ECC Decision (05)05

Harmonised utilization of spectrum for Mobile/Fixed Communications Networks (MFCN) operating within the band 2500-2690 MHz[[1]](#footnote-2)

**Approved 18 March 2005**

**Amended 03 July 2015**

# explanatory memorandum

## INTRODUCTION

On 9 March 2001, the European Commission issued Mandate 4[[2]](#footnote-3) calling upon CEPT to undertake preliminary investigations and to adopt the measures necessary to ensure the availability in the community of harmonised frequency bands, within the additional spectrum bands identified by WRC-2000 for the provision of terrestrial and satellite IMT-2000 services. In response to this mandate the ECC adopted ECC Decision (02)06 [7], which decided:

* to designate the 2500 to 2690 MHz band to IMT-2000/UMTS systems;
* that the 2500 to 2690 MHz band should be made available for use by IMT-2000/UMTS systems by 1 January 2008, subject to market demand and national licensing schemes;
* to designate the 2520 to 2670 MHz band for use by terrestrial IMT-2000/UMTS systems; and
* that the detailed spectrum arrangements for the 2500 to 2690 MHz band, as well as the utilisation of the bands 2500 to 2520 MHz / 2670 to 2690 MHz, should be decided in an additional ECC Decision by the end of 2004.

This resulted in the development of ECC Decision (05)05. With the 2015 revision of ECC Decision (05)05, CEPT has decided to withdraw ECC Decision (02)06 since all relevant aspects of an MFCN usage of the 2500-2690 MHz band have now been included into the revised ECC Decision (05)05 so that ECC Decision (02)06 was no longer needed as a separate ECC Decision.

Following CEPT’s response to Mandate 4, the European Commission issued Mandate 5[[3]](#footnote-4) in August 2003. This mandate requires CEPT to develop and adopt the measures necessary to ensure a harmonised and efficient use of the frequency band 2500-2690 MHz for IMT-2000/UMTS. Specifically CEPT is mandated to develop channelling arrangements for the band 2500-2690 MHz taking into account and commenting on at least the following issues;

* Availability of the bands 2500-2520 / 2670-2690 MHz for the use by the IMT-2000 satellite component and/or terrestrial component;
* The impact of BSS sound at 2605-2655 MHz (and possibly other services in the band 2500-2690 MHz) on IMT-2000/UMTS services;
* The impact of technological advances such as variable duplex spacing or other developments that may facilitate flexible channelling arrangements as well as technology neutrality, noting that these technologies must be commercially available by 2008;
* The desirability to take utmost account of making regulation technologically neutral, and
* Efficient and harmonised use of spectrum.

On 5 July 2006, the European Commission issued a Mandate to CEPT to develop least restrictive technical conditions for frequency bands addressed in the context of WAPECS (Wireless Access Policy for Electronic Communications Services). In response to this mandate the ECC adopted CEPT Report 19 [2] which contains the least restrictive technical conditions (e.g. a Block-Edge Mask (BEM)) for the 2500-2690 MHz band amongst other bands.

In 2015, the ECC Decision (02)06 [7] of 15 November 2002 related to the designation of frequency band 2500-2690 MHz for UMTS/IMT-2000 was reviewed and it was concluded that this Decision was suitable for withdrawal as the content of this decision has been incorporated into the revision of ECC Decision (05)05 which now contains both the designation of and channelling arrangements for the band 2500-2690 MHz and covers mobile/fixed communications networks (MFCN) in a technology neutral way. The bands 2500-2600 MHz have been used widely in Europe for IMT-2000 networks deploying LTE technology.

Based on a Mandate granted to CEPT by the European Commission, ECC conducted in 2018 a review of this ECC Decision and, based on this assessment, updated the harmonised technical conditions (LRTC) suitable for LTE AAS and 5G (New Radio (NR) including Active Antenna Systems (AAS)).ECC also developed the response to this Mandate in CEPT Report 72.

## BACKGROUND

The CEPT has recognised the importance of the European-wide harmonised availability of MFCN services to the citizens of Europe.

The first IMT-2000/UMTS systems have been introduced within Europe utilising the frequency bands identified for IMT-2000 at the WARC-92 in RR 5.388 and in accordance with the ERC Decision (97)07 [3], ERC Decision (99)25 [4] and ERC Decision (00)01 [5] and ERC Recommendation (02)10 [6].

In 1998, the European Community adopted a Decision, to facilitate the rapid and coordinated introduction of compatible UMTS networks and services, Commission Decision 128/1999/EC [8], the ‘UMTS Decision’. This Decision defined UMTS and described the characteristics which UMTS is to be capable of supporting. It instructed the Commission to give Mandates to CEPT to harmonise frequency use, and to take measures, where appropriate in cooperation with ETSI, to promote a common and open standard for the provision of compatible UMTS services throughout Europe.

The latest of these mandates was issued on 5 July 2006 to develop least restrictive technical conditions for frequency bands addressed in the context of WAPECS (Wireless Access Policy for Electronic Communications Services). In response to this mandate the ECC adopted CEPT Report 19 [2] which contains the least restrictive technical conditions (LRTC), e.g. a BEM, for the 2500-2690 MHz band amongst other bands.

Initially two separate ECC Decisions addressed the band 2500-2690 MHz for UMTS/IMT-2000. ECC Decision (02)06 [7] designated the band for UMTS/IMT-2000 whilst ECC Decision (05)05 provided the channelling arrangements for UMTS/IMT-2000.

During the revision process of ECC Decision (05)05 carried out in 2015 care was taken to make it technology neutral by designating it for MFCN instead of UMTS/IMT-2000. As a consequence, this Decision, revising ECC Decision (05)05, also covers the designation of the 2500-2690 MHz band for MFCN.

The current revision of this ECC Decision aims to reflect the development of MFCN technologies, in particular the introduction of Active Antenna Systems (AAS). The analysis done in ECC confirmed the current band plan and LRTC remain applicable for non-AAS-. New BEM have been developed for AAS systems.

1. [Review the sentence above about “confirmed current band plan” after public consultation as comments will be invited on the implementation of Alternative 2 (SDL) to assess whether this Alternative is still needed.]

The changes that have been introduced concern the base station block edge mask (BEM), and consists of an alternative BEM for AAS based on Total Radiated Power (TRP) instead of e.i.r.p..

The ECC analysis concluded on improvements to the current harmonised spectrum scheme (Annex 1). The BEM as contained in the previous revision (Annex 2) remains applicable for non-AAS and a new BEM was developed for AAS (Annex 2).

When considering the introduction of 5G AAS in 2.6GHz, there is a need to ensure coexistence with MFCN non AAS already in operation in order to ensure coexistence between intra MFCN networks operating in this band. The timing migration towards 5G AAS in this band is not subject of this regulatory framework.

## REQUIREMENT FOR AN ECC DECISION

The ECC recognises that a harmonised implementation of MFCN in the band 2500-2690 MHz will be of greatest benefit to operators, manufacturers and end users and will promote the continued development of MFCN services across Europe.

The ECC recognises that for MFCN services to continue to be developed successfully and in accordance with the global IMT definitions, manufacturers and operators must be given the confidence to make the necessary investment. The ECC believes that the continued development of MFCN services will be facilitated by harmonised use of IMT spectrum across the CEPT, and a commitment by CEPT member countries to implement this Decision will provide a clear indication that additional paired and unpaired frequency bands, necessary for the future successful development of MFCN services of will be made available in a timely manner, subject to market demand, and on a Europe-wide basis.

The ECC recognises that harmonised use of the frequency band 2500-2690 MHz must ensure that spectrum is available for AAS and non AAS MFCN systems while allowing administrations to respond to market demand. The least restrictive technical condition for AAS will complement the band plan to be used by MFCN systems in that band. This ECC Decision provides a harmonised band plan including 2x70 MHz for FDD and 50 MHz for TDD and SDL modes.

1. [Review the sentence above about “confirmed current band plan” after public consultation as comments will be invited on the implementation of Alternative 2 (SDL) to assess whether this Alternative is still needed.]

Compared to no-AAS systems, an additional BEM has been developed at 2690 MHz. As it has been mentioned in previous reports (see CEPT report 67 for example) as AAS systems cannot be fitted with additional external filters, TRP limits in OOB domain of AAS base stations 17dB higher than the OOB limits of non-AAS base stations (based on a single antenna connector) would result in a significant increase of restriction in 5G AAS BS deployment, in order to maintain the protection of radio astronomy sites. Therefore, there is a need for an additional BEM from 2690 MHz to 2700 MHz.

It is noted that the spurious domain for the base station in this frequency band starts 10 MHz from the band edge and that the corresponding limits are defined in current ERC Recommendation 74-01 [16] (i.e. -30 dBm/MHz, which was assumed in the analysis). Measures applicable at national level, such as pfd limits in order to protect the various types of radars 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.

# ECC Decision of 18 march 2005 on the harmonised utilisation of spectrum for Mobile/Fixed Communications Networks (MFCN) operating within the band 2500-2690 MHz (ECC/DEC/(05)05), amended 3 July 2015 and AMENDED on DD Month 2019

“The European Conference of Postal and Telecommunications Administrations,

*considering*

1. that MFCN for the purpose of this Decision includes IMT and other communications networks in the mobile and fixed services;
2. that IMT covers IMT-2000, IMT-Advanced and IMT-2020, as defined in Resolution ITU-R 56 [11] (Naming for International Mobile Telecommunications);
3. that detailed specifications of IMT radio interfaces are described in Recommendation ITU-R M.1457 [10] for IMT-2000 and Recommendation ITU-R M.2012 [9] for IMT-Advanced;
4. that WRC-2000 identified additional frequency bands for IMT-2000 in RR 5.384A of the Radio Regulations applying to the Mobile Service together with Resolutions 223 [12] and 225[14] and in RR 5.317A together with Resolution 224 [13];
5. that WRC-07 revised these identifications to cover IMT as described in considering b) above;
6. that there is a need to facilitate the interoperability of MFCN throughout Europe and to ensure a coexistence between AAS and non-AAS MFCN in 2.6 GHz;
7. that MFCN spectrum may be used for Supplemental DownLink (SDL), i.e. downlink without paired uplink spectrum;
8. to be reviewed after the public consultation
9. that the band 2500-2690 MHz is currently used for MFCN in most CEPT member countries;
10. that there will be differences in the demand for MFCN spectrum and there are different licensing schemes across Europe which could lead to an offset in timescales concerning the use of the band 2500-2690 MHz for MFCN;
11. that there is on-going work in ITU-R to define IMT-2020;
12. that ETSI has specified New Radio (NR) including Active Antenna Systems (AAS) and also specified AAS support for LTE;
13. [Check status of ETSI work after public consultation]
14. that the deployment of AAS will enhance the capacity and bit rates;
15. that AAS MFCN systems should not claim more protection than provided to non-AAS MFCN systems;
16. that AAS in the 2600 MHz frequency band only applies to base stations;
17. that CEPT supports the development by ITU-R of globally harmonised frequency arrangements for the bands identified for IMT;
18. that ECC Report 45 addresses sharing and adjacent band compatibility studies between IMT-2000/UMTS in the band 2500-2690 MHz and other services;
19. that CEPT Report 19 [2] contains least restrictive technical conditions in the context of WAPECS (Wireless Access Policy for Electronic Communications Services) for the frequency band 2500-2690 MHz amongst other bands;
20. that co-ordination may be required on a national and/or bilateral basis to protect the radio astronomy service (see RR 4.6, RR 5.30, RR 5.149, RR 5.340)
21. An additional baseline reduces the size of the coordination zones with radio astronomy. However, additional measures may be needed on a national basis in order to protect the RAS. Depending on the size of the necessary coordination zone to protect RAS cross border co-ordination may be necessary.
22. Additional baseline is not applicable in areas outside coordination zones with RAS or situations where additional baseline is not seen necessary by the concerned administration.
23. National measures may include coordination distances or compliance with the maximum pfd level at the radio astronomy sites or other mitigation techniques.
24. that to facilitate global roaming it is important to have harmonised spectrum, licensing and circulation arrangements for the use of IMT terminals;
25. that measures are necessary to ensure a harmonised and efficient use of the frequency band 2500-2690 MHz for MFCN;
26. that flexibility should be afforded to administrations to determine, at a national level, the availability of the 2500-2690 MHz band for MFCN in order to meet their specific deployment of existing systems, based on market demand and other national considerations;
27. that data traffic over public mobile broadband networks is predicted to increase over the coming years with an evolution towards asymmetrical traffic due to mobile multimedia usage which may lead to an increasing demand for downlink capacity which could be addressed by MFCN Supplemental downlink (SDL);
28. that the existing ECC Decision ECC Decision (02)06 is no longer required and suitable at CEPT level;
29. that this ECC Decision, updating the previous version of ECC Decision (05)05 which entered into force at 18 March 2005, caters for the latest developments at a technical and regulatory level in order provide relevant conditions for the development of 5G and AAS systems in that band;
30. that in case of non-AAS and AAS TDD networks in the same geographical area, it is beneficial to synchronise them (avoiding simultaneous uplink and downlink transmissions) to improve the efficient usage of spectrum by avoiding restricted blocks/guard bands between their networks and custom operator-specific filters on their non-AAS equipment as described in ECC Report 216; this approach is not feasible for AAS equipment
31. that in case of AAS and non-AAS TDD networks, in some situations, special measures from the administration may be needed to ensure whole-band inter-operator synchronisation, such as defining a default time reference, default UL/DL ratio, and scope of those measures (e.g. small cells may be excluded from those constraints);
32. in the case of unsynchronised AAS and non-AAS TDD networks and adjacent TDD and FDD UL blocks, the compliance of two adjacent operators with the BEM requirements may be achieved by introducing frequency separation (e.g. through the authorisation process at national level) between the block edges of both operators. Another option may be for CEPT administrations to introduce restricted spectrum block. Operators would then be required to limit the power used in the upper or lower part of their assigned spectrum, to limit the interference due to the selectivity of the adjacent operator’s receiver.
33. that wider channel bandwidths such as 10, 20, 40 MHz and higher could be accommodated thereby enabling higher data rates;
34. mobile network operators could enter into bilateral or multilateral agreements to develop less stringent technical parameters
35. Base Station operating in this band may also make use of equivalent isotropically radiated power (e.i.r.p.) limits other than those set out in Annex 2 provided that appropriate mitigation techniques are applied which comply with RE Directive and which offer at least an equivalent level of protection to that provided by these technical parameters.
36. the spurious emission domain for the base station starts 10 MHz from the band edge and the spurious emissions limits shall follow current ERC Recommendation 74-01 levels (i.e. -30 dBm/MHz) [16]
37. that in EU/EFTA countries the radio equipment that is under the scope of this Decision shall comply with the Radio Equipment Directive (2014/53/EU). Conformity with the essential requirements of this E Directive may be demonstrated by compliance with the applicable harmonised European standard(s) or by using the other conformity assessment procedures set out in the Directive;
38. Non-AAS (non-active antenna systems) refers to MFCN base stations that provide one or more antenna connectors, which are connected to one or more separately designed passive antenna elements to radiate radio waves.
39. AAS (active antenna systems) refers to MFCN base stations and antenna systems where the amplitude and/or phase of the signals from the various antenna elements is continually adjusted resulting in an antenna pattern that varies in response to short term changes in the radio environment. This is intended to exclude long term beam shaping such as fixed electrical down tilt.

*DECIDES*

1. that CEPT administrations shall designate the frequency band 2500-2690 MHz to mobile/fixed communications networks (MFCN);
2. that administrations shall make provisions to allow for the harmonised utilisation of spectrum in the frequency band 2500-2690 MHz for MFCN, as identified in ANNEX 1 to this Decision;
3. that the LRTC to be applied to the MFCN frequency arrangement are specified in Annex 2;
4. that the frequency band in decides 1 is available for MFCN systems, subject to market demand and national licensing schemes;
5. to withdraw the ECC Decision ECC Decision (02)06 of 15 November 2002 related to the designation of frequency band 2500-2690 MHz for UMTS/IMT-2000;
6. that this Decision shall enter into force at xxx 2019;
7. that CEPT **administrations shall** communicate the national measures implementing this Decision to the ECC Chairman and the Office when the Decision is nationally implemented.”

*Note:*

*Please check the Office documentation database https://www.ecodocdb.dk for the up to date position on the implementation of this and other ECC Decisions.*

1. HARMONISED SPECTRUM SCHEME FOR MFCN IN THE BAND 2500-2690 MHz
2. The frequency band 2500-2570 MHz is paired with 2620-2690 MHz for FDD operation with the mobile transmit within the lower band and base station transmit within the upper band;
3. Administrations may assign the frequency band 2570-2620 MHz either for TDD or for Supplemental Downlink. Any guard bands required to ensure adjacent band compatibility at 2570 MHz and 2620 MHz boundaries will be decided on a national basis and taken within the band 2570-2620 MHz;
4. Assigned blocks shall be in multiple of 5.0 MHz;
5. The MFCN channelling arrangements blocks in the band 2500-2690 MHz are depicted in Figure 1.

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| 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 |

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| UL01 | UL02 | UL03 | UL04 | UL05 | UL06 | UL07 | UL08 | UL09 | UL10 | UL11 | UL 12 | UL13 | UL14 | Alternative 1: TDD blocks\*Alternative 2: Supplemental Downlink blocks\* | DL01 | DL02 | DL03 | DL04 | DL05 | DL06 | DL07 | DL08 | DL09 | DL10 | DL11 | DL12 | DL13 | DL14 |
| FDD Uplink Blocks  | FDD Downlink Blocks |

\*Any guard bands required to ensure adjacent band compatibility at 2570 MHz and 2620 MHz boundaries will be decided on a national basis and taken within the band 2570-2620 MHz.

1. MFCN channelling arrangements blocks in the band 2500-2690 MHz
2. Least restrictive technical conditions for mfcn in the frequency band 2500-2690 mhz

The following technical parameters called Block Edge Mask (BEM) shall be applied as an essential component of conditions necessary to ensure coexistence in the absence of bilateral or multilateral agreements between neighbouring networks, without precluding less stringent technical parameters if agreed among the operators of such networks.

The technical conditions presented in this Annex are in the form of Block Edge Masks (BEMs) based on CEPT Report 19 [2] for non-AAS systems, complemented by a BEM for AAS systems. BEMs are related to spectrum licensing and the avoidance of interference between users of spectrum.

For AAS MFCN base stations, the BEM is expressed in terms of Total Radiated Power (TRP). TRP is defined as the integral of the power transmitted in different directions over the entire radiation sphere. TRP is equal to the total conducted power input into the antenna array system less any losses in the antenna array system.

Those BEM ensures a coexistence intra- FDD or TDD MFCN either non-AAS or AAS systems.

1. **MFCN BS BEM elements**

|  |  |
| --- | --- |
| BEM Element | Definition |
| In-block | Block for which the BEM is derived. |
| Baseline | Spectrum used for TDD and FDD UL, DL and SDL, except from the operator block in question and corresponding transitional regions |
| Transitional region | For FDD DL blocks, the transitional region applies 0 to 5 MHz below and above the block assigned to the operator. For TDD blocks, the transitional region applies 0 to 5 MHz below and above the block assigned to the operator. Transitional regions do not apply to TDD blocks allocated to other operators, unless networks are synchronised. The transitional regions do not apply below 2570MHz or above 2690 MHz. |
| Guard bands  | Any guard bands required to ensure adjacent band compatibility at 2570 MHz and 2620 MHz boundaries will be decided on a national basis and taken within the band 2570-2620 MHz. |
| Additional baseline | From 2690 MHz to 2700 MHz to address the coordination with radio astronomy service (RAS), where necessary |

CEPT administrations should ensure that network operators are free to enter into bilateral or multilateral agreements to develop less stringent technical parameters and, if agreed among all affected parties, these less stringent technical parameters may be used.

Equipment operating in this band may also make use of equivalent isotropically radiated power (e.i.r.p.) limits for non-AAS or TRP for AAS other than those set out below provided that appropriate mitigation techniques are applied which comply with RE Directive and which offer at least an equivalent level of protection to that provided by these technical parameters.

In general, and unless stated otherwise, the BEM levels correspond to the power radiated by the relevant device irrespective of the number of transmit antennas, except for the case of non-AAS MFCN base station transition requirements which are specified per antenna. For AAS MFCN base stations, the BEM is expressed in terms of Total Radiated Power (TRP). TRP is defined as the integral of the power transmitted in different directions over the entire radiation sphere. TRP is equal to the total conducted power input into the antenna array system less any losses in the antenna array system.

In the case of unsynchronized TDD networks and adjacent TDD and FDD UL blocks, the compliance of two adjacent operators with the BEM requirements may be achieved by introducing frequency separation (e.g. through the authorisation process at national level) between the block edges of both operators.

Another option may be for CEPT administrations to introduce restricted spectrum block. Operators would then be required to limit the power used in the upper or lower part of their assigned spectrum, to limit the interference due to the selectivity of the adjacent operator’s receiver.

It should also be noted that a 5 MHz TDD block (2615-2620 MHz) immediately adjacent to a FDD DL block may suffer an increased risk of interference due to the emissions from the FDD DL. This may however for instance be mitigated by a TDD BS receiver antenna with lower gain or by placing the TDD BS receiver antenna at lower height. Administrations should also be aware of the above and therefore treat it appropriately when they award spectrum.

In the case of downlink only operation in the 2615-2620 MHz that is adjacent to FDD downlink there is no reason to treat it differently from the remaining blocks in 2570-2615 MHz..

Where small cells have specifically been considered within this annex, these include various cell types including in-building cells (that may typically operate at up to 20 dBm eirp in residential scenarios and up to 24 dBm e.i.r.p. in enterprises) and outdoor cells that may typically operate at up to 40 dBm e.i.r.p.

* 1. UNRESTRICTED BEM FOR BASE STATIONS

The BEM for an unrestricted spectrum block is built up by combining Tables 3 and 4 for non-AAS and Tables 5 and 6 for AAS in such a way that the limit for each frequency is given by the higher value out of the baseline requirements and the block specific requirements.

1. **BS In-block non-AAS and AAS power limit**

|  |  |  |  |
| --- | --- | --- | --- |
| BEM element | Frequency range | Non-AAS e.i.r.p limit dBm/(5 MHz) | AAS TRP power limitdBm/(5 MHz) |
| In-block | Block assigned to the operator | Not obligatory.In case an upper bound is desired by an administration, a value of 65 dBm/5 MHz per antenna may be applied. | Not obligatory.In case an upper bound is desired by an administration, a value of 57 dBm/(5 MHz) per cell (1) may be applied. |
| Note: For locations where coordination procedure with adjacent services applies an upper bound on output power can be set by administrations(1) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors. |

1. **BS Baseline requirement for non-AAS**

|  |  |  |
| --- | --- | --- |
| BEM element | Frequency range | Maximum mean e.i.r.p |
| Baseline  | FDD DL blocks (including SDL blocks), TDD blocks synchronised with the interfering TDD block (2), or used for downlink only operation. It further applies to 2615-2620 MHz.  | +4 dBm/ MHz (1) |
| Baseline  | Frequencies in the band 2500-2690 MHz not covered by the definition in the row above.  | -45 dBm/ MHz |
| (1) the BS baseline BEM elements calculated for protection of spectrum used for downlink transmissions is based on the assumption that the emissions come from a Macro BS. It should be noted that small cells may be deployed at lower heights and thus closer to UEs which can result in higher levels of interference if the above power limits are used.  (2) Synchronised operation in the context of this Decision means operation of TDD in two different systems, where no simultaneous UL reception and DL transmissions occurs. |

1. BS Transitional region power limits for non-AAS

|  |  |  |
| --- | --- | --- |
| BEM element | Frequency range | Maximum mean e.i.r.p |
| Transitional region | -5 to 0 MHz offset from lower block edge  |  +16 dBm/ 5 MHz (1)  |
| Transitional region | 0 to 5 MHz offset from upper block edge |  +16 dBm/ 5 MHz (1)  |
| (1) In table 4, the BS transitional region BEM elements are based on the assumption that the emissions come from a Macro BS. It should be noted that small cells may be deployed at lower heights and thus closer to UEs which can result in higher levels of interference if the above power limits are used. For such cases, administrations could establish lower maximum mean e.i.r.p on a national level. |

1. BS Baseline requirement for AAS

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| --- | --- | --- |
| BEM element | Frequency range | AAS TRP power limitper cell(3) |
| Baseline | FDD DL blocks (including SDL blocks), TDD blocks synchronised with the interfering TDD block(2), or used for downlink only operation(4). It further applies to 2615-2620 MHz  | +5 dBm/MHz (1) |
| Baseline | Frequencies in the band 2500-2690 MHz not covered by the definition in the row above. | -52 dBm/MHz |
| (1) the BS baseline BEM elements calculated for protection of spectrum used for downlink transmissions is based on the assumption that the emissions come from a Macro BS. It should be noted that small cells may be deployed at lower heights and thus closer to UEs which can result in higher levels of interference if the above power limits are used.(2) Synchronised operation in the context of this Decision means operation of TDD in two different systems, where no simultaneous UL reception and DL transmissions occurs. (3) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors.(4) Introduction of FDD AAS does not impact the SDL usage condition for non-AAS/AAS |

1. BS Transitional region power limits for AAS

|  |  |  |
| --- | --- | --- |
| BEM element | Frequency range | AAS TRP power limitper cell (2) |
| Transitional region | -5 to 0 MHz offset from lower block edge (1) | +16 dBm/ 5 MHz |
| Transitional region | 0 to 5 MHz offset from upper block edge (1) | +16 dBm/ 5 MHz |
| (1) In Table 6, the BS transitional region BEM elements are based on the assumption that the emissions come from a Macro BS. It should be noted that small cells may be deployed at lower heights and thus closer to UEs which can result in higher levels of interference if the above power limits are used. For such cases, administrations could establish lower maximum mean TRP on a national level.(2) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors. |

* 1. RESTRICTED BEM FOR BASE STATIONS

The BEM for a restricted spectrum block is built up by combining Tables 3 and 7 (non-AAS/e.i.r.p.) and Table 5 and 7 (AAS/TRP) in such a way that the limit for each frequency is given by the higher value out of the baseline requirements and the block specific requirements.

The restricted blocks are 2570-2575 MHz (except in UL mode operation in that block) and any 5 MHz block between unsynchronised TDD networks. This is applicable for all configurations of FDD AAS adjacent to TDD non-AAS and FDD non AAS adjacent to TDD AAS.

1. BS In-block power limit for restricted spectrum blocks for non-AAS and AAS

|  |  |  |  |
| --- | --- | --- | --- |
| BEM element | Frequency range | Non-AAS e.i.r.p limit dBm/5 MHz | AAS TRP power limitdBm/(5 MHz) per cell(2) |
| In-block | Restricted Block spectrum | + 25 dBm/5 MHz (1) | + 22 dBm/5 MHz(1) |
| (1) It is noted that in some deployment scenarios this in-block power limit may not guarantee interference free UL 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. (2) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors. |

* 1. RESTRICTED BEM FOR BASE STATIONS WITH RESTRICTIONS ON ANTENNA PLACEMENT

In cases where antennas are placed indoors or where the antenna height is below a certain height, a CEPT administration may use alternative parameters in line with Table 8 for non-AAS, provided that at geographical borders to other countries Table 3 applies and that Table 7 remains valid nationwide.

For Indoor AAS BSs or AAS BS with restrictions on antenna placement, alternative measures compared to Table 5 or Table 7 may be required on a case by case basis and on a national basis.

It should be noted that restricted power use along with additional restrictions on the placement of antennas (such as being indoor or under a certain height) is applicable even if the channel bandwidth of the restricted power use is more than 5MHz.

1. BS BEM for restricted spectrum blocks with restrictions on antenna placement for non-AAS

|  |  |  |
| --- | --- | --- |
| BEM element | Frequency range | Maximum mean e.i.r.p |
| Baseline  | Start of the band (2500 MHz) to -5 MHz (lower edge) | -22 dBm/MHz  |
| Transitional region | -5 to 0 MHz offset from lower block edge  |  -6 dBm/ 5MHz  |
| Transitional region | 0 to 5 MHz offset from upper block edge |  -6 dBm/ 5 MHz  |
| Baseline | +5 MHz (upper edge) to end of band (2690 MHz) | -22 dBm/MHz |

* 1. LIMITS aT 2690 MHZ for FDD AAS base STATION

Additional baseline to be applied above 2690 MHz for AAS BS in specific areas with regard to RAS usage are provided in Table below.

1. Additional baseline to be applied above 2690 MHz for AAS BS in areas where necessary to ease the coordination with RAS

| **BEM element** | **Frequency range** | **AAS TRP power limitper cell** |
| --- | --- | --- |
| Additional Baseline | 2690-2700 MHz | 0 dBm/10MHz(1) |
| Additional Baseline | 2690-2700 MHz | Not applicable(2) |
| (1) This additional baseline reduces the size of the coordination zone (3). However, additional measures may be needed on a national basis in order to protect the RAS. Depending on the size of the necessary coordination zone to protect RAS cross border co-ordination may be necessary.(2) In areas outside coordination zones (3) with RAS or situations where additional baseline is not seen necessary by the concerned administration.(3) National measures may include coordination distances or compliance with the maximum pfd level at the radio astronomy sites. |

Measures applicable at national level, such as (pfd limits) in order to protect the various types of radars 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.

* 1. LIMITS FOR TERMINAL STATIONS
1. In-block power limits for terminal stations

| **BEM element** |  | **Maximum mean power**(including Automatic Transmitter Power Control (ATPC) range**)** |
| --- | --- | --- |
| In-block  | Total radiated power (TRP) | 31 dBm/5 MHz |
| In-block  | e.i.r.p. | 35 dBm/5 MHz |
| NB: e.i.r.p. should be used for fixed or installed terminal stations and the TRP should be used for the mobile or nomadic terminal stations. 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. |

* 1. Examples of Combining BEM elements

The BEM elements as described above are combined to provide a BEM for a particular block. Figures 2 to 5 provide examples of such combinations of BEM elements for TDD and FDD.

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1. Combined BEM elements for an FDD block above 2620 MHz
with downlink only operation within 2570-2620 MHz for non-AAS



1. Combined BEM elements for an FDD block with TDD
(synchronised/unsynchronised) networks within 2570-2620 MHz for non-AAS



1. Combined BEM elements for synchronised TDD blocks / downlink only blocks for non-AAS

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1. Combined BEM elements for Unsynchronised TDD blocks for non-AAS

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1. Combined BEM elements for synchronised TDD/downlink only blocks and
a restricted spectrum block in 2570-2575 MHz for non-AAS

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1. Combined BEM elements for an FDD block above 2620 MHz
with downlink only operation within 2570-2620 MHz for AAS



1. Combined BEM elements for an FDD block with TDD
(synchronised / unsynchronised) networks within 2570-2620 MHz for AAS



1. Combined BEM elements for synchronised TDD blocks/downlink only blocks for AAS

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1. Combined BEM elements for Unsynchronised TDD blocks for AAS



1. Combined BEM elements for synchronised TDD/downlink only blocks and a restricted spectrum block in 2570-2575 MHzfor AAS
	1. Other conditions

The spurious emission domain for the base station in this frequency band starts 10 MHz from the band edge and the corresponding limits are defined in current ERC Recommendation 74-01 (i.e. -30 dBm/MHz) [16].

In addition, that MFCN networks making use of AAS systems shall not be granted more protection from systems in adjacent and neighbouring bands than experienced with non-AAS systems.

1. List of referenceS

This annex contains the list of relevant reference documents.

1. Commission Decision 2008/477/EC on the harmonisation of the 2500-2690 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community
2. CEPT Report 19: Report from CEPT to the European Commission in response to
EC Mandate to develop least restrictive technical conditions for frequency bands addressed in the context of WAPECS
3. ERC Decision (97)07: “The frequency bands for the introduction of the Universal Mobile Telecommunications System (UMTS)”
4. ERC Decision (99)25:”The harmonised utilisation of spectrum for terrestrial Universal Mobile Telecommunications System (UMTS) operating within the bands 1900 - 1980 MHz, 2010 - 2025 MHz and 2110 - 2170 MHz”
5. ERC Decision (00)01:The frequency bands for the introduction of terrestrial Universal Mobile Telecommunications System (UMTS)”
6. ERC Recommendation (02)10: “Harmonised utilisation of spectrum for 1.28Mcps UTRA TDD option in connection with ERC/DEC/(99)25”
7. ECC/DEC/(02)06: “The designation of frequency band 2500-2690 MHz for UMTS/IMT-2000”
8. Commission Decision 128/1999/EC on the coordinated introduction of a third-generation mobile and wireless communications system (UMTS) in the Community
9. Recommendation ITU-R M.2012: “Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications Advanced (IMT-Advanced)”
10. Recommendation ITU-R M.1457: “Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2000 (IMT-2000)”
11. Resolution ITU-R 56: “Naming for International Mobile Telecommunications”
12. Resolution ITU-R 223: “Additional bands identified for IMT-2000”
13. Resolution ITU-R 224: “Compatibility studies in relation to Resolution 224 in the bands 698-806 MHz and 790-862 MHz”
14. Resolution ITU-R 225: “Use of additional frequency bands for the satellite component of IMT”
15. ERC Recommendation 74-01: Unwanted emissions in the spurious domain, amended January 2011
1. Comparable technical specifications to those given in this ECC Decision are given in Commission Decision 2008/477/EC of 13 June 2008 [1]. EU/EFTA Member States and, if so approved by the EEA Joint Committee, Iceland, Liechtenstein and Norway are obliged to implement the EC Decision. [↑](#footnote-ref-2)
2. Mandate to CEPT to harmonise frequency usage in order to facilitate a co-ordinated implementation in the Community of third generation mobile and wireless communication systems operating in additional frequency bands as identified by WRC-2000 for IMT-2000 systems, 9 March 2001. [↑](#footnote-ref-3)
3. Mandate to CEPT to harmonise the frequency usage within the additional frequency band of 2500-2690 MHz to be made available for IMT-2000/UMTS systems in Europe (Mandate 5), August 2003. [↑](#footnote-ref-4)