DECISIONS

COMMISSION IMPLEMENTING DECISION (EU) 2020/636

of 8 May 2020

amending Decision 2008/477/EC as regards an update of relevant technical conditions applicable to the 2 500–2 690 MHz frequency band

(notified under document C(2020) 2831)

(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 (Radio Spectrum Decision) ([1]), and in particular Article 4(3) thereof,

Whereas:

(1) Commission Decision 2008/477/EC ([2]) harmonises the technical conditions for using the 2 500–2 690 MHz frequency band ('2,6 GHz frequency band') for terrestrial systems capable of providing electronic communications services (ECSs) in the Union, mainly targeting wireless broadband services for end-users.

(2) Article 6(3) of Decision No 243/2012/EU of the European Parliament and the Council ([3]), requires Member States to help ECS providers 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..

(3) Commission's Communication on Connectivity for a competitive digital single market – towards a European gigabit society ([4]) sets out new connectivity objectives for the Union to be achieved through the widespread deployment and take-up of very high capacity networks. To that end, the Commission's Communication 5G for Europe: an action plan ([5]) identifies a need for action at Union level, including the identification and harmonisation of spectrum for 5G on the basis of the opinion of the Radio Spectrum Policy Group (RSPG), in order to ensure uninterrupted 5G coverage in all urban areas and major terrestrial transport paths by 2025.

(4) In its two opinions on the strategic roadmap towards 5G for Europe (16 November 2016 ([6]) and 30 January 2019 ([7])), the RSPG identified a need to ensure that the technical and regulatory conditions for all bands already harmonised for mobile networks are fit for 5G use. The 2,6 GHz frequency band is one such band, currently in use in the Union mainly for the fourth generation of wireless broadband systems (i.e. Long Term Evolution, LTE).

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

([2]) Commission Decision 2008/477/EC of 13 June 2008 on the harmonisation of the 2 500-2 690 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community (OJ L 163, 24.6.2008, p. 37).

([3]) 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).

([4]) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on Connectivity for a competitive digital single market – towards a European gigabit society (COM (2016) 587 final).

([5]) Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on 5G for Europe: an action plan (COM(2016) 588 final).

([6]) 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) (RSPG 1st opinion on 5G)*.

([7]) Document RSPG19-007 final of 30 January 2019, *Strategic spectrum roadmap towards 5G for Europe: opinion on 5G implementation challenges (RSPG 3rd opinion on 5G)*.

(5) On 12 July 2018, pursuant to Article 4(2) of Decision No 676/2002/EC, the Commission mandated the European Conference of Postal and Telecommunications Administrations (CEPT) to review the harmonised technical conditions for certain EU-harmonised frequency bands, including the 2,6 GHz frequency band, and to develop least restrictive harmonised technical conditions suitable for next-generation (5G) terrestrial wireless systems.

(6) On 5 July 2019 the CEPT issued a report (CEPT report 72) reviewing, inter alia, EU-harmonised technical conditions in the 2,6 GHz frequency band based on the concept of a block edge mask (BEM), in the context of the introduction of next-generation (5G) terrestrial wireless systems in that band. In particular, the report sets out harmonised technical conditions for non-active and active antenna systems (non-AASs and AASs), which are used in systems capable of providing wireless broadband electronic communications services (WBB ECSs) under synchronized and unsynchronised operations. It also provides for the coexistence of AAS and non-AAS WBB ECSs and WBB ECSs based on frequency division duplex (FDD) and time division duplex (TDD) within the band. It also addresses the coexistence of WBB ECSs within the band and other services in the adjacent frequency bands.

(7) CEPT report 72 notes very limited unpaired use (either TDD or Supplemental Downlink, SDL) outside the 2 570–2 620 MHz sub-band, stressing that such use should be subject to further harmonisation and coordinated timing at EU level, due to the risk of interference at national borders. In order to eliminate that risk, the flexibility of unpaired use outside that sub-band, as provided by the EU harmonised channelling arrangement for the 2,6 GHz frequency band, should be avoided. Member States may choose synchronised, semi-synchronised or unsynchronised TDD network operations in the 2 570–2 620 MHz sub-band and ensure an efficient use of spectrum, taking into account Electronic Communications Committee (ECC) reports 296 ([8]) and 308 ([9]) regarding synchronisation.

(8) The conclusions of the CEPT report 72 should be applied across the Union and implemented by the Member States without delay, except in duly justified cases. This will foster the availability and use of the 2,6 GHz frequency band for 5G deployment, while upholding the principles of technology and service neutrality.

(9) The notion of 'designating and making available' the 2,6 GHz frequency band in the context of this Decision refers to the following steps: (i) the adaptation of the national legal framework on frequency allocation to include the intended use of this band under the harmonised technical conditions set in this Decision; (ii) the initiation of all necessary measures in order to ensure coexistence with existing use in this band to the extent necessary; (iii) the initiation of the appropriate measures, supported by the launch of a stakeholder consultation process where appropriate, in order to allow the use of this band in accordance with the applicable legal framework at Union level, including the harmonised technical conditions of this Decision.

(10) Cross-border agreements between Member States and with non-EU countries 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.

(11) Decision 2008/477/EC should therefore be amended accordingly.

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

([8]) ECC Report 296 of 8 March 2019, *National synchronization regulatory framework options in 3 400-3 800 MHz: a toolbox for coexistence of MFCNs in synchronised, unsynchronised and semi-synchronised operation in 3 400-3 800 MHz.*

([9]) ECC Report 308 of 6 March 2020, *Analysis of the suitability and update of the regulatory technical conditions for 5G MFCN and AAS operation in the 2 500-2 690 MHz frequency band.*

HAS ADOPTED THIS DECISION:

Article 1

Decision 2008/477/EC is amended as follows:

(1) in Article 2, paragraphs 1 and 2 are replaced by the following:

‘1. Member States shall designate and make available, on a non-exclusive basis, the 2 500-2 690 MHz frequency band for terrestrial systems capable of providing electronic communications services, in compliance with the parameters set out in the Annex to this Decision.

2. Member States implementing time division duplex or “downlink-only” use outside the 2 570–2 620 MHz sub-band on the date when this Decision takes effect may request a transitional period for the implementation of this Decision, pursuant to Article 4(5) of Decision No 676/2002/EC.’;

(2) the Annex is replaced by the text in the Annex to this Decision;

(3) Article 3 is replaced by the following:

‘*Article 3*

Member States shall report to the Commission on the implementation of this Decision by 30 April 2021.’

Article 2

This Decision is addressed to the Member States.

Done at Brussels, 8 May 2020.

For the Commission
Thierry BRETON
Member of the Commission

ANNEX

'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.

Non-active antenna systems (non-AAS) means a base station and an antenna system that provides one or more antenna connectors, which are connected to one or more separately designed passive antenna elements to radiate radio waves. The amplitude and phase of the signals to the antenna elements is not continually adjusted in response to short term changes in the radio environment.

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.

Equivalent isotropically radiated power (EIRP) means the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain).

Total radiated power (TRP) means 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:

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

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

B. GENERAL PARAMETERS

(1) The assigned block size shall be in multiples of 5,0 MHz;

(2) Within the 2 500–2 690 MHz frequency band, the duplex spacing for Frequency Division Duplex operation shall be 120 MHz with terminal station transmission (uplink) located in the lower part of the band starting at 2 500 MHz and ending at 2 570 MHz, and base station transmission (downlink) located in the upper part of the band starting at 2 620 MHz and ending at 2 690 MHz;

(3) The 2 570–2 620 MHz frequency sub-band shall be used for Time Division Duplex or for base station transmission ("downlink-only"). Any guard band required to ensure compatibility of frequency use at either the 2 570 MHz or the 2 620 MHz boundary shall be decided on a national basis and taken within the 2 570–2 620 MHz frequency sub-band.

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 co-existence between neighbouring networks, in the absence of bilateral or multilateral agreements between operators of such neighbouring networks. Less stringent technical parameters, if agreed among all affected operators of such networks, may also be used provided that these operators continue to comply with the technical conditions applicable for the protection of other services, applications or networks and with obligations resulting from cross-border coordination.

The BEM consists of several elements given in Table 1. The in-block power limit is applied to a block assigned to an operator. The baseline power limit, designed to protect the spectrum of other operators within the 2,6 GHz frequency band, and the transitional region power limit, enabling filter roll-off from the in-block to the baseline power limit, represent out-of-block power elements.

Power limits are provided separately for non-AAS and AAS. For non-AAS, the power limits apply to the mean EIRP. For AAS, the power limits apply to the mean TRP ([1]). The mean EIRP or mean TRP are measured by averaging over a time interval and over a measurement frequency bandwidth. In the time domain, the mean EIRP or mean TRP is averaged over the active portions of signal bursts and corresponds to a single power control setting. In the frequency domain, the mean EIRP or mean TRP is determined over the measurement frequency bandwidth as given in Tables 2–8 below ([2]). In general, and unless stated otherwise, the BEM power limits correspond to the aggregate power radiated by the relevant device including all transmit antennas, except in the case of baseline and transition requirements for non-AAS base stations, which are specified per antenna.

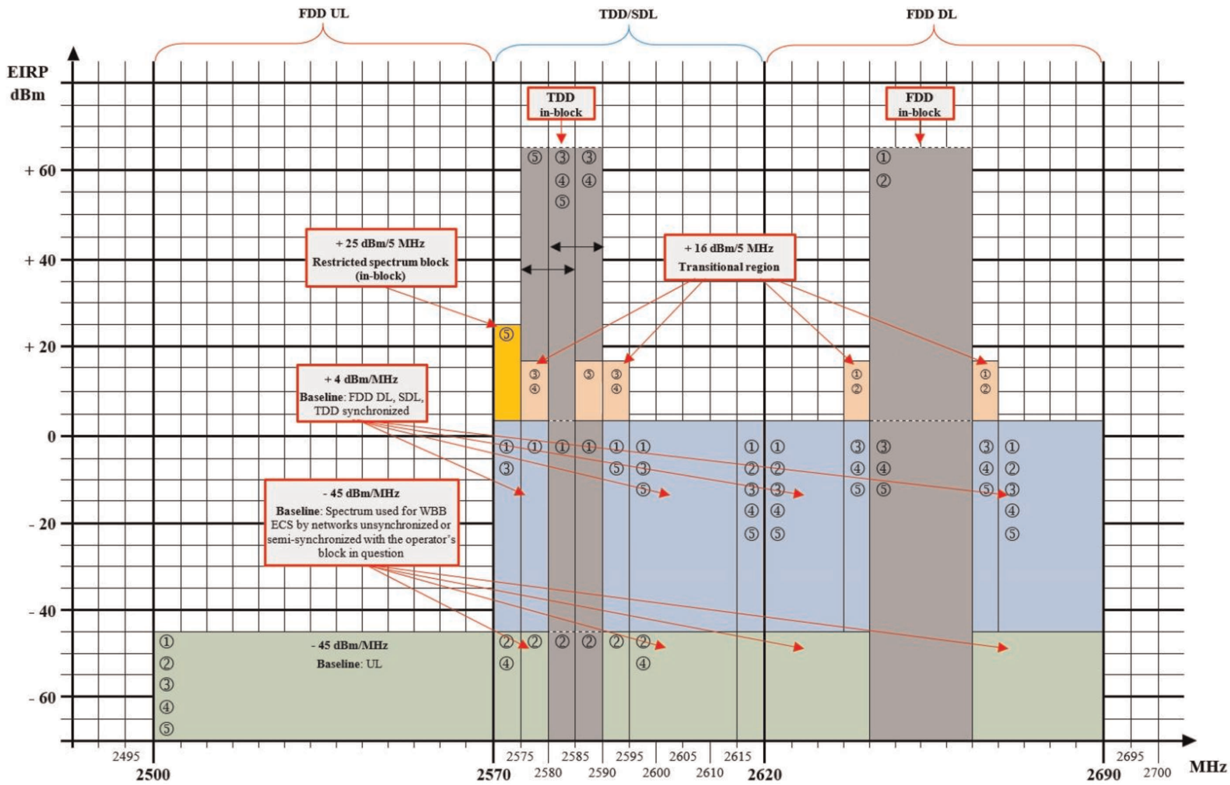
The additional baseline limit for FDD AAS base stations is an out-of-block power limit which may be applied in order to reduce the necessary coordination zone with radio astronomy service (RAS) stations and protect the RAS in the adjacent frequency band 2 690–2 700 MHz in specific geographical areas.

Measures applicable at national level, such as pfd limits, in order to protect the various types of radars operating above 2 700 MHz would remain applicable, noting that it may be more complex for operators to comply with the pfd limit since AAS systems cannot be fitted with additional external filters.

Equipment operating in this band may also make use of EIRP or TRP limits other than those set out below, provided that appropriate mitigation techniques are applied which comply with Directive 2014/53/EU of the European Parliament and of the Council ([3]) and which offer at least an equivalent level of protection to that provided by the essential requirements of that Directive.

([1]) TRP is a measure of how much power the antenna actually radiates. EIRP and TRP are equivalent for isotropic antennas.
([2]) The actual measurement bandwidth of the measurement equipment, used for purposes of compliance testing, may be smaller than the measurement bandwidth provided in those tables.
([3]) Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC (OJ L 153, 22.5.2014, p. 62).

Examples of base station BEM elements and power limits for non-AAS



1. Combined BEM elements for a non-AAS FDD block (i.e. above 2620 MHz) and downlink only operation within 2570-2620 MHz.
2. Combined BEM elements for a non-AAS FDD block with TDD (synchronised/unsynchronised) networks within 2570-2620 MHz.
3. Combined BEM elements for synchronised non-AAS TDD blocks / downlink only blocks.
4. Combined BEM elements for unsynchronised non-AAS TDD blocks.
5. Combined BEM elements for synchronised non-AAS TDD/downlink only blocks and a restricted spectrum block in 2570-2575 MHz.

Explanatory note to the Figure

The applicable BEM limit is always the one immediately above the respective number (i.e. 1 to 5).

Table 1

Definition of BEM elements

BEM Element	Definition
In-block	Refers to a block for which the BEM is derived.
Baseline	Spectrum within 2 500–2 690 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 5,0 MHz below and 0 to 5,0 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 2 500 MHz or above 2 690 MHz.
Additional baseline	Spectrum between 2 690–2 700 MHz.

Coexistence of geographically adjacent networks using also adjacent frequency blocks within the 2,6 GHz frequency band may need specific measures to mitigate radio interference. Typically, a frequency separation of at least 5 MHz should be applied in the case of two adjacent unsynchronised TDD networks or a TDD network adjacent to an FDD network. Such a separation should be implemented by either leaving a 5 MHz block unused as a guard block, or through usage of such a 5 MHz block under more restrictive BEM parameters (restricted spectrum block). Any usage of a 5 MHz guard block would be subject to an increased risk of interference.

To achieve coexistence of adjacent FDD and TDD networks, the restricted spectrum block 2 570–2 575 MHz (except in TDD uplink-only operation in this block) should be introduced for all adjacent configurations of (i) FDD-AAS to TDD-non-AAS; and (ii) FDD-non-AAS to TDD-AAS. Furthermore, the frequency block 2 615–2 620 MHz, which is immediately adjacent to the FDD downlink, may suffer an increased risk of interference due to the emissions from the FDD downlink.

The BEM for a spectrum block, other than a restricted spectrum block, is built up by combining Tables 2, 3 and 4 in such a way that the limit for each frequency is given by the higher value out of the baseline and the in-block power limits.

The BEM for a restricted spectrum block is built up by combining Tables 3 and 5 in such a way that the limit for each frequency is given by the higher value out of the baseline and the in-block power limits.

Furthermore, for base stations with restrictions on antenna placement, i.e. where base station antennas are placed indoors or where the antenna height is below a certain height, a Member State may use alternative BEM power limits on a national basis. In these cases the BEM for a restricted spectrum block for non-AAS may be in line with Table 6, provided that at geographical borders to other Member States, Table 3 applies and that Table 5 remains valid nationwide. For AAS with restrictions on antenna placement, alternative national measures compared to Table 3 or Table 5 may be required on a case-by-case basis.

Table 2

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

BEM element	Non-AAS EIRP limit	AAS TRP limit
In-block	Not obligatory. In case an upper limit is set by a Member State, a value between 61dBm/5MHz and 68 dBm/5 MHz per antenna may be applied.	Not obligatory. In case an upper limit is set by a Member State, a value between 53dBm/5MHz and 60 dBm/5 MHz per cell (*) may be applied.

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

Table 3

Baseline power limit for non-AAS and AAS base stations

BEM element	Frequency range	Non-AAS maximum mean EIRP limit per antenna	AAS maximum mean TRP limit per cell (*)
Baseline	FDD downlink; TDD blocks synchronised with the TDD block under consideration; TDD blocks used for downlink-only (**); The range 2 615–2 620 MHz.	+ 4 dBm/MHz	+ 5 dBm/MHz (***)
	Frequencies in the 2 500–2 690 MHz frequency band not covered by the definition in the row above.	– 45 dBm/MHz	– 52 dBm/MHz

(*) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors.
(**) Introduction of FDD AAS does not impact the downlink-only usage condition for non-AAS/AAS.
(***) When applied for the protection of spectrum used for downlink transmissions, this baseline limit is based on the assumption that the emissions come from a macro base station. It should be noted that small-area wireless access points (small cells) may be deployed at lower heights and thus closer to terminal stations, which can result in higher levels of interference if the above power limits are used.

Explanatory note to Table 3

Both the EIRP and TRP limits are integrated over a bandwidth of 1 MHz.

Table 4

Transitional region power limit for non-AAS and AAS base stations

BEM element	Frequency range	Non-AAS maximum mean EIRP limit per antenna	AAS maximum mean TRP limit per cell (*)
Transitional region	−5,0 to 0 MHz offset from lower block edge, or 0 to + 5,0 MHz offset from upper block edge	+ 16 dBm/5 MHz (**)	+ 16 dBm/5 MHz (**)

(*) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors.
(**) This limit is based on the assumption that the emissions come from a macro base station. It should be noted that small-area wireless access points (small cells) may be deployed at lower heights and thus closer to terminal stations, which can result in higher levels of interference if this power limit is used. For such cases, Member States may establish a lower limit on a national level.

Table 5

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

BEM element	Frequency range	Non-AAS EIRP limit per antenna	AAS TRP limit per cell (*)
In-block	Restricted Block spectrum	+ 25 dBm/5 MHz	+ 22 dBm/5 MHz (**)

(*) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors.
(**) It is noted that in some deployment scenarios this limit may not guarantee interference-free uplink operation in adjacent channels, although this would typically be mitigated by building penetration loss and/or difference in antenna height. Other mitigation methods may also be applied on a national level.

Table 6

Power limits for restricted block for non-AAS base stations with additional restrictions on antenna placement

BEM element	Frequency range	Maximum mean EIRP limit
Baseline	Lower band edge of 2 500 MHz to −5,0 MHz offset from lower block edge, or + 5,0 MHz offset from upper block edge to upper band edge of 2 690 MHz	− 22 dBm/MHz
Transitional region	−5,0 to 0 MHz offset from lower block edge, or 0 to + 5,0 MHz offset from upper block edge	− 6 dBm/5 MHz

Table 7

Additional baseline power limit for FDD AAS base stations with regard to Radio Astronomy Service

BEM element	Frequency range	Case	TRP power limit per cell
Additional baseline	2 690–2 700 MHz	A	+ 3 dBm/10 MHz
		B	Not applicable

Case A: This limit yields a reduced coordination zone with respect to RAS stations.

Case B: For situations where additional baseline is not considered necessary by the concerned Member State (e.g. where there is no nearby RAS station or situation where no coordination zone is required).

Explanatory note to Table 7

These power limits may be applied to reduce the size of the coordination zone with RAS in specific geographical areas. Depending on the size of the necessary coordination zone to protect RAS station(s), cross border coordination may also be necessary. Additional measures may be needed on a national basis in order to protect RAS stations.

D. TECHNICAL CONDITIONS FOR TERMINAL STATIONS

Table 8

In-block power limits for terminal stations

BEM element	Maximum mean EIRP limit (including Automatic Transmitter Power Control range)	Maximum mean TRP limit (including Automatic Transmitter Power Control range)
In-block	+ 35 dBm/5 MHz	+ 31 dBm/5 MHz’

Note: EIRP should be used for fixed or installed terminal stations and the TRP should be used for the mobile or nomadic terminal stations.