DECISIONS

COMMISSION IMPLEMENTING DECISION (EU) 2016/687

of 28 April 2016

on the harmonisation of the 694-790 MHz frequency band for terrestrial systems capable of providing wireless broadband electronic communications services and for flexible national use in the Union

(notified under document C(2016) 2268)

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Decision No 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community (the Radio Spectrum Decision) ([1]), and in particular Article 4(3) thereof,

Whereas:

(1) In the multiannual radio spectrum policy programme (RSPP) adopted by Decision No 243/2012/EU ([2]), the European Parliament and the Council set the policy objective to identify at least 1 200 MHz of suitable spectrum to meet the increasing demand for wireless data traffic in the Union by 2015 ([3]). Furthermore, the RSPP empowered the Commission and the Member States in cooperation, to ensure spectrum availability for programme making and special events (PMSE) ([4]), for the development of safety services and the free circulation of related devices as well as the development of innovative interoperable solutions for public protection and disaster relief (PPDR) ([5]), and for the 'Internet of Things' (IoT) ([6]). The Radio Spectrum Policy Group (RSPG) has adopted a report on strategic sectoral spectrum needs, which addresses, inter alia, the spectrum needs for PPDR, PMSE and the IoT ([7]).

(2) Spectrum in the 694-790 MHz frequency band (hereinafter '700 MHz frequency band') is a valuable asset for deploying cost-efficient terrestrial wireless networks with high capacity and ubiquitous indoor and outdoor coverage. The Radio Regulations of the International Telecommunication Union contain allocations of the 700 MHz frequency band to the broadcasting and mobile (except aeronautical mobile) service on a co-primary basis and identifications of this band for International Mobile Telecommunications (IMT). This frequency band is currently used across the Union for digital terrestrial television (DTT) and wireless audio PMSE equipment.

(3) The Commission's strategy for the Digital Single Market ([8]) highlights the importance of the 700 MHz frequency band for ensuring the provision of broadband services in rural areas and stresses the need for a coordinated release of that frequency band, while accommodating the specific needs of audiovisual media distribution, in order to encourage investment in high-speed broadband networks and facilitate the proliferation of advanced digital services.

([1]) OJ L 108, 24.4.2002, p. 1.
([2]) Decision No 243/2012/EU of the European Parliament and of the Council of 14 March 2012 establishing a multiannual radio spectrum policy programme (OJ L 81, 21.3.2012, p. 7).
([3]) Article 3(b), RSPP.
([4]) Article 8(5), RSPP.
([5]) Article 8(3), RSPP.
([6]) Article 8(6), RSPP.
([7]) Document RSPG13-540rev2.
([8]) See: http://ec.europa.eu/priorities/digital-single-market/index_en.htm

(4) In its opinion on long-term strategy for the 470-790 MHz frequency band ([1]), the RSPG recommends a coordinated approach for repurposing the 700 MHz frequency band for wireless broadband electronic communications services including making this band available under harmonised technical conditions across the Union.

(5) On 11 March 2013, pursuant to Article 4(2) of the Radio Spectrum Decision, the Commission issued to the European Conference of Postal and Telecommunications Administrations (CEPT) a mandate to develop harmonised technical conditions for the 700 MHz frequency band in the Union for the provision of wireless broadband electronic communications services and other uses in support of the Union's spectrum policy priorities.

(6) On 28 November 2014 and 1 March 2016, in response to that mandate, CEPT issued its Reports 53 ([2]) and 60 ([3]). They provide the basis for technical harmonisation of the 700 MHz frequency band for terrestrial wireless broadband electronic communications services, which allows for economies of scale for equipment in line with international developments in this band.

(7) CEPT Reports 53 and 60 also present options for using portions of the 700 MHz frequency band (the so-called duplex gap and/or guard bands), which can be decided by a Member State ('national options'). One national option is supplemental downlink (SDL) which represents downlink-only (i.e. unidirectional) base station transmission for the provision of terrestrial wireless broadband electronic communications services, thereby addressing the problem of data traffic asymmetry by enhancing the downlink capability of such services. Other national options are PPDR, PMSE and M2M communications based on terrestrial systems capable of providing electronic communications services.

(8) Harmonised technical conditions would ensure take-up of the 700 MHz frequency band for high-speed terrestrial wireless broadband electronic communications services and other uses in line with spectrum policy priorities at Union level; they would foster the single market, mitigate harmful interference and facilitate frequency coordination.

(9) The 700 MHz frequency band should therefore be used for the provision of terrestrial wireless broadband electronic communications services based on a harmonised channelling arrangement ('core arrangement') and related common least restrictive technical conditions, whenever Member States designate it for use other than by high-power broadcasting networks. Member States may exceptionally and on an interim basis use for DTT services portions of the 700 MHz frequency band outside the core arrangement in order to facilitate the timely transition from terrestrial television broadcasting in the band, as appropriate in light of national circumstances for example in regard to modifying rights of use of spectrum for DTT services or simulcast arrangements in accordance with agreements between neighbouring Member States on managing cross-border interference risks.

(10) Member States should also have the flexibility to use portions of the 700 MHz frequency band in response to specific national needs. Besides terrestrial wireless broadband electronic communications services, this could also include use in line with the Union's sectoral spectrum policy priorities, in particular for PMSE, PPDR and the IoT and with the aim of ensuring efficient spectrum use. In this regard, the 790-791 MHz frequency band may also be used without prejudice to Commission Decision 2010/267/EU ([4]). Flexible harmonisation of spectrum availability within the 700 MHz frequency band to address these national needs based on a limited set of national options would help achieve economies of scale for equipment, as well as cross-border coordination, and should be limited to available frequency ranges and, where appropriate, a related duplex method and a channelling arrangement. Member States should decide on the implementation of national options as well as the appropriate combination of national options and organise their coexistence. Use of spectrum for national options should also ensure coexistence with terrestrial wireless broadband electronic communications services complying with the core arrangement.

(11) Terrestrial wireless broadband electronic communications services and national options in the 700 MHz frequency band should ensure appropriate protection of incumbent terrestrial television broadcasting services and wireless audio PMSE use below 694 MHz in line with their regulatory status. Additional measures may need to be applied at national level to manage mutual interference between wireless broadband electronic communications

([1]) Document RSPG 15-595 final; link: http://rspg-spectrum.eu/wp-content/uploads/2013/05/RSPG15-595_final-RSPG_opinion_UHF.pdf
([2]) Link to CEPT Report 53: http://www.erodocdb.dk/Docs/doc98/official/pdf/CEPTREP053.PDF
([3]) Link to CEPT Report 60: http://www.erodocdb.dk/Docs/doc98/official/pdf/CEPTREP060.PDF
([4]) Commission Decision 2010/267/EU of 6 May 2010 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 (OJ L 117, 11.5.2010, p. 95).

services and DTT services such as from wireless broadband electronic communications base station transmitters to DTT receivers, or from DTT broadcasting transmitters to wireless broadband electronic communications base station receivers, whereby appropriate mitigation techniques can be applied by mobile operators on a case-by-case basis.

(12) While measures under the Radio Spectrum Decision are without prejudice to the rights of Member States to organise and use spectrum for public order and public security purposes (namely PPDR) ([1]), such use would benefit from a common frequency range in order to ensure free circulation of devices and interoperable services in line with the RSPP policy objective on spectrum availability. Harmonised technical conditions for terrestrial wireless broadband electronic communications services would also allow, where needed and appropriate within the core arrangement, the deployment of broadband PPDR services that can make use of these technical conditions based on the assumption that the PPDR network has the same co-existence characteristics as terrestrial wireless broadband electronic communications networks. When making use of the designation for electronic communications services on a non-exclusive basis, Member States may also deploy PPDR when needed. In this regard, the RSPG Report on strategic sectoral spectrum needs recognises that spectrum needs for broadband PPDR services differ for each Member State and national solutions depend on political decisions, including on the method of conducting missions to ensure public safety and the related role of national authorities or public operators.

(13) CEPT Reports 53 and 60 refer to the need for a setup procedure for audio PMSE equipment, in order to ensure interference-free operation for the required quality of service. In order to improve the coexistence between indoor wireless audio PMSE equipment and mobile electronic communications networks using adjacent frequency bands, Member States should encourage, where feasible and necessary, the implementation of interference mitigation solutions such as those referred to in Commission Implementing Decision 2014/641/EU ([2]).

(14) Member States should conclude relevant bilateral cross-border agreements with other Member States and non-EU countries. Such agreements between Member States and non-EU countries may be necessary in relevant parts of Member States' territory to ensure implementation of harmonised parameters, avoidance of harmful interference and improvement of spectrum efficiency. The RSPG Report on the spectrum coordination approach for broadcasting in the case of a reallocation of the 700 MHz band ([3]) sets out technical conditions and principles for cross-border coordination between terrestrial wireless broadband electronic communications services and terrestrial television broadcasting, including with non-EU countries.

(15) Member States should report to the Commission on the implementation of this Decision and the use of the 700 MHz frequency band, in particular with a view to adapting it to future developments in wireless systems (such as in the context of 5G or the IoT), which may affect its use for terrestrial wireless broadband electronic communications services and national options. This will facilitate assessing its impact at EU level as well as its timely review, if and when necessary.

(16) The measures provided for in this Decision are in accordance with the opinion of the Radio Spectrum Committee,

HAS ADOPTED THIS DECISION:

Article 1

This Decision harmonises the technical conditions for the availability and efficient use of the 694-790 MHz ('700 MHz') frequency band in the Union for terrestrial systems capable of providing wireless broadband electronic communications services. It aims also to facilitate flexible national use in response to specific national needs in accordance with RSPP spectrum policy priorities. The harmonised conditions for the 790-791 MHz frequency band under this Decision shall apply without prejudice to the provisions of Decision 2010/267/EU.

([1]) Article 1(4) of the Radio Spectrum Decision.
([2]) Commission Implementing Decision 2014/641/EU of 1 September 2014 on harmonised technical conditions of radio spectrum use by wireless audio programme making and special events equipment in the Union (OJ L 263, 3.9.2014, p. 29).
([3]) Document RSPG13-524 rev1; link: https://circabc.europa.eu/d/a/workspace/SpacesStore/614d3daf-76a0-402d-8133-77d2d3dd2518/RSPG13-524%20rev1%20Report_700MHz_reallocation_REV.pdf

Article 2

For the purposes of this Decision the following definitions shall apply:

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

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

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

Article 3

1. When Member States designate and make available the 700 MHz frequency band for use other than high-power broadcasting networks, they shall:

(a) designate and make available the 703-733 MHz and 758-788 MHz frequency bands, on a non-exclusive basis, for terrestrial systems capable of providing wireless broadband electronic communications services in compliance with the parameters set out in Sections A.1, B and C of the Annex;

(b) subject to national decisions and choice, designate and make available the portions of the 700 MHz frequency band other than those referred to in paragraph 1(a), for use in compliance with the parameters set out in Sections A.2 to A.5 of the Annex.

2. Member States shall facilitate coexistence among different uses referred to in paragraph 1.

Article 4

Member States shall ensure that the systems referred to in Article 3(1)(a) and (b) give appropriate protection to existing systems in the adjacent 470-694 MHz band, namely digital terrestrial television broadcasting services and wireless audio PMSE equipment in accordance with their regulatory status.

Article 5

Member States shall facilitate cross-border coordination agreements with the aim of enabling operation of the systems referred to in Article 3(1)(a) and, where appropriate, of those referred to in Article 3(1)(b), taking into account existing regulatory procedures and rights as well as relevant international agreements.

Article 6

Member States shall monitor the use of the 700 MHz frequency band and report their findings to the Commission upon request or at their own initiative in order to allow timely review of this Decision, as appropriate.

Article 7

This Decision is addressed to the Member States.

Done at Brussels, 28 April 2016.

For the Commission
Günther OETTINGER
Member of the Commission

ANNEX

PARAMETERS REFERRED TO IN ARTICLE 3

A. **General parameters**

1. Pursuant to Article 3(1)(a), within the 703-733 MHz and 758-788 MHz frequency bands, the frequency arrangement shall be as follows:

   (a) the assigned block sizes shall be in multiples of 5 MHz ([1]);

   (b) the mode of operation shall be Frequency Division Duplex (FDD); the duplex spacing shall be 55 MHz with terminal station transmission (FDD uplink) located in the lower frequency band 703-733 MHz and base station transmission (FDD downlink) located in the upper frequency band 758-788 MHz;

   (c) the lower frequency limit of an assigned block shall be aligned with or spaced at multiples of 5 MHz from the band edge of 703 MHz.

   Without prejudice to the right of Member States to organise and use their spectrum for public safety and public security purposes and for defence, if PPDR radio communications are implemented, the technical conditions for wireless broadband electronic communications services in this annex should be used.

2. Pursuant to Article 3(1)(b), the frequency arrangement within the 738-758 MHz frequency band for use in full or in part for terrestrial systems capable of providing wireless broadband electronic communications services, shall be as follows:

   (a) the upper band edge of the designated spectrum range shall be either 758 MHz or 753 MHz; the latter is only applicable in conjunction with the frequency arrangement pursuant to Section A.3 starting at 753 MHz;

   (b) the lower band edge of the designated spectrum range shall start at one of the following: 738 MHz, 743 MHz, 748 MHz or 753 MHz;

   (c) the mode of operation shall be limited to base station ('downlink-only') transmission in accordance with the technical parameters in Section B;

   (d) the assigned block sizes within the designated spectrum range shall be in multiples of 5 MHz ([1]); the upper frequency limit of an assigned block shall be aligned with or spaced at multiples of 5 MHz from the upper band edge.

3. Pursuant to Article 3(1)(b), the frequency arrangement within the frequency bands 698-703 MHz, 733-736 MHz, 753-758 MHz and 788-791 MHz for use in full or in part for PPDR radio communications shall be as follows: the mode of operation shall be Frequency Division Duplex; the duplex spacing shall be 55 MHz with terminal station transmission (PPDR uplink) located in one or both of the frequency band 698-703 MHz and 733-736 MHz, and base station transmission (PPDR downlink) located in one or both of the frequency band 753-758 MHz and 788-791 MHz, respectively.

   The frequency bands 703-733 MHz and 758-788 MHz, or a subset thereof, may also be used for PPDR radio communications. Such use is addressed in Section A.1.

4. Pursuant to Article 3(1)(b), the frequency arrangement within the frequency bands 733-736 MHz and 788-791 MHz for use for M2M radio communications shall be as follows: the mode of operation shall be Frequency Division Duplex; the duplex spacing shall be 55 MHz with terminal station transmission (M2M uplink) located in the 733-736 MHz frequency band and base station transmission (M2M downlink) located in the 788-791 MHz frequency band.

5. Pursuant to Article 3(1)(b), Member States decide on the frequency arrangement within the frequency bands 694-703 MHz and 733-758 MHz for use in full or in part for wireless audio PMSE equipment. In order to improve the coexistence between indoor wireless audio PMSE equipment used within the 694-703 MHz and/or 733-758 MHz frequency bands, and mobile electronic communications networks, Member States shall encourage, where feasible and necessary, the implementation of interference mitigation solutions.

([1]) 5 MHz or more; this does not preclude smaller channel bandwidths within an assigned block.

B. **Technical conditions for base stations for terrestrial systems capable of providing electronic communications services within the 738-788 MHz frequency band**

The following technical parameters for base stations called 'block edge mask' (BEM) shall be used in order to ensure coexistence between neighbouring networks and protection of other services and applications in adjacent bands. Less stringent technical parameters, if agreed among the operators or administrations concerned, may also be used provided that these parameters comply with the technical conditions applicable for the protection of other services or applications, including in adjacent bands or subject to cross-border obligations.

The BEM ([1]) is an emission mask that is defined as a function of frequency in relation to a 'block edge', the latter being the frequency boundary of a spectrum block for which rights of use are assigned to an operator. The BEM consists of several elements which are defined for certain measurement bandwidths. A 'band edge' denotes the frequency boundary of a spectrum range designated for a certain use.

BEMs for base stations given below have been developed for equipment used in mobile networks. The same base station BEM applies both for FDD downlink use within the 758-788 MHz frequency band (as defined in Section A.1) and optional downlink-only use within the 738-758 MHz frequency band (as defined in Section A.2). The BEMs serve to protect other spectrum blocks used for electronic communications services (including downlink-only use) as well as other services and applications in adjacent bands. Additional measures which do not constrain economies of scale of equipment may be applied at national level to further facilitate the coexistence of electronic communications services and other uses within the 700 MHz frequency band.

The base station BEM consists of in-block and out-of-block power limits. The in-block power limit is applied to a block assigned to an operator. The out-of-block power limits are applied to spectrum within or outside the 700 MHz frequency band, which is outside the block assigned. Table 1 contains the different spectrum elements of the base station BEM, whereby all BEM elements except 'in-block' are mapped to out-of-block power limits. Optional in-block power limits are given in Table 2. Out-of-block power limits for different BEM elements are given in Table 3 to Table 8.

To obtain a base station BEM for a specific block within the FDD downlink or within the 738-758 MHz frequency band when used for optional downlink-only use, the BEM elements are used as follows:

In-block power limit is used for the block assigned to the operator.

— Transitional regions are determined, and corresponding power limits are used. The transitional regions may overlap with guard bands, adjacent bands and the duplex gap, in which case transitional power limits are used.

— For remaining assigned spectrum which constitutes baseline (as defined in Table 1), baseline power limits are used.

— For remaining spectrum in the guard bands (i.e. not covered by transitional regions or not used for PPDR or M2M radio communications), guard band power limits are used.

— For spectrum in the 733-758 MHz frequency band not used for downlink-only or PPDR or M2M radio communications, duplex gap power limits apply.

Table 1

Definition of BEM elements for blocks pursuant to Sections A.1 and A.2

BEM element	Definition
In-block	Refers to a block for which the BEM is derived.
Baseline	Spectrum used within the frequency bands 703-733 MHz (i.e. FDD uplink) and 758-788 MHz (i.e. FDD downlink) as well as within the 738-758 MHz frequency band for downlink-only (if applicable), for digital terrestrial television broadcasting below the 694 MHz band edge, for terrestrial systems capable of providing electronic communications services above 790 MHz (both uplink and downlink), for PPDR radio communications in the 700 MHz frequency band (both uplink and downlink), and for M2M radio communications in the 700 MHz frequency band (both uplink and downlink).

([1]) The BEM is based on minimum coupling loss (MCL) analysis and simulations; the BEM elements are defined on a per cell or per antenna basis, depending on the co-existence scenario from which they have been derived.

BEM element	Definition
Transitional region	Spectrum from 0 to 10 MHz below and from 0 to 10 MHz above the block assigned to an operator; in a frequency range where transitional regions and spectrum used for FDD uplink, PPDR uplink or M2M uplink overlap, transitional power limits do not apply.
Guard bands	(a) Spectrum between the lower edge of the 700 MHz frequency band and the lower edge of the FDD uplink (i.e. 694-703 MHz); (b) Spectrum between the upper edge of FDD downlink (i.e. 788 MHz) and the lower edge of the FDD downlink according to Decision 2010/267/EU (i.e. 791 MHz). In case of overlap between a transitional region and a guard band, transitional power limits are used. When spectrum is used for PPDR or M2M radio communications, baseline or transitional power limits are used.
Duplex gap	Spectrum in the 733-758 MHz frequency band. In case of overlap between a transitional region and the part of the duplex gap not used for downlink-only or PPDR radio communications or M2M radio communications, transitional power limits are used.

In-block requirements

Table 2

Base station in-block power limit

Frequency range	Maximum mean EIRP [1]	Measurement bandwidth
Block assigned to the operator	Not mandatory. In case an upper bound is desired by an administration, a value may be applied, which does not exceed 64 dBm/5 MHz per antenna.	5 MHz

[1] Equivalent Isotropically Radiated Power (EIRP) is the total power radiated in any direction at a single location, independent of any base station configuration.

Out-of-block requirements

Table 3

Base station baseline power limit

Frequency range	Bandwidth of protected block	Maximum mean EIRP	Measurement bandwidth
Uplink frequencies in the range 698-736 MHz [1]	≥ 5 MHz	− 50 dBm per cell [2]	5 MHz
	3 MHz	− 52 dBm per cell [2]	3 MHz [1]
	≤ 3 MHz	− 64 dBm per cell [2]	200 kHz [1]
FDD uplink frequencies as defined in Decision 2010/267/EU (i.e. 832-862 MHz)	≥ 5 MHz	− 49 dBm per cell [2]	5 MHz

Frequency range	Bandwidth of protected block	Maximum mean EIRP	Measurement bandwidth
Downlink frequencies in the range 738-791 MHz	≥ 5 MHz	16 dBm per antenna	5 MHz
	3 MHz	14 dBm per antenna	3 MHz
	< 3 MHz	2 dBm per antenna	200 kHz
FDD downlink frequencies as defined in Decision 2010/267/EU (i.e. 791-821 MHz)	≥ 5 MHz	16 dBm per antenna	5 MHz

(1) Administrations may select a measurement bandwidth of 3 MHz or 200 kHz for protection of a block size of 3 MHz depending on the national implemented options.
(2) In a multi-sector site, the value per 'cell' corresponds to the value for one of the sectors.

Table 4

Base station transitional power limits in the range 733-788 MHz

Frequency range	Maximum mean EIRP	Measurement bandwidth
– 10 to – 5 MHz from lower block edge	18 dBm per antenna	5 MHz
– 5 to 0 MHz from lower block edge	22 dBm per antenna	5 MHz
0 to + 5 MHz from upper block edge	22 dBm per antenna	5 MHz
+ 5 to + 10 MHz from upper block edge	18 dBm per antenna	5 MHz

Table 5

Base station transitional power limits above 788 MHz

Frequency range	Maximum mean EIRP	Measurement bandwidth
788-791 MHz for a block with upper edge at 788 MHz	21 dBm per antenna	3 MHz
788-791 MHz for a block with upper edge at 783 MHz	16 dBm per antenna	3 MHz
788-791 MHz for a block with upper edge at 788 MHz for protection of systems with bandwidth < 3 MHz	11 dBm per antenna	200 kHz
788-791 MHz for a block with upper edge at 783 MHz for protection of systems with bandwidth < 3 MHz	4 dBm per antenna	200 kHz
791-796 MHz for a block with upper edge at 788 MHz	19 dBm per antenna	5 MHz

Frequency range	Maximum mean EIRP	Measurement bandwidth
791-796 MHz for a block with upper edge at 783 MHz	17 dBm per antenna	5 MHz
796-801 MHz for a block with upper edge at 788 MHz	17 dBm per antenna	5 MHz

Table 6

Base station power limits for the part of the duplex gap not used for downlink-only or PPDR radio communications or M2M radio communications

Frequency range	Maximum mean EIRP	Measurement bandwidth
– 10 to 0 MHz offset from FDD downlink lower band edge or lower edge of the lowest downlink-only block, but above FDD uplink upper band edge	16 dBm per antenna	5 MHz
More than 10 MHz offset from FDD downlink lower band edge or lower edge of the lowest downlink-only block, but above FDD uplink upper band edge	– 4 dBm per antenna	5 MHz

Table 7

Base station power limits for the part of the guard bands not used for PPDR radio communications or M2M radio communications

Frequency range	Maximum mean EIRP	Measurement bandwidth
Spectrum between the lower band edge of the 700 MHz frequency band and FDD uplink lower band edge (i.e. 694-703 MHz);	– 32 dBm per cell (1)	1 MHz
Spectrum between FDD downlink upper band edge and the FDD downlink lower band edge as defined in Decision 2010/267/EU (i.e. 788-791 MHz)	14 dBm per antenna	3 MHz

(1) In a multi-sector site, the value per 'cell' corresponds to the value for one of the sectors.

Table 8

Base station baseline power limits for spectrum below 694 MHz

Frequency range	Maximum mean EIRP	Measurement bandwidth
Frequencies below 694 MHz where digital terrestrial television broadcasting is protected	– 23 dBm per cell (1)	8 MHz

(1) In a multi-sector site, the value per 'cell' corresponds to the value for one of the sectors.

C. **Technical conditions for terminal stations for electronic communications services within the 703-733 MHz frequency band**

BEMs for terminal stations given below have been developed for equipment used in mobile networks.

The terminal station BEM consists of in-block and out-of-block power limits. The in-block power limit is applied to a block assigned to an operator. The out-of-block power limits are applied to the following spectrum elements: the duplex gap between FDD uplink and FDD downlink (including downlink-only spectrum, if applicable), the guard band between the upper limit of spectrum used for television broadcasting (694 MHz) and FDD uplink (i.e. 694-703 MHz), and spectrum used for television broadcasting (i.e. below 694 MHz).

The BEM requirements for terminal stations are given in Table 9 to Table 12 ([1]). The power limits are specified as equivalent isotropically radiated power (EIRP) for terminal stations designed to be fixed or installed and as total radiated power (TRP) ([2]) for terminal stations designed to be mobile or nomadic.

Administrations may relax the in-block power limit in certain situations, for example fixed terminal stations in rural areas provided that protection of other services, networks and applications is not compromised and cross-border obligations are fulfilled.

In-block requirements

Table 9

Terminal station in-block power limit

Maximum mean power	23 dBm ([1])

([1]) This value is subject to a tolerance of up to + 2 dB, to take account of operation under extreme environmental conditions and production spread.

Out-of-block requirements

Table 10

Terminal station power limits for the guard band 694-703 MHz

Frequency range	Maximum mean out-of-block EIRP	Measurement bandwidth
694-698 MHz	− 7 dBm	4 MHz
698-703 MHz	2 dBm	5 MHz

Table 11 (non-mandatory)

Terminal station power limits for the duplex gap

Frequency range	Maximum mean out-of-block EIRP	Measurement bandwidth
733-738 MHz	2 dBm	5 MHz
738-753 MHz	− 6 dBm	5 MHz
753-758 MHz	− 18 dBm	5 MHz

([1]) Further requirements may be taken into account by ETSI in the harmonised standards.
([2]) Total radiated power (TRP) is a measure of how much power the antenna actually radiates. The TRP is defined as the integral of the power transmitted in different directions over the entire radiation sphere.

Explanatory note to Table 11

The power limits have been derived from the spectrum emission mask specified in clause 4.2.3 of ETSI EN 301 908-13 v6.2.1, which means that LTE-based equipment will comply inherently with the emission limits specified in Table 11. No additional test procedure is required to ensure compliance of such equipment with the power limits specified above.

Table 12

Terminal station power limits for frequencies below 694 MHz used for terrestrial broadcasting (unwanted emissions)

Frequency range	Maximum mean out-of-block power	Measurement band-width
470-694 MHz	− 42 dBm	8 MHz

Explanatory notes to Table 12

(1) The derivation of the unwanted emissions limit is based on DTT broadcasting using DVB-T2 and a WBB system with a bandwidth of 10 MHz for a centre frequency separation between DTT broadcasting and WBB of 18 MHz (assuming an 8 MHz TV channel, 9 MHz guard band and a WBB system bandwidth of 10 MHz). If Member States wish to allow the deployment of WBB systems on a national basis with a bandwidth greater than 10 MHz and in case unwanted out-of-block power higher than − 42 dBm/8 MHz is generated in the band below 694 MHz, they should consider:

(a) either implementing the greater WBB system bandwidth starting at a frequency higher than 703 MHz so that the required limit of out-of-block power is still met;

(b) and/or applying mitigation techniques according to note 3.

(2) The value of the unwanted out-of-block emissions limit is derived with regard to fixed DTT reception. Member States who wish to consider portable-indoor DTT reception may need, on a case-by-case basis, to implement further measures at a national/local level (see note 3).

(3) Examples of potential mitigation techniques which may be considered by Member States include using additional DTT filtering, reducing the in-block power of the terminal station, reducing the bandwidth of the terminal station transmissions, or using techniques contained in the non-exhaustive list of potential mitigation techniques given in CEPT Report 30.

(4) Additional considerations on coexistence between WBB systems and DTT broadcasting: in order to mitigate DTT receiver blocking caused by base station transmission, additional external filtering could be applied at the input of the DTT receiver chain at national level, in particular to avoid overload saturation in antenna amplifiers; furthermore, interference from broadcasting transmitters to base station receivers, either caused by transmitter in-band power or unwanted emissions, may arise. In such cases, appropriate mitigation techniques may be applied on a case-by-case basis at national level.