

**Spectrum packaging
for the 800 MHz, 900 MHz, 1800 MHz
and 2600 MHz frequency bands award
in Romania**

**CEE Regional Working Group Meeting:
Sharing Experience in Spectrum Auctioning
Bucharest, 9 May 2013**

Background – Mobile Spectrum Bands

- ❑ Four MNOs in 900 MHz, 1800 MHz and 2100 MHz bands before the auction:
 - 3 MNOs in 900 MHz and 1800 MHz bands
 - 4 MNOs in 2100 MHz band
- ➔
 - **3 MNOs** in all the bands: 900 MHz, 1800 MHz and 2100 MHz
 - **1 MNO** in 2100 MHz band only
- ❑ Existing spectrum usage rights in 900 MHz and 1800 MHz bands:
 - 2 GSM/UMTS licenses in 900 MHz and 1800 MHz band expire on 31.12.2012
 - 1 GSM/UMTS license in 900 MHz and 1800 MHz band expires on 05.04.2014
- ❑ Existing spectrum usage rights in 2100 MHz bands:
 - 2 UMTS licenses in 2100 MHz band – valid until 31.03.2020
 - 2 UMTS licenses in 2100 MHz band – valid until January 2022

Background – Mobile Spectrum Bands

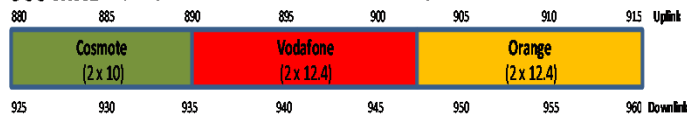
Spectrum holdings of the four MNOs in 900 MHz, 1800 MHz and 2100 MHz frequency bands before the auction:

Frequency Band/ Technology	Orange	Vodafone	Cosmote	RCS & RDS
900 MHz GSM / UMTS	2 x 12.4 MHz until 31.12.2012	2 x 12.4 MHz until 31.12.2012	2 x 10 MHz until 05.04.2014	-
1800 MHz GSM / UMTS	2 x 12.4 MHz until 31.12.2012	2 x 12.4 MHz until 31.12.2012	2 x 12.6 MHz until 05.04.2014	-
2100 MHz UMTS	2 x 14.8 MHz (FDD) 5 MHz (TDD) until 31.03.2020	2 x 14.8 MHz (FDD) 5 MHz (TDD) until 31.03.2020	2 x 14.8 MHz (FDD) 5 MHz (TDD) until 19.01.2022	2 x 15 MHz (FDD) 5 MHz (TDD) until 05.01.2022

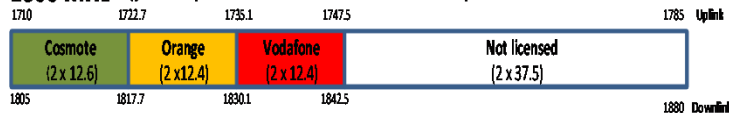
Background – Mobile Spectrum Bands

Spectrum allotments in 900 MHz, 1800 MHz and 2100 MHz bands before the auction

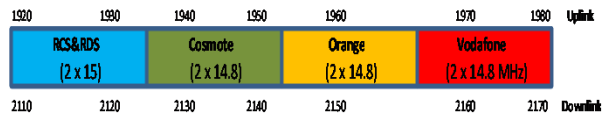
900 MHz (fully licensed for 2G and 3G services)



1800 MHz (partially licensed for 2G and 3G services)



2100 MHz (fully licensed for 3G services)



- The situation of spectrum licensing in 900 MHz, 1800 MHz and 2100 MHz bands before the auction:
 - the 900 MHz band fully licensed for GSM and UMTS services
 - the 1800 MHz band partially licensed (half of the band) for GSM and UMTS services
 - the 2100 MHz band fully licensed for UMTS services

Frequency Bands subject to the Award

❑ New frequency bands were made available to be awarded in the auction:

- the upper half of 1800 MHz band, i.e. 1747.5 –1780 MHz / 1842.5-1880 MHz
- the frequency bands 791-821 MHz / 832-862 MHz (800 MHz band)
- the 2500 – 2690 MHz band (2600 MHz band)

These bands will be released from military use no later than 31 December 2013.

❑ The frequency bands subject to the award:

- the paired frequency bands 791-821 MHz / 832-862 MHz (800 MHz band): 2 x 30 MHz
- the paired frequency bands 880-915 MHz / 925-960 MHz (900 MHz band): 2 x 35 MHz
- the paired frequency bands 1710-1785 MHz / 1805-1880 MHz (1800 MHz band): 2 x 75 MHz
- the frequency band 2500-2690 MHz (2600 MHz): 2 x 70 MHz (FDD); 1 x 45 MHz (TDD).

Frequency Bands subject to the Award

□ Time periods for granting the spectrum usage rights

- The spectrum rights of use were granted for two time periods (or temporal segments), depending on the availability of the spectrum resources, as follows:
 - for the period between **1 January 2013** and **5 April 2014** in case of the rights of use for:
 - ✓ the 890-915 MHz / 935-960 MHz bands
 - ✓ the 1722.7-1752.7 MHz / 1817.7-1847.7 MHz bands
 - for a **15-year** period, starting on **6 April 2014** until **5 April 2029** in case of the rights of use for:
 - ✓ the 791-821 MHz / 832-862 MHz bands (800 MHz band)
 - ✓ the 880-915 MHz / 925-960 MHz bands (900 MHz band)
 - ✓ the 1710-1785 MHz / 1805-1880 MHz bands (1800 MHz band)
 - ✓ the 2500 – 2690 MHz band (2600 MHz band)

Frequency Bands subject to the Award

□ Reasons for auctioning the spectrum rights across two time periods:

Due to the fact that:

- The spectrum in 900 MHz and 1800 MHz bands available for commercial use was allotted to existing operators by licenses having different expiry dates (as shown in the previous slides);
- The entire 1800 MHz band (i.e. 2 x 75 MHz) will be available for commercial use starting on 6 April 2014, after the release of the band from the military applications;

ANCOM decided to award the spectrum usage rights in two temporal segments, in order:

- ✓ to accommodate the different expiry dates of existing rights of use in the 900 MHz and 1800 MHz bands;
- ✓ to ensure the non-discriminatory access to all spectrum resources for all competitors, on a long term (starting on 6 April 2014).

Frequency Bands subject to the Award

- Frequencies from the following frequency bands were available for the auction:

Frequency band [MHz]	Lower band (FDD) [MHz]	Upper band (FDD) [MHz]	Simplex band (TDD) [MHz]	Spectrum amount to be awarded [MHz]	Validity of spectrum usage rights
800	791-821	832-862		2 x 30	06.04.2014 – 05.04.2029
900	890-915	935-960		2 x 25	01.01.2013 – 05.04.2014
900	880-915	925-960		2 x 35	06.04.2014 – 05.04.2029
1800	1722.7-1752.7	1817.7-1847.7		2 x 30	01.01.2013 – 05.04.2014
1800	1710-1785	1805-1880		2 x 75	06.04.2014 – 05.04.2029
2600	2500-2570	2620-2690	2570-2615	2 x 70 1 x 45	06.04.2014 – 05.04.2029

Main Objectives of the Spectrum Award

- ❑ **The following main objectives were envisaged by ANCOM when awarding the spectrum rights of use:**
 - ✓ Allotting the radio spectrum resource in an efficient manner, to those operators which value it most;
 - ✓ Promoting the competition in the mobile communications services market;
 - ✓ Encouraging the efficient investments in infrastructure and promoting the innovation;
 - ✓ Promoting the efficient use of the radio spectrum taking into account the technological evolution;
 - ✓ Increasing the penetration of mobile broadband communications services, with better coverage and higher quality;
 - ✓ Ensuring the flexibility in spectrum use, technology neutrality and service neutrality;
 - ✓ Complying with the principles of objectivity, transparency, non-discrimination;
 - ✓ Providing regulatory predictability and certainty for the market.

Spectrum Packaging

- **Frequency band plans, generic blocks (lots) and block categories within the auction**
 - The channel arrangements in 800 MHz and 2600 MHz FDD bands were consistent with the harmonised channel arrangements of 5 MHz duplex blocks, from the relevant EC decisions on harmonised technical conditions of use in the 790-862 MHz and 2500-2690 MHz bands for terrestrial systems capable of providing electronic communications services in the European Union.
 - The channel arrangements in 900 MHz and 1800 MHz bands awarded for the long term period were also based on a block size of 2 x 5 MHz.
 - The 2 x 5 MHz block size has the advantage of:
 - ✓ being suitable to accommodate all technologies (GSM, UMTS, LTE, WiMAX);
 - ✓ providing flexibility to the bidders in aggregating a number of 5 MHz contiguous blocks, in order to obtain wider channel bandwidths for LTE, and in choosing spectrum packages according to their individual needs and business models.

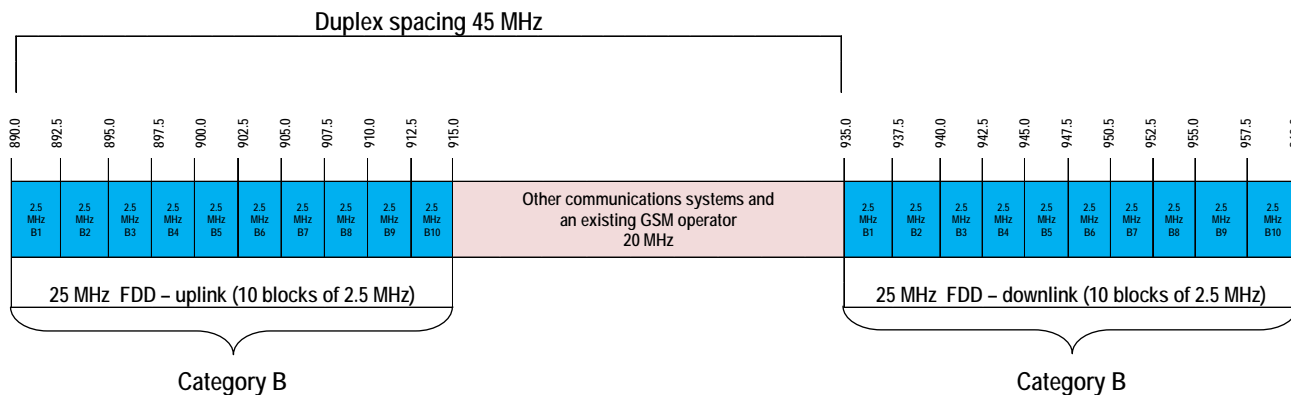
Spectrum Packaging

- The frequency bands to be awarded were organized in abstract frequency blocks (generic lots) and classified in different categories, depending on their equivalence in terms of: type of use, advantages and disadvantages of their use, applicable technical conditions, restrictions, specific obligations and validity of their actual use.
- The generic lots in one category had the same quotation (eligibility points) and were substitutable during the auction.
- Lots in all the categories were auctioned simultaneously which allowed for package bidding.
- In the first auction stage the bidders competed for obtaining abstract frequency blocks in one or a number of category of blocks (spectrum package), specifying the number of generic lots they want to acquire within each of the available categories.
- The **first auction stage** determined the **winners** and the **amount of abstract blocks** to be awarded to the winners in each category of blocks.
- The second auction stage (**the allotment stage**) determined the individual position of the abstract blocks obtained in the previous phase within each frequency band (**the concrete frequency blocks**).

Spectrum Packaging

- For the 01.01.2013 – 05.04.2014 time period:
 - The frequency arrangement within the **890-915 MHz / 935-960 MHz** bands (**2 x 25 MHz**) is presented below:

890 – 915 MHz / 935 – 960 MHz
(for the time period 01.01.2013 – 05.04.2014)

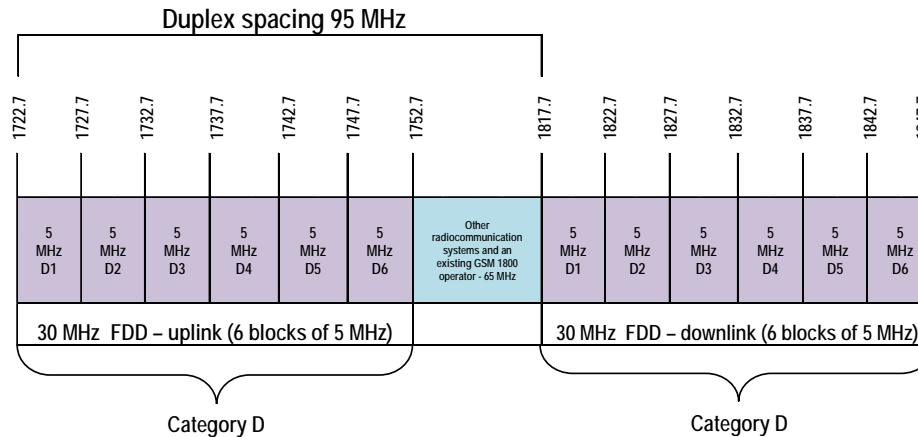


- The frequency bands were divided into **10** duplex **abstract blocks** of **2 x 2.5 MHz** bandwidth;
- The duplex spacing (frequency separation between the transmission frequency and the reception frequency) is 45 MHz;
- The 890-915 MHz band will be used for base station reception, respectively for mobile station transmission (uplink);
- The 935-960 MHz band will be used for base station transmission, respectively for mobile station reception (downlink);
- All 10 abstract blocks were equivalent and were part of the category **B: B1 ÷ B10**.

Spectrum Packaging

- For the 01.01.2013 – 05.04.2014 time period:
 - The frequency arrangement within the 1722.7-1752.7 MHz / 1817.7-1847.7 MHz bands (2 x 30 MHz) is presented below:

1722.7 – 1752.7 / 1817.7 – 1847.7 MHz
 (for the time period 01.01.2013 – 05.04.2014)



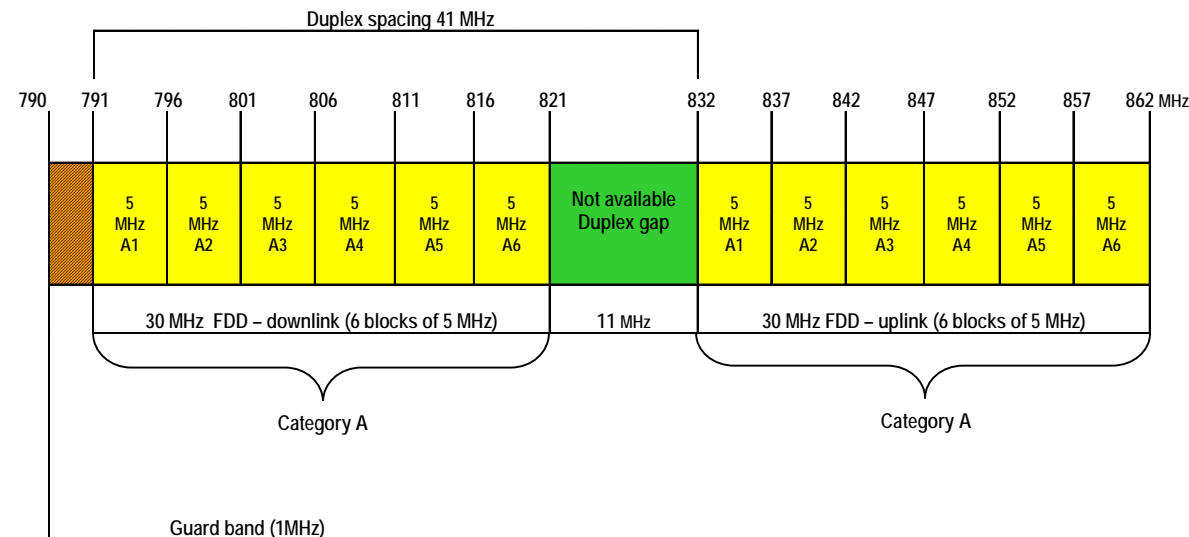
- The above frequency bands were divided into **6** duplex abstract blocks of **2 x 5 MHz** bandwidth;
- The duplex spacing (frequency separation between the transmission frequency and the reception frequency) is 95 MHz;
- The 1722.7-1752.7 MHz band will be used for base station reception, respectively for mobile station transmission (uplink);
- The 1817.7-1847.7 MHz band will be used for base station transmission, respectively for mobile station reception (downlink);
- All 6 abstract blocks were equivalent and belonged to the category **D**: **D1 ÷ D6**.

Spectrum Packaging

➤ For the 06.04.2014 – 05.04.2029 time period:

- The frequency arrangement within the **791-821 MHz / 832-862 MHz** bands (**2 x 30 MHz**) is presented below:

Channel arrangement, of 5 MHz width blocks,
in the frequency band 790 – 862 MHz



- The frequency arrangement is consistent with the European harmonised channel arrangement for 800 MHz band from the EC Decision 2010/267/EU and CEPT/ECC Decision ECC/DEC/(09)03.

Spectrum Packaging

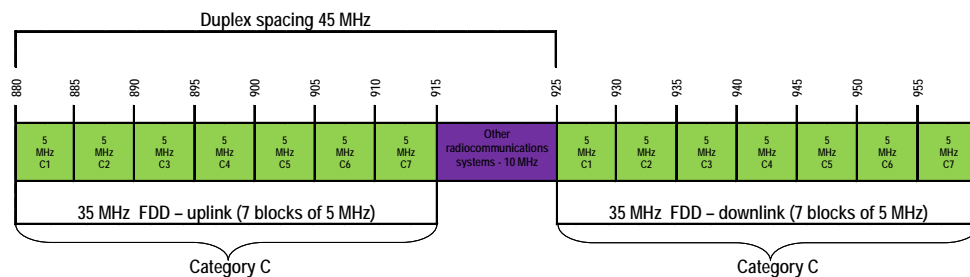
791-821 MHz / 821-832 MHz bands (for the 06.04.2043 – 05.04.2029 time period):

- The sub-band 790-791 MHz is kept as guard band between the lower part of 800 MHz band and the adjacent band;
- The sub-band 821-832 MHz is kept as duplex gap between the FDD bands and is not available;
- The paired frequency bands **791-821 MHz / 832-862 MHz** were divided into **6** duplex **blocks** of **2 x 5 MHz** bandwidth;
- The mode of operation is FDD (Frequency Division Duplex);
- The duplex spacing (frequency separation between the transmission frequency and the reception frequency) is 41 MHz;
- The 791-821 MHz band will be used for base station transmission, respectively for mobile station reception (downlink);
- The 832-862 MHz band will be used for base station reception, respectively for mobile station transmission (uplink);
- All 6 abstract blocks were considered equivalent and part of the category **A**: **A1 ÷ A6**.

Spectrum Packaging

- For the 06.04.2014 – 05.04.2029 time period:
 - The frequency arrangement within the 880-915 MHz / 925-960 MHz bands (2 x 35 MHz) is presented below:

880 – 915 MHz / 925 – 960 MHz
 (for the time period 06.04.2014 – 05.04.2029)

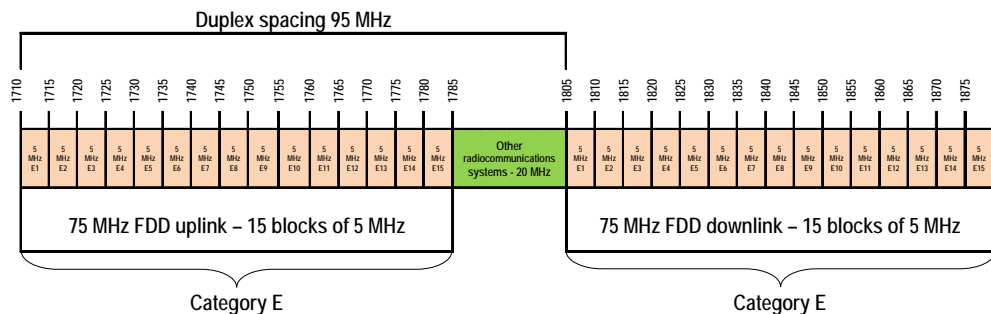


- The above frequency bands were divided into **7** duplex **abstract blocks** of **2 x 5 MHz** bandwidth;
- The duplex spacing (frequency separation between the transmission frequency and the reception frequency) is 45 MHz;
- The 880-915 MHz band will be used for base station reception, respectively for mobile station transmission (uplink);
- The 925-960 MHz band will be used for base station transmission, respectively for mobile station reception (downlink);
- All **7** abstract blocks were equivalent and were part of the category **C**: **C1 ÷ C7**.

Spectrum Packaging

- For the 06.04.2014 – 05.04.2029 time period:
 - The frequency arrangement within the 1710-1785 MHz / 1805-1880 MHz bands (2 x 75 MHz) is presented below:

1710 - 1785 MHz / 1805 - 1880 MHz
 (for the time period 06.04.2014 – 05.04.2029)



- The above frequency bands were divided into **15 duplex abstract blocks** of 2 x 5 MHz bandwidth;
- The duplex spacing (frequency separation between the transmission frequency and the reception frequency) is 95 MHz;
- The 1710-1785 MHz band will be used for base station reception and mobile station transmission (uplink);
- The 1805-1880 MHz band will be used for base station transmission and mobile station reception (downlink);
- All 15 abstract blocks were equivalent and were part of the category **E: E1 ÷ E15**.

Spectrum Packaging

- For the **06.04.2014 – 05.04.2029** time period:
 - The frequency arrangement within the **2500-2690 MHz** band (**2 x 70 MHz + 1 x 50 MHz**) is presented below:

2500 – 2690 MHz (for the time period 06.04.2014 – 05.04.2029)

2500 MHz	2505 MHz	2510 MHz	2515 MHz	2520 MHz	2525 MHz	2530 MHz	2535 MHz	2540 MHz	2545 MHz	2550 MHz	2555 MHz	2560 MHz	2565 MHz	2570 MHz	2575 MHz	2580 MHz	2585 MHz	2590 MHz	2595 MHz	2600 MHz	2605 MHz	2610 MHz	2615 MHz	2620 MHz	2625 MHz	2630 MHz	2635 MHz	2640 MHz	2645 MHz	2650 MHz	2655 MHz	2660 MHz	2665 MHz	2670 MHz	2675 MHz	2680 MHz	2685 MHz	2690 MHz					
5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	15 MHz G1			15 MHz G2			15 MHz G3			5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz	5 MHz
70MHz FDD Uplink (14 blocks of 5 MHz)														45 MHz TDD (3 blocks of 15 MHz)						70 MHz FDD Downlink (14 blocks of 5 MHz)																							

- The frequency arrangement in 2500-2690 MHz band is based on European harmonised channel arrangement for 2600 MHz band from the EC Decision 2008/477/EC and CEPT/ECC Decision ECC/DEC(05)05;
- The paired frequency sub-bands **2500-2570 MHz / 2620-2690 MHz** (2 x 70 MHz) were designated for **FDD** mode of operation;
- The duplex spacing (frequency separation between the transmission frequency and the reception frequency) is 120 MHz;
- The 2500-2570 MHz sub-band will be used for base station reception and mobile station transmission (uplink);
- The 2620-2690 MHz sub-band will be used for base station transmission and mobile station reception (downlink);

Spectrum Packaging

- The unpaired frequency sub-band **2570-2615 MHz** (1 x 45 MHz) will be used in **TDD** (Time Division Duplex) mode of operation;
- The sub-band 2615-2620 MHz was kept as guard band between the TDD and FDD usages, if the upper TDD block and the lower FDD block are awarded to different operators;
- The FDD frequency sub-bands were divided into **14** duplex **blocks** of **2 x 5 MHz** bandwidth;
- All 14 abstract blocks were considered to be equivalent and were part of the category **F**: **F1 ÷ F14**;
- The TDD sub-band 2570-2615 MHz was divided into **3** simplex blocks of **15 MHz** bandwidth belonging to the category **G**: **G1 ÷ G3**.

Spectrum Packaging

- A total of 61 abstract frequency blocks, sub-divided into 7 categories (A-G), were auctioned.

Bid category	Number of blocks	Band	Block size	Validity of use
A	6	791-821/832-862 MHz	2 x 5 MHz	06.04.2014 – 05.04.2029
B	10	890-915/935-960 MHz	2 x 2.5 MHz	01.01.2013 – 05.04.2014
C	7	880-915/925-960 MHz	2 x 5 MHz	06.04.2014 – 05.04.2029
D	6	1722.7-1752.7/ 1817.7-1847.7 MHz	2 x 5 MHz	01.01.2013 – 05.04.2014
E	15	1710-1785/ 1805-1880 MHz	2 x 5 MHz	06.04.2014 – 05.04.2029
F	14	2500-2570/ 2620-2690 MHz	2 x 5 MHz	06.04.2014 – 05.04.2029
G	3	2570-2615 MHz	1 x 15 MHz	06.04.2014 – 05.04.2029

- ❑ **Advantages of sub-1 GHz spectrum and competition concern related to the access to sub-1 GHz spectrum**
- Sub-1 GHz spectrum gives advantages over higher frequencies in terms of coverage; it allows a significantly greater geographical area to be served than higher frequency band would, for the same number of sites (because signals travel further at lower frequencies).
- It also provides better quality of deep indoor coverage, due to the substantially better signal quality and higher download speeds (user throughput) within the buildings, than higher frequencies since lower frequency signals are better at penetrating solid objects.
- These advantages could mean that a national MNO with a large amount of sub-1 GHz spectrum may have a competitive advantage compared to a national MNO without any sub-1 GHz spectrum; the MNO without sub-1 GHz spectrum may suffer a material competitive disadvantage because it is unable to develop its network to offer services sufficiently similar to those of the national MNO with sub-1 GHz spectrum, without significant additional costs.
- Since the amount of sub-1 GHz spectrum is reduced, there was a high risk of anti-competitive accumulation in the spectrum below 1 GHz, which may have led to a situation where not all four existing MNOs could have acquired sub-1 GHz spectrum.

Spectrum Caps

- ❑ **Spectrum caps to guard against longer term risk to competition**
 - In order to prevent the anti-competitive results of the auction, such as overly concentrated or very asymmetric holdings of sub-1 GHz spectrum, and to address the longer term risk of failing to promote competition, ANCOM imposed limitations for the maximum amount of spectrum which a bidder may acquire in the frequency bands below 1 GHz (spectrum caps).
 - By imposing the spectrum caps, ANCOM ensured the conditions for:
 - ✓ equitable access to the resources of spectrum below 1 GHz, more appropriate for the coverage of rural areas, involving lower costs for the infrastructure deployment;
 - ✓ encouraging the efficient investments in infrastructure;
 - ✓ a sustainable competition based on the equitable access to the spectrum resources.

Spectrum Caps

- To safeguard competition, the following **spectrum caps** were placed on the amount of spectrum that bidders could acquire in the bands below 1 GHz:
 - a) a spectrum cap of **2 x 12.5 MHz** in **900 MHz** band, for the time period 01.01.2013 – 05.04.2014 (in category B);
 - b) a spectrum cap of **2 x 10 MHz** in **800 MHz** band, for the time period 06.04.2014 – 05.04.2029 (in category A);
 - c) a spectrum cap of **2 x 10 MHz** in **900 MHz** band, for the time period 06.04.2014 – 05.04.2029 (in category C).
- The maximum amount of spectrum for which a bidder could acquire usage rights in the spectrum below 1 GHz, for the time period 06.04.2014 – 05.04.2029, was **2 x 20 MHz**.
- In the calculation of the aforementioned maximum spectrum amounts, the spectrum for which the bidders hold a usage right, valid on the date of entry into force of licenses awarded following the auction, is included.

The Obligations under the Licenses (I)

I. Coverage obligations

- **Coverage obligations for the licenses in 800 MHz and 900 MHz bands with the validity period between 06.04.2014 – 05.04.2029:**
- The holders of frequency usage rights below 1 GHz (800 MHz and/or 900 MHz) have the obligation to ensure:
 - a) priority coverage of 95% of the population from **732** localities with mobile communications services in UMTS technology, enhanced IMT technologies (HSPA, HSPA+) or LTE or equivalent, with a downlink data speed of at least **384 kbps**, by means of their own radio access network, including the 3G network provided in 2100 MHz band, for the operators holding 3G networks, until **05 April 2016**.
 - Each block in categories **A** (800 MHz) or **C** (900 MHz), that was awarded as the result of the auction, had an associated obligation to cover a number of **56** localities without coverage with mobile broadband services, from a list of localities established by ANCOM.
 - b) coverage with mobile communications services as follows:
 - For existing operators which hold 2G or 3G networks:
 - ✓ coverage with mobile broadband data services, with a downlink speed of at least **2 Mbps** with a 95% probability of indoor reception, of areas inhabited by at least **60%** of the population, by means of their own radio access network, including the coverage achieved by means of their own 3G network in 2100 MHz band, until **05 April 2019** at the latest.

The Obligations under the Licenses (I)

- For a **new-entrant**:
 - ✓ coverage with voice services of areas inhabited by at least **60%** of Romania's population, by means of their own radio access network, until **5 April 2021**;
 - ✓ coverage with mobile broadband data services with a downlink data speed of at least **2 Mbps**, with a 95% probability of indoor reception, of areas inhabited by at least **30%** of the population, by means of their own radio access network, until **5 April 2019** at the latest, and, respectively, **60%** of the population by **5 April 2021** at the latest.

- The holders of frequency usage rights below 1 GHz which commit to offer access to the **MVNOs** into their own mobile electronic communications network have lighter coverage obligations, with respect to the deadlines for their fulfillment, as follows:
 - ✓ **5 April 2021** instead of 5 April 2019 for achieving the coverage with mobile broadband data services with a downlink data speed of at least **2 Mbps**, for at least **60%** of the population, in two or three intermediate stages, depending on the status of the bidder (if it is an existing 3G MNO or a new-entrant);
 - The priority coverage obligation for the localities without mobile broadband coverage is the same as for the operators which didn't commit to host MVNOs.

The Obligations under the Licenses (I)

- **Coverage obligations for the licenses in the 1800 MHz and 2600 MHz bands with the validity period 06.04.2014 - 05.04.2029:**
 - ❑ The holders of frequency usage rights only in the frequency bands above 1 GHz (1800 MHz and/or 2600 MHz) have the obligation to ensure coverage with mobile communications services as follows:
 - For the **existing operators** which hold **2G** or **3G** networks:
 - ✓ coverage with voice services of areas inhabited by at least **80%** of Romania's population, by means of their own radio access network, until **5 April 2017**, for existing operators that hold **2G/3G** networks in the 1800 MHz band;
 - ✓ coverage with voice services of areas inhabited by at least **80%** of Romania's population, by means of their own radio access network, until **5 April 2019**, for existing operators that hold **3G** networks in the 2100 MHz band;
 - ✓ coverage with mobile broadband data services with a downlink data speed of at least **2 Mbps** with a 95% probability of indoor reception, of areas inhabited by at least **30%** of the population, by means of their own radio access network, including the coverage achieved by means of their own network in 2100 MHz band, for the existing 3G operators, until **5 April 2019** at the latest.
 - For a **new entrant**:
 - ✓ coverage with voice services of areas inhabited by at least **30%** of Romania's population, by means of their own radio access network, until **5 April 2021** at the latest;

The Obligations under the Licenses (I)

- ✓ coverage with mobile broadband data services with a downlink data speed of at least **2 Mbps**, with a 95% probability of indoor reception, of areas inhabited by at least **15%** of the population, by means of their own radio access network, until **5 April 2019** at the latest;
- ✓ coverage with mobile broadband data services with a downlink data speed of at least **2 Mbps**, with a 95% probability of indoor reception, of areas inhabited by at least **30%** of the population, by means of their own radio access network, until **5 April 2021** at the latest;
- The holders of frequency usage rights only in the frequency bands above 1 GHz which commit to offer access to the **MVNOs** into their own mobile electronic communications network have lighter coverage obligations, with respect to the deadlines for their fulfillment, as follows:
 - ✓ **5 April 2021** instead of 5 April 2019 for achieving the coverage with mobile broadband data services with a downlink data speed of at least **2 Mbps**, for at least **30%** of the population, in two or three intermediate stages, depending on the status of the bidder (if it is an existing 3G operator or a new entrant).
 - The coverage obligation with voice services is the same as for the MNOs which didn't commit to host MVNOs.

The Obligations under the Licenses (II)

II. Technical conditions for the use of radio frequencies:

- ❑ For the use of 800 MHz, 900 MHz, 1800 MHz and 2600 MHz bands the provisions of the relevant EC decisions, CEPT/ECC decisions, recommendations and reports apply, with regard to:
 - ✓ the harmonised use of 800 MHz, 900 MHz, 1800 MHz and 2600 MHz bands;
 - ✓ technical requirements to ensure the co-existence of systems operating in 800 MHz, 900 MHz, 1800 MHz and 2600 MHz bands with the systems in the same band or in adjacent spectrum bands;
 - ✓ technical requirements for frequency coordination in border areas in order to ensure the co-existence between the systems operating in the same band in the neighboring countries, in border areas.

- **For the use of the 800 MHz band:**
 - EC 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;
 - ECC/DEC/(09)03: Harmonised conditions for mobile/fixed communications networks (MFCN) operating in 790-862 MHz band;
 - ECC/REC/(11)04: Frequency planning and frequency coordination for terrestrial systems for Mobile/Fixed Communications Networks (MFCN) capable of providing electronic communications services in the frequency band 790-862 MHz.

The Obligations under the Licenses (II)

- ✓ The use in 800 MHz band is liberalised for any suitable technology or service;
 - ✓ The terrestrial systems which may be developed in 800 MHz band are those compliant with technical conditions set out in the EC Decision 2010/267/EU;
 - ✓ The 5 MHz block edge masks (BEM) defined in the Annex of Decision 2010/267/EU and in ECC/DEC/(09)03, Annex 3, must be complied with.
- **For the use of the 900 MHz and 1800 MHz bands:**
- EC Decision 2009/766/EC on the harmonisation of the 900 MHz and 1800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community, amended by the Commission Decision 2011/251/UE;
 - ECC/DEC/(06)13: Designation of the GSM 900/1800 bands for terrestrial IMT-2000/UMTS systems;
 - ECC/REC/(08)02: Frequency planning and frequency coordination for the GSM 900 (including E-GSM)/UMTS 900, GSM 1800/UMTS 1800 Land Mobile Systems;

The Obligations under the Licenses (II)

- ✓ The terrestrial systems which may be developed in 900 MHz and 1800 MHz bands are those compliant with Decision 2009/766/EC amended by the Decision 2011/251/EU: GSM, UMTS, LTE and WiMAX.
- ✓ The nominal channel spacing:
 - for the GSM systems: 200 kHz;
 - for the UMTS and WiMAX systems: 5 MHz;
 - for LTE systems: flexible channel bandwidth of 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz or 20 MHz.
- Channel edge separation in case of two networks using adjacent frequencies, depending upon the actual technologies used, shall be the following:
 - ✓ between two GSM channel edges: 0 kHz;
 - ✓ between the UMTS/LTE/WiMAX and GSM channel edges: 200 kHz;
 - ✓ between two UMTS channel edges: 0 kHz;
 - ✓ between the UMTS and LTE/WiMAX channel edges: 0 kHz;
 - ✓ between two LTE channel edges: 0 kHz;
 - ✓ between two WiMAX channel edges: 0 kHz;
 - ✓ between the LTE and WiMAX channel edges: 0 kHz.

The Obligations under the Licenses (II)

➤ For the use of the 2600 MHz band:

- EC Decision 2008/477/EC on the harmonisation of the 2500-2600 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community;
- CEPT Report 019: Least restrictive conditions for frequency bands addressed in the context of WAPECS;
- ECC Report 119: Coexistence between mobile systems in the 2600 MHz frequency band at the FDD/TDD boundary;
- ECC/REC/(11)05: Frequency planning and frequency coordination for terrestrial systems for Mobile/Fixed Communications Networks (MFCN) capable of providing electronic communications services in the frequency band 2500-2690 MHz.
- ✓ The terrestrial systems that may be developed in 2600 MHz band must observe the block edge masks (BEM) established by the Annex to the Decision 2008/477/EC.
- ✓ The 5 MHz block edge mask in 2500-2690 MHz band is distinctively defined for two types of usage conditions: for unrestricted blocks and for restricted blocks.
- ✓ For the use of FDD 2620-2690 MHz band (downlink) the conditions for unrestricted blocks apply to all FDD blocks (F1-F14).

The Obligations under the Licenses (II)

- ✓ The following applies to the use of 2570-2615 MHz TDD band:
 - the conditions for restricted blocks apply to the lower 5 MHz in the frequency blocks G1, G2, G3;
 - the conditions for unrestricted blocks apply to the remaining 5 MHz frequency blocks in the frequency blocks G1, G2 and G3.

- The technical conditions for the use of frequencies in the 800 MHz, 900 MHz, 1800 MHz and 2600 MHz bands in border areas are those defined in the bi- or multilateral agreements with the neighboring countries and in the relevant ECC recommendations on frequency coordination.

See the *Terms of reference for the organisation of the competitive selection procedure* at: http://www.ancom.org.ro/en/uploads/links_files/Caiet_de_sarcini_procedura_multibanda_800_900_1800_2600_2_07_2012_en.pdf, for more details on technical conditions applicable to the use of frequencies in the bands awarded within the auction.

Thank you

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