 MHz;
- c) the total maximum amount of spectrum in the 900 MHz band, over which a bidder could hold usage rights, following the selection procedure, during 06.04.2014-05.04.2029, was 2 x 10 MHz.

Question no. 14

In your opinion, in order to set the premises for fair competition and equitable access to spectrum resources for the provision of broadband mobile networks and services, is it necessary to impose caps on the maximum amount of spectrum over which a bidder may hold usage rights in certain bands, following the selection procedure, also taking into account the spectrum for which bidders already have usage rights?

Please give rationale for your answer.

Question no. 15

If your answer to question no. 14 is affirmative, please specify what would be the maximum amount of spectrum an operator could hold in the bands below 1 GHz? What

about the bands above 1 GHz - do you consider that limitations should be imposed on the maximum amount of spectrum that can be acquired in the selection procedure and, if so, what would those limitations be?

Please give rationale for your answer.

3.3. Other conditions associated with spectrum usage rights

Question no. 16

Do you consider it adequate to impose additional license conditions, in order to avoid spectrum hoarding? If so, what such conditions could the authority impose?

Please give rationale for your answer.

3.4. Validity of spectrum usage rights

Question no. 17

In your opinion, what should the date of entry into force of the spectrum usage rights to be granted in the bands subject to consultation?

Please give rationale for your answer.

Question no. 18

Taking into account the fact that the rights to use radio frequencies granted in the 800 MHz, 900 MHz, 1800 MHz and 2600 MHz bands, following the auction held in 2012, have a validity of 15 years, during 06.04.2014 - 05.04.2029,

do you consider it appropriate to align the expiry date of the spectrum usage rights in the frequency bands subject to consultation with the expiry date of the licenses already granted in the abovementioned bands, i.e. 05.04.2029?

Please give rationale for your answer.

4. Coverage obligations

Including obligations in licenses is a well-established practice in order to promote legitimate public interests. For example, in the selection procedures organized by ANCOM, requirements have been formulated, and minimum obligations have been included in licences regarding service coverage and network access.

In the terms of reference for the organization of the competitive selection procedure with a view to awarding the spectrum usage rights in the 800 MHz, 900 MHz, 1800 MHz and 2600 MHz bands, which took place in 2012, distinct coverage obligations were imposed in the licenses granted in the frequency bands below 1 GHz and – respectively – for those in bands above 1 GHz, with the validity period 06.04.2014 - 05.04.2029.

(See Section 3.3.1 of the Terms of Reference, available here:

http://www.ancom.org.ro/en/uploads/links_files/Caiet_de_sarcini_procedura_multibanda_800_900_1800_2600_2_07_2012_en.pdf).

Question no. 19

- a) *What minimum coverage requirements would you see associated with spectrum usage rights, in the case of a new entrant acquiring spectrum in the bands below 1 GHz?*
- b) *What about the minimum requirements in the case of a new entrant acquiring usage rights in the bands over 1 GHz?*

Please give rationale for your answer, correlating it with the answers to questions no. 12 and 13 on minimum spectrum requirements.

Question no. 20

In the case of the granting spectrum usage rights in the frequency bands subject to this consultation to existing operators, what are the additional coverage obligations you think should be imposed, as to those set out in the already granted licenses, given the forthcoming provision of 5G services?

Please give rationale for your answer.

5. Access obligations

Question no. 21

Do you consider that, for the holders of spectrum usage rights in the bands subject to consultation, access obligations should be set? Please give details and arguments supporting in your view on what should be the access obligations for holders of spectrum usage in the frequency bands subject to this consultation.

6. Reserve prices (minimum license fee) / block of frequencies

Question no. 22

Do you agree that the operators' assessments on the fair values of their own licenses (intangible assets) can be helpful sources of information that need to be used for establishing reserve prices in competitive selection procedures?

Question no. 23

Do you agree that 2 x 5 MHz blocks in harmonised frequency bands below 1 GHz (700 MHz, 800 MHz and 900 MHz) should have considerably close economic values in Romania? Please detail your answer.

7. Indicative schedule of the selection procedure

Question no. 24

What do you think an indicative timetable for the preparation and organisation of the selection procedure should be, taking into account the activities listed below:

- a) *Submission of applications for granting spectrum usage rights in the frequency sub-bands under consideration and expressing firm interest for participating in a possible selection procedure (in case it is decided to carry out this action before the start of the actual selection procedure);*

- b) Announcement of the need to organize a competitive selection procedure (if demand exceeds the offer) (in case it is decided to carry out this action before the of the actual selection procedure);*
- c) Publication of the documentation required for the organization of the selection procedure (draft decision on organising the selection procedure, draft terms of reference - initial version, draft Government decision on the minimum amount of the licence fee);*
- d) Public consultation on the documentation and submission of comments;*
- e) Summary of comments and organization of the Consultative Council;*
- f) Adoption of the decision on the organization of the selection procedure and of the Government decision on the minimum amount of the license fee, along with the consolidation of the final version of the terms of reference;*
- g) Publication of the announcement;*
- h) Submission of requests for clarification;*
- i) Publication of answers to the requests for clarification received;*
- j) Receiving applications;*
- k) Announcement of qualified/unqualified applicants;*
- l) Submission of possible complaints;*
- m) Solving any disputes;*
- n) Announcement of the fact that the primary auction stage is organised and of its starting date or announcement of the fact that no primary auction stage is required as well as the announcement of the winning bidders of abstract blocks and the starting date of any additional rounds, or of the assignment round;*
- o) Information session on the auction rules;*
- p) Launch of the auction;*
- q) Completion of primary and/or additional rounds;*
- r) Assignment round;*
- s) Announcement of auction results;*
- t) Payment of the license fee resulting from the selection procedure;*
- u) Licence issuance*