COMMISSION IMPLEMENTING DECISION (EU) 2019/235

of 24 January 2019

on amending Decision 2008/411/EC as regards an update of relevant technical conditions applicable to the 3 400-3 800 MHz frequency band

(notified under document C(2019) 262)

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

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

Having regard to Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code ([1]),

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 (Radio Spectrum Decision) ([2]), and in particular Article 4(3) thereof,

Whereas:

(1) Commission Decision 2008/411/EC ([3]) harmonises the technical conditions for using the spectrum in the 3 400-3 800 MHz frequency band for the terrestrial provision of electronic communications services in the Community and was amended by Commission Implementing Decision 2014/276/EU ([4]).

(2) Article 6(3) of Decision No 243/2012/EU of the European Parliament and the Council ([5]) establishing a multiannual radio spectrum policy programme, requires Member States to help providers of electronic communication services regularly upgrade their networks to the latest, most efficient technology, in order to create their own spectrum dividends in line with the principles of service and technological neutrality. Initial commercial deployments around the world of next-generation (5G) terrestrial systems are expected as of 2020.

(3) The Commission's Communication 'Connectivity for a Competitive Digital Single Market — Towards a European Gigabit Society' ([6]) sets out new connectivity objectives for the Union to be achieved through the widespread deployment and take-up of very high capacity networks. To this end, the Commission's Communication '5G for Europe: An Action Plan' ([7]) identifies the need for action at the EU level, including the identification and harmonisation of spectrum for 5G based on the opinion of the Radio Spectrum Policy Group (RSPG), in order to ensure the objective of uninterrupted 5G coverage in all urban areas and major terrestrial transport paths by 2025.

(4) In its 'Strategic roadmap towards 5G for Europe: Opinion on spectrum related aspects for next-generation wireless systems (5G)' ([8]), the Radio Spectrum Policy Group (RSPG) identifies the 3 400-3 800 MHz frequency band as the primary pioneer band for 5G use in the Union.

([1]) OJ L 321, 17.12.2018, p. 36.

([2]) OJ L 108, 24.4.2002, p. 1.

([3]) Commission Decision 2008/411/EC of 21 May 2008 on the harmonisation of the 3 400-3 800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community (OJ L 144, 4.6.2008, p. 77).

([4]) Commission Implementing Decision 2014/276/EU of 2 May 2014 on amending Decision 2008/411/EC on the harmonisation of the 3 400-3 800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community (OJ L 139, 14.5.2014, p. 18).

([5]) 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).

([6]) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'Connectivity for a Competitive Digital Single Market — Towards a European Gigabit Society' COM(2016) 587 final.

([7]) Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions '5G for Europe: An Action Plan', COM(2016) 588 final.

([8]) Document RSPG16-032 final of 9 November 2016, 'Strategic roadmap towards 5G for Europe: Opinion on spectrum related aspects for next-generation wireless systems (5G)'.

(5) In its complementary opinion 'Strategic roadmap towards 5G for Europe: RSPG second opinion on 5G networks' ([9]), the RSPG acknowledges that the availability of the primary 5G band, 3 400-3 800 MHz, will be key for the success of 5G in the Union. It therefore urges Member States to consider appropriate measures to defragment this band in time to authorise sufficiently large blocks of spectrum by 2020.

(6) The European Electronic Communications Code requires Member States to allow the use of 3 400-3 800 MHz band for terrestrial systems capable of providing next generation (5G) wireless broadband electronic communication services by 31 December 2020. It also requires Member States to take all appropriate measures to facilitate the roll-out of 5G, including reorganising the 3 400-3 800 MHz band to allow sufficiently large blocks of spectrum. Therefore, to enable the roll-out of 5G, a timely amendment of the harmonised technical conditions is necessary.

(7) In December 2016, pursuant to Article 4(2) of Decision No 676/2002/EC, the Commission gave the European Conference of Postal and Telecommunications Administrations (CEPT) a mandate to develop harmonised technical conditions for spectrum use in support of the introduction of next-generation (5G) terrestrial wireless systems in the frequency bands 3 400-3 800 MHz and 24,25-27,5 GHz in the Union.

(8) In response to that mandate, on 9 July 2018 the CEPT issued a report (CEPT Report 67) on the technical conditions for spectrum harmonisation in support of the introduction of next generation (5G) terrestrial wireless systems in the 3 400-3 800 MHz frequency band. CEPT Report 67 provides harmonised technical conditions for both non-active antenna systems (non-AAS) and active antenna systems (AAS), which are terrestrial wireless systems capable of providing wireless broadband electronic communications services under synchronised, semi-synchronized and unsynchronised operations. It also calls for the co-existence of wireless broadband electronic communications services with services in adjacent bands (below 3 400 MHz and above 3 800 MHz).

(9) The results of CEPT Report 67 should be applied across the Union and implemented by the Member States without delay. This will foster the use of the entire 3 400-3 800 MHz frequency band with the aim of putting the Union at the forefront of 5G deployment. When applying this implementing Decision, Member States should choose their preferred next generation (5G) terrestrial wireless systems based on either synchronised, semi-synchronised and unsynchronised network operations and ensure an efficient use of spectrum. Member States should also take into account the results of the ECC Report 296 on synchronisation.

(10) Taking into account Article 54 of the European Electronic Communications Code, Member States should aim at ensuring a defragmentation of the 3 400-3 800 MHz frequency band so as to provide opportunities to access large portions of contiguous spectrum in line with the goal of gigabit connectivity. This includes facilitating trading and/or leasing of existing rights of use. Large contiguous spectrum portions of preferably 80-100 MHz facilitate the efficient deployment of 5G wireless broadband services, for example using Active Antenna Systems (AAS), with high throughput, high reliability and low latency in line with the policy objective of gigabit connectivity. This objective is of particular importance for a defragmentation.

(11) The legal framework for using the 3 400-3 800 MHz frequency band set out by Decision 2008/411/EC should remain unchanged in terms of ensuring continued protection of existing services, other than terrestrial electronic communications networks, within the band. In particular, if retained in the band, earth stations in the fixed satellite service (FSS, space-to-earth) should be given continued protection through appropriate coordination between those systems and wireless broadband networks managed at national level on a case-by-case basis.

(12) CEPT's Electronic Communications Committee (ECC) has issued the ECC Report 254, which provides guidance to Member States on the coexistence between wireless broadband electronic communication services, fixed services (FS) and FSS in the 3 600-3 800 MHz frequency band. Further guidance to operators and administrations for the operation of 4G and 5G networks in the same or in adjacent channels, while ensuring an efficient use of spectrum with a view to network synchronisation, are provided in ECC report 296.

(13) Cross-border agreements may be necessary to ensure that Member States implement the parameters set by this Decision, thus avoiding harmful interference and improving spectrum efficiency and non-fragmentation in spectrum use.

([9]) Document RSPG18-05 final of 30 January 2018, 'Strategic roadmap towards 5G for Europe: second opinion on 5G networks'.

(14) Decision 2008/411/EC should therefore be amended accordingly.

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

HAS ADOPTED THIS DECISION:

Article 1

Decision 2008/411/EC is amended as follows:

(1) in Article 2, paragraph 1 is replaced by the following:

‘1. Without prejudice to the protection and continued operation of other existing use in this band, when Member States designate and make available, on a non-exclusive basis the 3 400-3 800 MHz frequency band for terrestrial electronic communications networks, they shall do so in compliance with the parameters set out in the Annex.’;

(2) Article 4a is replaced by the following:

‘*Article 4a*

Member States shall report on the application of this Decision on 30 September 2019 at the latest.’;

(3) the Annex is replaced by the text in the Annex to this Decision.

Article 2

This Decision is addressed to the Member States.

Done at Brussels, 24 January 2019.

For the Commission
Mariya GABRIEL
Member of the Commission

ANNEX

PARAMETERS REFERRED TO IN ARTICLE 2

A. DEFINITIONS

Active antenna systems (AAS) means a base station and an antenna system where the amplitude and/or phase between antenna elements is continually adjusted resulting in an antenna pattern that varies in response to short term changes in the radio environment. This excludes long-term beam shaping such as fixed electrical down tilt. In AAS base stations the antenna system is integrated as part of the base station system or product.

Synchronised operation means operation of two or more different time division duplex (TDD) networks, where simultaneous uplink (UL) and downlink (DL) transmissions do not occur, that is at any given moment in time either all networks transmit in downlink or all networks transmit in uplink. This requires the alignment of all DL and UL transmissions for all TDD networks involved as well as synchronising the beginning of the frame across all networks.

Unsynchronised operation means operation of two or more different TDD networks, where at any given moment in time at least one network transmits in DL while at least one network transmits in UL. This might happen if the TDD networks either do not align all DL and UL transmissions or do not synchronise at the beginning of the frame.

Semi-synchronised operation means operation of two or more different TDD networks, where part of the frame is consistent with synchronised operation, while the remaining portion of the frame is consistent with unsynchronised operation. This requires the adoption of a frame structure for all TDD networks involved, including slots where the UL/DL direction is not specified, as well as synchronising the beginning of the frame across all networks.

Total radiated power (TRP) is a measure of how much power a composite antenna radiates. It equals the total conducted power input into the antenna array system less any losses in the antenna array system. TRP means the integral of the power transmitted in different directions over the entire radiation sphere as shown in the formula:

$$TRP \stackrel{\text{def}}{=} \frac{1}{4\pi}\int_0^{2\pi}\int_0^{\pi} P(\theta,\varphi)\sin(\theta)\,d\theta\, d\varphi$$

where $P(\vartheta,\varphi)$ is the power radiated by an antenna array system in direction (ϑ,φ) given by the formula:

$$P(\vartheta,\varphi) = P_{Tx}g(\vartheta,\varphi)$$

where P_{Tx} denotes the conducted power (measured in Watts), which is input to the array system, and $g(\vartheta,\varphi)$ denotes the array systems directional gain along the (ϑ, φ) direction.

B. GENERAL PARAMETERS

Within the 3 400-3 800 MHz frequency band:

1. the duplex mode of operation shall be time division duplex (TDD);
2. the assigned block sizes shall be in multiples of 5 MHz. The lower frequency limit of an assigned block shall be aligned with or spaced at multiples of 5 MHz from the lower band edge of 3 400 MHz ([1]);
3. there shall be spectrum available providing the opportunity to access sufficiently large portions of contiguous spectrum, preferably 80-100 MHz, for wireless broadband electronic communications services;
4. base stations and terminal stations transmission shall be in compliance with the technical conditions specified in Part C and Part D, respectively.

C. TECHNICAL CONDITIONS FOR BASE STATIONS — BLOCK EDGE MASK

The following technical parameters for base stations called block edge mask (BEM) are an essential component of conditions necessary to ensure coexistence between neighbouring networks, in the absence of bilateral or multilateral agreements between operators of such neighbouring networks. Less stringent technical parameters, if agreed among the operators of such networks, may also be used.

([1]) If assigned blocks need to be offset to accommodate other existent users, a raster of 100 kHz must be used. Narrower blocks can be defined adjacent to other users, to allow efficient use of spectrum.

The BEM consists of several elements given in Table 1. The in-block power limit is applied to a block owned by an operator. The baseline power limit, designed to protect the spectrum of other operators, the transitional region power limit, enabling filter roll-off from the in-block to the baseline power limit, and the restricted baseline power limit applicable to cases of unsynchronised or semi-synchronised operation represent out-of-block elements. The additional baseline power limit is an out-of-band power limit which is used either for the protection of radar operation below 3 400 MHz or for the protection of fixed satellite services (FSS) and fixed services (FS) above 3 800 MHz.

Tables 2 to 7 contain the power limits for the different BEM elements for TDD networks providing wireless broadband (WBB) electronic communications services (ECS). Power limits are provided for synchronised, unsynchronised and semi-synchronised WBB ECS networks.

In Tables 3 and 4, the power level P_{Max} is the maximum carrier power in dBm for the base station in question. P_{Max} is defined and measured as the equivalent isotropically radiated power (e.i.r.p.) per antenna for base stations with non-active antenna systems (non-AAS). For AAS, base stations P_{Max} is defined as the maximum mean carrier power in dBm for the base station and measured as TRP per carrier in a given cell.

In Tables 3, 4, and 7 the power limits are determined relative to a fixed upper limit by means of the formula $\mathrm{Min}(P_{Max - A}, B)$, which sets the lower (or stricter) of two values: (1) (P_{Max} A) expressing the maximum carrier power P_{Max} minus a relative offset A, and (2) the fixed upper limit B.

To obtain a BEM for a specific block, the BEM elements that are defined in Table 1 are combined in the following steps:

1. in-block power limit is used for the block assigned to the operator;

2. transitional regions are determined, and corresponding power limits are used;

3. baseline power limit is used in the case of synchronised WBB ECS networks for spectrum within the band except from the operator's block in question and the corresponding transitional regions;

4. restricted baseline power limits are used in the case of unsynchronised and semi-synchronised WBB ECS networks;

5. for spectrum below 3 400 MHz the respective additional baseline power limit is used;

6. for coexistence with FSS/FS above 3 800 MHz an additional baseline power limit is used.

The Figure below provides an example of the combination of different BEM elements.

Figure

Example of base station BEM elements and power limits

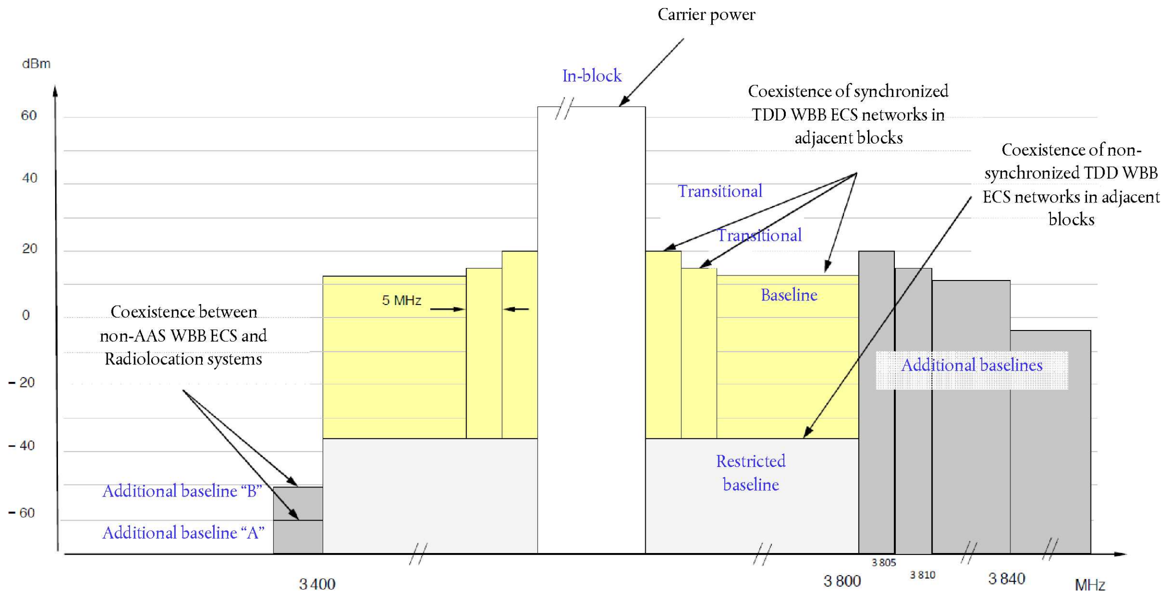

Table 1

Definition of BEM elements

BEM element	Definition
In-block	Refers to a block for which the BEM is derived.
Baseline	Spectrum within 3 400-3 800 MHz used for WBB ECS, with the exception of the block assigned to the operator and the corresponding transitional regions.
Transitional region	Spectrum within 0 to 10 MHz below and 0 to 10 MHz above the block assigned to the operator. Transitional regions do not apply to TDD blocks assigned to other operators, unless networks are synchronised. The transitional regions do not apply below 3 400 MHz or above 3 800 MHz.
Additional baseline	Spectrum below 3 400 MHz and above 3 800 MHz.
Restricted baseline	Spectrum used for WBB ECS by networks unsynchronised or semi-synchronised with the operator's block in question.

Explanatory note to Table 1

The BEM elements are applicable to base stations with different power levels, typically referred to as macro, micro, pico, and femto base stations ([2]).

Table 2

In-block power limit for non-AAS and AAS base stations

BEM element	Frequency range	Power limit for non-AAS and AAS base stations
In-block	Block assigned to the operator	Not obligatory.

Explanatory note to Table 2

In the specific case of femto base stations, power control shall be applied to minimize interference to adjacent channels. The requirement on power control for femto base stations results from the need to reduce interference from equipment that may be deployed by consumers and may thus not be coordinated with surrounding networks. Member States wishing to include a limit in their authorisation or to use a limit for coordination purposes may define such limits on a national basis.

Table 3

Baseline power limits for non-AAS and AAS base stations with synchronised network operation

BEM element	Frequency range	Non-AAS e.i.r.p limit	AAS TRP limit
Baseline	Below – 10 MHz offset from lower block edge Above 10 MHz offset from upper block edge Within 3 400-3 800 MHz	Min(P_{Max} – 43, 13) dBm/(5 MHz) per antenna (*)	Min($P_{Max'}$ – 43, 1) dBm/(5 MHz) per cell (**) (***)

(*) P_{Max} is the maximum mean carrier power in dBm for the base station measured as e.i.r.p. per carrier per antenna
(**) $P_{Max'}$ is the maximum mean carrier power in dBm for the base station measured as TRP per carrier in a given cell
(***) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors.

([2]) These terms are not uniquely defined and refer to cellular base stations with different power levels, which decrease in the following order: macro, micro, pico, femto. In particular, femto cells are small base stations with the lowest power levels, which are typically used indoors.

Explanatory note to Table 3

The applied fixed upper limit (13 dBm/(5 MHz) for non-AAS or 1 dBm/(5 MHz) for AAS) provides an upper bound on the interference from a base station. When two TDD blocks are synchronised, there will be no interference between base stations.

Table 4

Transitional region power limits, for non-AAS and AAS base stations with synchronised WBB ECS network operation

BEM element	Frequency range	Non-AAS e.i.r.p limit	AAS TRP limit
Transitional region	– 5 to 0 MHz offset from lower block edge or 0 to 5 MHz offset from upper block edge	Min(P_{Max} – 40, 21) dBm/(5 MHz) per antenna (*)	Min($P_{Max'}$ – 40, 16) dBm/(5 MHz) per cell (**) (***)
Transitional region	– 10 to – 5 MHz offset from lower block edge or 5 to 10 MHz offset from upper block edge	Min(P_{Max} – 43, 15) dBm/(5 MHz) per antenna (*)	Min($P_{Max'}$ – 43, 12) dBm/(5 MHz) per cell (**) (***)

(*) P_{Max} is the maximum mean carrier power in dBm for the base station measured as e.i.r.p. per carrier per antenna
(**) $P_{Max'}$ is the maximum mean carrier power in dBm for the base station measured as TRP per carrier in a given cell
(***) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors.

Table 5

Restricted baseline power limits for non-AAS and AAS base stations with unsynchronised and semi-synchronised WBB ECS network operation

BEM element	Frequency range	Non AAS e.i.r.p limit	AAS TRP limit
Restricted baseline	Unsynchronised and semi synchronised blocks, below the lower block edge and above the upper block edge, within 3 400-3 800 MHz	– 34 dBm/(5 MHz) per cell (*)	– 43 dBm/(5 MHz) per cell (*)

(*) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors.

Explanatory note to Table 5

These restricted power limits are used for unsynchronised and semi-synchronised operations of base stations, if no geographic separation is available. In addition, depending on national circumstances, Member States may define a relaxed alternative restricted baseline power limit applying to specific implementation cases to ensure a more efficient usage of spectrum.

Table 6

Additional baseline power limits for non-AAS and AAS base stations (*) below 3 400 MHz for country-specific cases

Case		BEM element	Frequency range	Non-AAS e.i.r.p limit	AAS TRP limit
A	Member States with military radiolocation systems below 3 400 MHz	Additional baseline	Below 3 400 MHz (**)	– 59 dBm/MHz per antenna	– 52 dBm/MHz per cell (***)

Case		BEM element	Frequency range	Non-AAS e.i.r.p limit	AAS TRP limit
B	Member States with military radiolocation systems below 3 400 MHz	Additional baseline	Below 3 400 MHz (**)	– 50 dBm/MHz per antenna	
C	Member States without adjacent band usage or with usage that does not need extra protection	Additional baseline	Below 3 400 MHz	Not applicable	Not applicable

(*) Alternative measures may be required on a case by case basis for indoor AAS base stations on a national basis.

(**) In cases where Member States have already implemented a guard band when issuing licences for terrestrial systems capable of providing WBB ECS before the adoption of this Decision and in accordance with Commission Decision 2008/411/EC, those Member States may apply the additional baseline only below such guard band, provided it complies with the protection of radars in the adjacent band and with cross-border obligations.

(***) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors

Explanatory note to Table 6

The additional baseline power limits reflect the need for protection of military radiolocation in some countries. Member States may select the limits from case A or B for non AAS depending on the level of protection required for the radar in the region in question. A coordination zone of up to 12 km around fixed terrestrial radars, based on AAS TRP limit of – 52 dBm/MHz per cell, may be required. Such coordination is under responsibility of the relevant Member State.

Other mitigation measures like geographical separation, coordination on a case-by-case basis or an additional guard band may be necessary. In case of indoor deployments, Member States may define a relaxed limit applying to specific implementation cases.

Table 7

Additional baseline power limits above 3 800 MHz for base stations for coexistence with FSS/FS

BEM element	Frequency range	Non-AAS e.i.r.p limit	AAS TRP power limit
Additional baseline	3 800-3 805 MHz	Min(P_{Max} – 40, 21) dBm/(5 MHz) per antenna (*)	Min($P_{Max'}$ – 40, 16) dBm/(5 MHz) per cell (**) (***)
	3 805-3 810 MHz	Min(P_{Max} – 43, 15) dBm/(5 MHz) per antenna (*)	Min($P_{Max'}$ – 43, 12) dBm/(5 MHz) per cell (**) (***)
	3 810-3 840 MHz	Min(P_{Max} – 43, 13) dBm/(5 MHz) per antenna (*)	Min($P_{Max'}$ – 43, 1) dBm/(5 MHz) per cell (**) (***)
	Above 3 840 MHz	– 2 dBm/(5 MHz) per antenna (*)	– 14 dBm/(5 MHz) per cell (***)

(*) P_{Max} is the maximum mean carrier power in dBm for the base station measured as e.i.r.p. per carrier per antenna

(**) $P_{Max'}$ is the maximum mean carrier power in dBm for the base station measured as TRP per carrier in a given cell

(***) In a multi-sector base station, the radiated power limit refers to the level corresponding to each one of the individual sectors

Explanatory note to Table 7

The additional baseline power limits are applied at the 3 800 MHz band edge to support the coordination process to be carried out at national level.

D. TECHNICAL CONDITIONS FOR TERMINAL STATIONS

Table 8

In-block requirement — terminal station BEM in-block power limit

Maximum in-block power	28 dBm TRP

Explanatory note to Table 8

The inblock radiated power limit for fixed/nomadic terminal stations may exceed the limit in Table 8 provided cross-border obligations are fulfilled. For such terminal stations mitigation measures to protect radar below 3 400 MHz may be necessary, for example, geographical separation or an additional guard band.