

# ECC Decision (11)06

Harmonised frequency arrangements and least restrictive technical conditions (LRTC) for mobile/fixed communications networks (MFCN) operating in the band 3400-3800 MHz

**Approved 09 December 2011**

**Amended 26 October 2018**

## EXPLANATORY MEMORANDUM

### 1 INTRODUCTION

The harmonised frequency arrangements for the 3400-3800 MHz band in this ECC Decision are intended to facilitate high data rate mobile/fixed communications networks (MFCN) including International Mobile Telecommunications (IMT) services supported by larger channel bandwidths as an evolution to the existing framework without the consequential requirement for a replacement of systems based on the existing regulatory framework by allowing the continued use of systems previously harmonised in the context of IMT/BWA. It aims at providing the basis to the mobile industry and administrations to respond to the growth of mobile broadband and technological developments for wider channel bandwidths and increased data rates.

In the future, it is foreseen that new demands, such as a higher traffic volume, more numerous devices with diverse service requirements, better quality of user experience (QoE) and better affordability by further reducing costs, will result in an increasing requirement on spectrum availability.

Since WRC-07, the 3400-3600 MHz band has been allocated on a co-primary basis to the mobile, except aeronautical mobile, service and identified for IMT according to the ECA. The frequency band 3600-3800 MHz has been allocated to the mobile service in Region 1 on a co-primary basis in the European Common Allocations (ECA) Table and on a secondary basis in the Radio Regulations and is not identified for IMT.

The term IMT covers IMT-2000, IMT-Advanced, and IMT-2020 systems. Recommendation ITU-R M.1036 on frequency arrangements for implementation of the terrestrial component of IMT [1] has been revised to include, among others, the arrangement(s) for the 3400-3600 MHz band.

The process of developing IMT-2020 is ongoing in ITU-R, in cooperation with standardisation organisations. Recommendation ITU-R M.2083 [2] addresses the objectives of the future development of IMT for 2020 and beyond, which includes further enhancements of existing IMT and the development of IMT-2020.

In its first opinion on 5G, the Radio Spectrum Policy Group (RSPG) identified the 3400-3800 MHz band to be one of the pioneer bands suitable for the introduction of 5G based services in Europe and the primary band for the introduction of those services even before 2020. In the most recent opinion (January 2018) on the subject, the RSPG is of the opinion that EU Member States should consider appropriate measures to defragment this band in time for authorising sufficiently large blocks of spectrum by 2020.

In so far as practicable, these frequency arrangements are intended to be technology neutral and capable of facilitating competitive provision of services using a range of technologies with sufficient flexibility to accommodate current and future wireless broadband services, including 5G based services.

### 2 BACKGROUND

Due to its favourable properties, such as the combination of radio wave propagation and available bandwidth, the frequency band 3400-3800 MHz will be the primary spectrum band in Europe between 1 GHz and 6 GHz for the introduction of 5G based services supported by MFCN systems in TDD mode.

ECC has developed the following ECC Reports:

- ECC Report 203 on the Least Restrictive Technical Conditions suitable for Mobile/Fixed Communication Networks (MFCN), including IMT, in the frequency bands 3400-3600 MHz and 3600-3800 MHz [3] (issued in 2013);
- ECC Report 254 on the Operational guidelines for spectrum sharing to support the implementation of the current ECC framework in the 3600-3800 MHz range [4] (issued in 2016);
- ECC Report 281 on the Analysis of the suitability of the technical regulatory conditions for 5G MFCN operation in the 3400-3800 MHz band. [5] (issued in 2018);

- ECC Report 287 on Guidance on defragmentation of the frequency band 3400-3800 MHz.

ECC has developed the following CEPT reports in response to EC Mandates:

- CEPT Report 015 in response to the first EC Mandate on 3400-3800 MHz [6] (issued in 2006);
- CEPT Report 049 in response to the second EC Mandate on 3400-3800 MHz [7] (issued in 2012);
- CEPT Report 67 in response to the EC Mandate to CEPT to develop harmonised technical conditions for spectrum use in support of the introduction of next-generation (5G) terrestrial wireless systems in the Union [8] (issued in 2018).

Starting from January 2017, CEPT conducted additional analysis to determine whether the existing least restrictive technical conditions (BEM – Block Edge Masks) are suitable also for the high data rate IMT services supported by larger channel bandwidths as foreseen in the context of this ECC Decision and concluded on the need to develop new BEM. The CEPT additional studies focused on the use of Active Antenna Systems (AAS) envisaged for 5G. When reviewing the applicability of the current regulatory framework for 5G, CEPT identified that:

- There is no need to maintain FDD frequency arrangement. Moreover, the frequency separation at 3600 MHz for the TDD frequency arrangement is no longer needed;
- The proposed frequency arrangement will facilitate availability of larger contiguous frequency blocks to enable 5G, accounting for the need for largest possible contiguous portions of spectrum to be made available for 5G. Moreover, 5G is expected to be commonly deployed leveraging AAS;
- The regulatory framework from ECC Decision (11)06 as amended in March 2014 required further amendments to account for AAS BSs;
- There is a need for additional BEM: when using AAS for BSs, 4G and 5G are similar from a compatibility standpoint and can be accommodated by a single set of LRTCs appropriate for AAS BSs;
- When using non-AAS BSs, 4G and 5G are similar from a compatibility standpoint and can be accommodated by a single set of LRTCs appropriate for non-AAS BSs.

Therefore, CEPT concluded that in order not to restrict harmonisation to only non-AAS deployment, it was necessary to extend the current regulatory framework with a set of LRTCs appropriate for AAS BSs (including 5G).

As a result of the above:

- ECC developed ECC Report 281 on the Analysis of the suitability of the technical regulatory conditions for 5G MFCN operation in the 3400-3800 MHz band which was published in July 2018;
- ECC developed CEPT Report 67 in response to the EC Mandate to CEPT to develop harmonised technical conditions for spectrum use in support of the introduction of next-generation (5G) terrestrial wireless systems in the Union which was published in July 2018.

ECC is also currently developing a new ECC Report “toolbox for the most appropriate synchronisation regulatory framework including coexistence of MFCN in 3400-3800 MHz in unsynchronised and semi-synchronised mode”.

In addition, CEPT took into account existing CEPT results on coexistence with other services and the potential impact on these services, such as FSS usage, in this band. CEPT developed ECC Report 254 - ‘Operational guidelines for spectrum sharing to support the implementation of the current ECC framework in the 3600-3800 MHz range’.

In the context of evolution of MFCN, including IMT, the 5G New Radio interface (5G NR) optimises wideband operation. This allows operators to take full advantage of larger allocations of contiguous spectrum to increase peak rates and user experience. Current 5G NR specifications support channel bandwidths up to 100 MHz<sup>1</sup>. The ways to achieve this are expected to vary from one country to another.

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<sup>1</sup> Standardisation considers the following bandwidths: 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 MHz

In particular, in order to respond to market demand, as expressed by industry, to ensure a possible introduction of MFCN systems requiring very large bandwidths (80-100 MHz), on the basis of nationwide coverage, it may be necessary for the administrations to reorganise the 3400-3800 MHz band in order to provide wide contiguous spectrum. ECC has developed the guidelines accordingly (see ECC Report 287)

The implementation of this ECC Decision will encompass different stages at the national level (e.g. national consultation processes and update of existing authorisations as required) with a varying complexity depending on the legal and regulatory framework of each country.

### **3 REQUIREMENT FOR AN ECC DECISION**

The ECC recognises that implementation of MFCN that provides high data rate applications in the band 3400-3800 MHz based on a harmonised frequency arrangement will maximise the opportunities and benefits for end users and society, will benefit capital expenditure for operators, will reduce development and implementation costs of manufacturing equipment and will secure future long terms investments by providing economies of scale. A harmonised frequency arrangement will reduce complexity in cross border coordination. The opportunity to utilise larger channel bandwidths and Active Antenna Systems (AAS) will assist the provision of high data rates for IMT (especially with IMT-2020).

The ECC recognises that for the continuation of the successful development of MFCN, including IMT, the regulatory framework needs to provide the confidence and certainty for industry to make the necessary investment. ECC recognises that administrations need flexibility to adapt their use of the band 3400-3800 MHz to national circumstances. Any transition from legacy systems to future systems would be managed at national level. ECC has developed ECC Report 287 on defragmentation of the 3400-3800 MHz band [9].

**ECC DECISION OF 9 DECEMBER 2011 ON HARMONISED FREQUENCY ARRANGEMENTS AND LEAST RESTRICTIVE TECHNICAL CONDITIONS (LRTC) FOR MOBILE/FIXED COMMUNICATIONS NETWORKS (MFCN) OPERATING IN THE BAND 3400-3800 MHz (ECC/DEC/(11)06), AMENDED 14 MARCH 2014 AND AMENDED 26 OCTOBER 2018**

“The European Conference of Postal and Telecommunications Administrations,

*considering*

- a) that WRC-07 allocated the band 3400-3600 MHz to the Mobile, except Aeronautical Mobile, Service on a primary basis in Region 1 subject to provisions of RR 5.430A [10];
- b) that RR 5.430A [10] also identifies the 3400-3600 MHz band for IMT;
- c) that the 3400-3500 MHz and 3500-3600 MHz bands have been allocated to the Mobile Service and identified for IMT in some countries of Region 3 (RR 5.432A, 5.432B and 5.433A [10]);
- d) that the 3500-3600 MHz band is allocated to the Mobile, except Aeronautical Mobile, Service on a primary basis in Region 2, and that the 3400-3500 MHz band is allocated on a primary basis to the Mobile, except Aeronautical Mobile, Service in some countries of Region 2 and to the Mobile Service on a secondary basis in the rest of Region 2 (RR 5.431A, 5.431B [10]);
- e) that the 3600-3800 MHz band is allocated to the Mobile Service in Region 1 on a secondary basis in the Radio Regulations [10] and not identified for IMT;
- f) that in the European Table of Frequency Allocations (ERC Report 25 [11]) the major use or major interest in CEPT member countries in the 3400-3800 MHz band is the Mobile Service on a primary basis;
- g) that “mobile/fixed communications networks” (MFCN) for the purpose of this Decision includes IMT and other mobile and fixed communications networks;
- h) that IMT covers IMT-2000, IMT-Advanced, and IMT-2020 as defined in Resolution ITU-R 56 (Naming for International Mobile Telecommunications) [12];
- i) that development of new radio interfaces (5G) that support the new capabilities of IMT-2020 is expected along with the enhancement of IMT-2000 and IMT-Advanced systems;
- j) that detailed specifications of IMT radio interfaces are described in Recommendation ITU-R M.1457 [13] for IMT-2000, Recommendation ITU-R M. 2012 [14] for IMT-Advanced, and are planned to be described in the draft new Recommendation ITU-R M.[IMT2020.SPECS] for IMT-2020;
- k) that Recommendation ITU-R M.2083 [2] defines the framework and overall objectives of the future development of IMT for 2020 and beyond;
- l) that IMT-2020 systems, will have enhanced capabilities compared to those described in Recommendation ITU-R M.1645 [15];
- m) that a harmonised frequency arrangement facilitates economies of scale resulting in the availability of affordable equipment;
- n) that the designation of a frequency band for a specific application does not prevent the designation of the same frequency band for other applications;
- o) that the band 3400-3800 MHz is allocated to the Fixed-Satellite Service (space-to-Earth) on a primary basis in the Radio Regulations and is used in some CEPT countries for that service;
- p) that in some countries, the Fixed-Satellite Service usage is mainly in 3600-3800 MHz;

- q) that the band 3400 MHz to 3410 MHz is identified in ERC Report 25 [11] for airborne radars;
- r) that the band 3400 MHz to 3800 MHz is identified in ERC Report 25 [11] for MFCN;
- s) that in some CEPT countries the band 3400 MHz to 3410 MHz is not available for MFCN due to use by land, airborne and naval military radars;
- t) that many CEPT countries have existing licences for IMT/BWA/FSS/FS systems available until 2025 (see ECO Report 03 [16]) and may need to consider them in order to ensure that sufficient wide contiguous spectrum could be made available for the introduction of the 5G based services supported by MFCN systems before 2020;
- u) that ECC Report 254 [4] provides *operational guidelines for spectrum sharing to support the implementation of the current ECC framework in the 3600-3800 MHz range* taking into account that the framework in place at that time was limited to non-AAS BSs;
- v) that ECC Report 287 [9] provides guidance to administrations for defragmenting 3400-3800 MHz band to enable new 5G based services supported by MFCN systems.
- w) that there could be differences in the market demand for spectrum for MFCN, in different CEPT countries, which could lead to different timescales for the introduction of MFCN within the band 3400-3800 MHz;
- x) that in some CEPT countries parts of the band 3400-3800 MHz are already used for BWA, FWA and IMT systems;
- y) that global roaming is facilitated by common frequency arrangements and measures for free circulation for IMT terminals;
- z) that current 5G NR specifications support channel bandwidths up to 100 MHz in the band 3400-3800 MHz thereby enabling higher data rates;
- aa) that Standard Developing Organisations' specifications (e.g. 3GPP) support contiguous channel configurations of 100 MHz or more in this frequency range;
- bb) that high throughput 5G use cases benefit from wide contiguous frequency allocations;
- cc) that spectrum licensed for MFCN is generally assigned in multiples of 5 MHz, except where this is not possible, e.g. due to the presence of existing users;
- dd) that measures might be needed to ensure coexistence between unsynchronised TDD networks in adjacent blocks (e.g. additional filtering (non-AAS site), site coordination, restricted blocks/guard bands) and different licensing approaches may be applied by administrations to avoid interference between adjacent operators (e.g., guard band between the block edges of two adjacent operators, to enable sufficient roll-off of filters to meet the baseline (non-AAS only) or by power limitation used in the upper or lower part of the assigned blocks);
- ee) that in case of TDD MFCNs networks in the same geographical area, it may be beneficial to synchronise them (avoiding simultaneous uplink and downlink transmissions) in order to improve the efficient usage of spectrum by avoiding restricted blocks/guardbands between their networks
- ff) that the synchronisation of TDD networks of different operators can be managed at national level (e.g. voluntary agreement between operators or national regulatory measures);
- gg) that studies on sharing between IMT and the Fixed Satellite Service have been carried out by ITU-R, (see Report ITU-R M.2109 [17] and S.2368 [18]);
- hh) that in some CEPT countries, the deployment of networks will need a bilateral agreement concerning the use of stations in the mobile service in one country and stations of other primary services in a neighbouring country (e.g. Earth stations of the fixed satellite service) (see RR 5.430A [10] for the band 3400-3600 MHz);

- ii) that in EU/EFTA countries the radio equipment that is under the scope of this Decision shall comply with the Radio Equipment Directive (RED) [19]; Conformity with the essential requirements of the Radio Equipment 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 Radio Equipment Directive;
- jj) that a separate ECC Report will cover measures to facilitate coexistence between TDD networks in adjacent blocks without synchronisation;
- kk) that TDD may allow more flexible accommodation of current use of the frequency bands by other services;
- ll) that least restrictive technical conditions suitable for mobile/fixed communications networks (MFCN), including IMT, in the frequency band 3400-3800 MHz are developed in the ECC Report 281 [5];
- mm) that the coordination between mobile/fixed communications network stations and Fixed-Satellite Service (FSS) Earth stations could be required at national level or between neighbouring administrations;
- nn) that CEPT Report 049 [7] and ECC Report 203 [3] conclude that coordination (including, if needed, power limitation and separation distance) between MFCN and other systems and services should be carried out on a case-by-case basis due to the diversity of interference scenarios;
- oo) that maximum unwanted emission levels from MFCN base stations have been determined for protection of radiolocation systems deployed below 3400 MHz and of FSS Earth stations deployed above 3800 MHz, and additional measures could be applied at national level;
- pp) that radiolocation systems operating below 3400 MHz and FSS Earth stations operating above 3800 MHz may be sensitive to blocking effect due to MFCN base stations in-band power and may need additional measures for their protection on a national basis (e.g. geographical separation, in-band power reduction and frequency separation),
- qq) that a transitional period may be necessary during which terrestrial networks with different technical characteristics coexist;

#### *DECIDES*

1. that CEPT administrations shall designate the frequency band 3400-3800 MHz on a non-exclusive basis to mobile/fixed communications networks (MFCN), without prejudice to the protection and continued operation of other existing users in this band;
2. that administrations wishing to implement MFCN in the 3400-3800 MHz band should follow the frequency arrangement given in Annex 1;
3. that administrations wishing to implement MFCN in the 3400-3800 MHz band should follow the least restrictive technical conditions suitable for MFCN, given in Annex 2;
4. that administrations should consider facilitating the migration within the frequency band 3400-3800 MHz of existing terrestrial networks and authorisations to the frequency arrangement and least restrictive technical conditions described in the Annexes 1 and 2;
5. that administrations should implement key principles related to the coexistence with services other than MFCN as described in Annex 3;
6. that this Decision **enters into force** on 26<sup>th</sup> October 2018
7. that the preferred **date for implementation** of the Decision shall be 26<sup>th</sup> April 2019;
8. 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:*

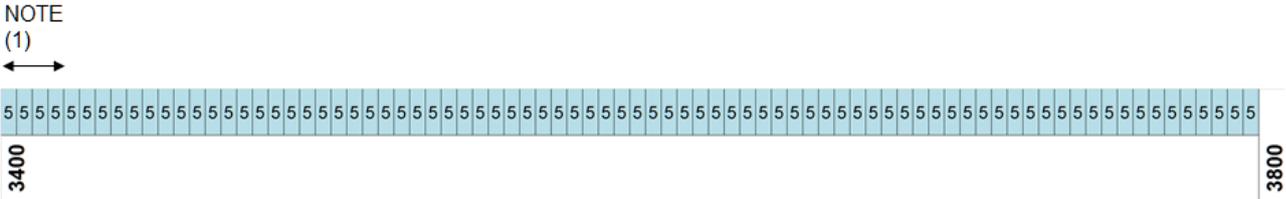
*Please check the Office documentation database <https://www.ecodocdb.dk> for the up to date position on the implementation of this and other ECC Decisions.*

**ANNEX 1: FREQUENCY ARRANGEMENT FOR THE 3400-3800 MHz FREQUENCY BAND BASED ON TDD**

The frequency arrangement is a TDD arrangement, based on a block size of 5 MHz starting at the lower edge of the band at 3400 MHz.

If blocks need to be offset to accommodate other users, the raster should be 100 kHz. Narrower blocks can be defined adjacent to other users, to allow full use of spectrum. It has to be noted that TDD in one extreme case also covers downlink only operation.

**Figure 1: 3400-3800 MHz frequency arrangement**



NOTE (1): The feasibility of implementation of wide area outdoor AAS base stations in the lowest 5 MHz blocks taking into account the out-of-band unwanted emission limits to protect radars will require evolution of filtering capabilities for AAS. However, these lowest blocks would remain usable in some circumstances.

Multiple adjacent blocks of 5 MHz can be combined to obtain wider channels.

## **ANNEX 2: LEAST RESTRICTIVE TECHNICAL CONDITIONS SUITABLE FOR AAS AND NON-AAS MOBILE/FIXED COMMUNICATIONS NETWORKS (MFCN) IN THE FREQUENCY BAND 3400-3800 MHz**

The least restrictive technical conditions defined in this annex are in the form of block-edge masks (BEMs) applicable to AAS and non-AAS MFCN base stations. The BEMs have been derived to allow coexistence between MFCN applications in the 3400-3800 MHz band. In addition, this annex includes “additional baseline” power limits for protection of military radiolocation systems below 3400 MHz. Additional baseline power limits are also introduced for the protection of FSS/FS systems above 3800 MHz.

### **A2.1 AAS AND NON-AAS BASE STATIONS**

Non-AAS (short for non-active antenna systems) refers to MFCN base station transmitters which are manufactured and supplied separately to antenna systems.

AAS refers to a base station and 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 is intended to exclude long term beam shaping such as fixed electrical down tilt.

### **A2.2 SYNCHRONISATION**

The definitions below may not necessarily apply to an entire network. In particular, there are use cases where different base stations within a network may be unsynchronised or semi-synchronised.

#### **A2.2.1 Synchronised operation**

The synchronised operation in the context of this Decision means operation of TDD in several different networks, where no simultaneous UL and DL transmissions occur, i.e. at any given moment in time either all networks transmit in DL or all networks transmit in UL. 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.

#### **A2.2.2 Unsynchronised operation**

The unsynchronised operation in the context of this Decision means operation of TDD in several different 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.

#### **A2.2.3 Semi-synchronised operation**

The semi-synchronised operation corresponds to the case where part of the frame is consistent with synchronised operation as described above, while the remaining portion of the frame is consistent with unsynchronised operation as described above. 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.

The semi-synchronised operation can be beneficial for small-cells. The interference mitigation techniques necessary for semi-synchronisation would be studied at the earliest in 3GPP Release 16. It is expected that not all User Equipment will be able to support this type of operation.

### **A2.3 BASE STATION BEM**

To obtain a BEM for a specific block, the BEM elements that are defined in Table 1 are used as follows:

1. In-block power limit is used for the block assigned to the operator.
2. Baseline is used for synchronised WBB ECS networks except from the operator block in question and corresponding transitional regions.
3. Transitional regions are determined, and corresponding power limits are used.
4. Restricted baseline is used for unsynchronised and semi-synchronised WBB ECS networks,
5. For spectrum below 3400 MHz, one of the additional baseline power limits is used.
6. For coexistence with FSS/FS above 3800 MHz, the same baseline and transitional power limit as for synchronised WBB ECS applies.

**Table 1: BEM elements and applicable frequencies**

BEM element	Definition
In-block	Block for which the BEM is derived.
Baseline	Spectrum used for MFCN, except from the operator block in question and corresponding transitional regions.
Transitional region	The transitional region applies 0 to 10 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 3400 MHz or above 3800 MHz.
Additional baseline	Below 3400 MHz and above 3800 MHz
Restricted baseline	Spectrum used for WBB ECS by networks unsynchronised or semi-synchronised with the operator block in question

**Table 2: In-block power limit**

BEM element	Frequency range	Non-AAS e.i.r.p. limit (1)	AAS TRP limit (1)
In-block	Block assigned to the operator	Not obligatory. For femto base stations, the use of power control is mandatory in order to minimise interference to adjacent channels.	Not obligatory. For femto base stations, the use of power control is mandatory in order to minimise interference to adjacent channels.
(1) see ECC Report 281			

The following out-of-block power limits are proposed for coexistence of synchronised MFCN BSs. Less stringent technical parameters, if agreed among the operators of such networks, may also be used.

**Table 3: Baseline and transitional power limits for synchronised MFCN networks, for non-AAS and AAS base stations**

BEM element	Frequency range	Non-AAS e.i.r.p. limit dBm/(5 MHz) per antenna	AAS TRP limit dBm/(5 MHz) per cell (1)
Transitional region	-5 to 0 MHz offset from lower block edge 0 to 5 MHz offset from upper block edge	$\text{Min}(P_{\text{Max}}-40, 21)$ (2)(3)	$\text{Min}(P_{\text{Max}}'-40, 16)$ (2)(4)
Transitional region	-10 to -5 MHz offset from lower block edge 5 to 10 MHz offset from upper block edge	$\text{Min}(P_{\text{Max}}-43, 15)$ (2)(3)	$\text{Min}(P_{\text{Max}}'-43, 12)$ (2)(4)
Baseline	Below -10 MHz offset from lower block edge. Above 10 MHz offset from upper block edge. Within 3400 - 3800 MHz.	$\text{Min}(P_{\text{Max}}-43, 13)$ (2)(3)	$\text{Min}(P_{\text{Max}}'-43, 1)$ (2)(4)

(1) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors.  
(2) The transitional regions and the baseline power limits apply to the synchronised operation of MFCN networks as defined in ECC Report 281.  
(3)  $P_{\text{Max}}$  is the maximum mean carrier power in dBm for the base station measured as e.i.r.p. per carrier, interpreted as per antenna  
(4)  $P_{\text{Max}}'$  is the maximum mean carrier power in dBm for the base station measured as TRP per carrier in a given cell.  
Note: for TDD blocks the transitional region applies in case of synchronised adjacent blocks, and in-between adjacent TDD blocks that are separated by 5 or 10 MHz. The transition region does not extend below 3400 MHz or above 3800 MHz.

The following out-of-block power limit applies to unsynchronised and semi-synchronised MFCN base stations if no geographic or indoor/outdoor separation is available. Less stringent technical parameters, if agreed among the operators of such networks, may also be used, such as where there is appropriate radio isolation (e.g. due to geographic or indoor/outdoor separation) between the networks. In addition, depending on national circumstances, CEPT Administrations may define a relaxed alternative “restricted baseline limit” applying to specific implementation cases to ensure a more efficient usage of spectrum.

**Table 4: Updated restricted baseline power limits for unsynchronised and semi-synchronised MFCN networks, for non-AAS and AAS base stations**

BEM element	Frequency range	Non-AAS e.i.r.p. limit dBm/(5 MHz) per cell (2)	AAS TRP limit dBm/(5 MHz) per cell (1)
Restricted baseline	Unsynchronised and semi-synchronised blocks. Below the lower block edge. Above the upper block edge. Within 3400-3800 MHz	-34	-43

(1) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors  
(2) It is assumed that note (1) also applies in this case.

**Table 5: Base station additional baseline power limits below 3400 MHz for country specific cases, for non-AAS and AAS base stations (1) cases**

Case		BEM element	Frequency range	Non AAS e.i.r.p. limit dBm/MHz per antenna	AAS TRP limit dBm/MHz per cell (2)
A	CEPT countries with radiolocation systems below 3400 MHz	Additional baseline	Below 3400 MHz (3)	-59 dBm	-52
B	CEPT countries with radiolocation systems below 3400 MHz	Additional baseline	Below 3400 MHz(3)	-50 dBm	
C	CEPT countries without adjacent band usage or with usage that does not need extra protection	Additional baseline	Below 3400 MHz(3)	Not applicable	Not applicable

(1) Alternative measures may be required on a case by case basis for indoor AAS BSs on a national basis.  
(2) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors  
(3) In cases where CEPT administrations have already implemented a guard band when issuing licences for MFCN before the adoption of this ECC Decision and in accordance with ECC Decision(11)06 (approved 9th December 2011, amended 14th March 2014), these CEPT administrations 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.

*Explanatory note to Table 5:* The additional baseline power limits given in Table 5 were derived assuming only outdoor cells. Therefore, in the case of an indoor cell, the power limits can be relaxed on a case by case basis.

The additional baseline limit reflects the need for protection for military radiolocation in some countries. CEPT administrations 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 an AAS TRP limit of -52 dBm/MHz per cell, may be required. Such coordination is the responsibility of the relevant administration. Other mitigation measures like geographical separation, in-block power limit or an additional guard band may be necessary.

In case of indoor deployments, administrations may define a relaxed limit applying to specific implementation cases to ensure a more efficient usage of spectrum.

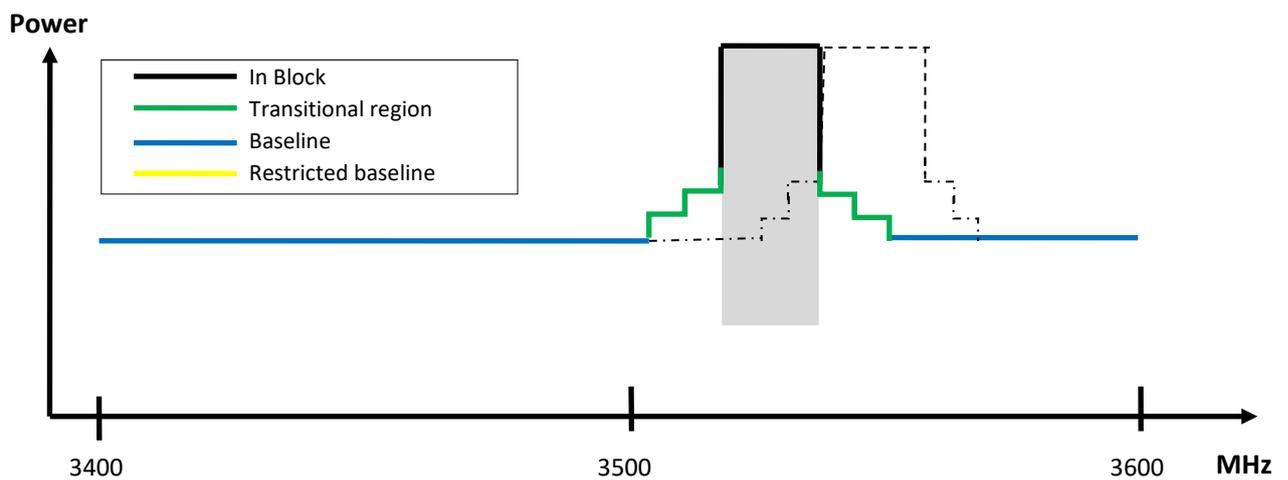
**Table 6: Additional baseline power limits to be applied above 3800 MHz for non-AAS and AAS base stations**

BEM element	Frequency range	Non-AAS e.i.r.p. limit dBm/(5 MHz) per antenna	AAS TRP limit dBm/(5 MHz) per cell (1)
Additional baseline	3800-3805 MHz	Min(PMax-40, 21) (2)	Min(PMax'-40, 16) (3)
	3805-3810 MHz	Min(PMax-43, 15) (2)	Min(PMax'-43, 12) (3)
	3810-3840 MHz	Min(PMax-43, 13) (2)	Min(PMax'-43, 1) (3) (4)
	Above 3840 MHz	-2 (2)(5)	-14 (5)

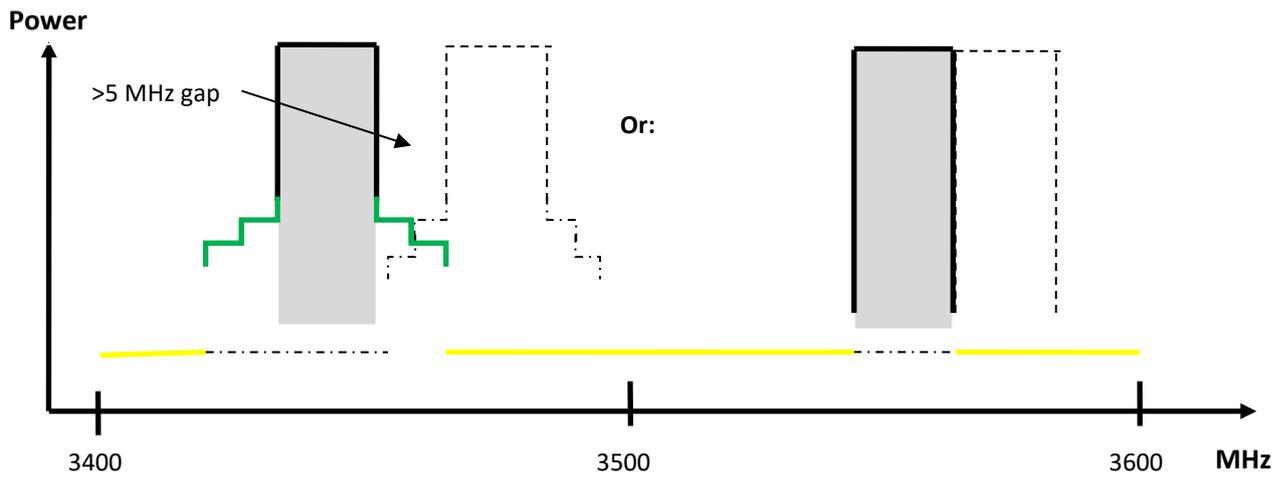
- (1) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors.
- (2) PMax is the maximum mean carrier power in dBm for the base station measured as e.i.r.p. per carrier, interpreted as per antenna.
- (3) PMax' is the maximum mean carrier power in dBm for the base station measured as TRP per carrier in a given cell.
- (4) Additional limits may apply on a case by case basis at national level.
- (5) derived from 3GPP TS 38.104 [20]

#### A2.4 COMBINATION OF BEM ELEMENTS

The BEM elements as described above are combined to provide a BEM for a particular block following the five steps listed above. Figure 2 and Figure 3 provide examples of such combinations of BEM elements.



**Figure 2: Combined BEM elements for adjacent blocks with synchronised TDD networks**



**Figure 3: Combined BEM elements for adjacent blocks with unsynchronised and semi-synchronised TDD networks**

#### A2.5 UE IN-BLOCK REQUIREMENT

As for the technical condition for user equipment (UEs) it is recommended that the in-block TRP for mobile UEs does not exceed 28 dBm. The in-block radiated power limit for fixed/nomadic UEs may be agreed on a national basis provided that cross-border obligations are fulfilled.

### ANNEX 3: CO-EXISTENCE WITH SERVICES OTHER THAN MFCN

Coordination between MFCN and FSS, FS or Radiolocation should be carried out on a case-by-case basis, since no single separation distance, guard band or signal strength limit can be provided. The services can be coordinated based on the same methodology as that which has been used for coordination between BWA and FSS or FS. A technical toolkit for administrations to consider coexistence with FS and FSS has been provided by the CEPT in ECC Report 254 [4]. ECC Report 254 did not consider AAS BSs.

The following key principles related to the coordination between MFCN stations and FSS Earth stations should be considered at national level or between neighbouring countries in order to ensure coordination between these systems:

1. Frequency coordination is primarily concerned with local implementation, local propagation conditions and local licensed use of the shared band. This is best dealt with by national administrations;
2. Protection of the licensed spectrum users operating in accordance to prevailing license terms and conditions should be considered by national administrations;
3. Some administrations have effective co-ordination arrangements in place. The implementation of these guidelines is at the discretion of the national administrations to the extent this may help them;
4. The key objectives of co-ordination processes are maximising efficient use of the available spectrum for the benefit of the CEPT whilst protecting existing and future licensed uses of the band;
5. Coordination processes and associated protection should only apply to registered/licensed spectrum users;
6. Data exchange and coordination processes are mutual and reciprocal to all band users;
7. Data on registered use of the band should be available to all users under relevant legal protections and confidentiality obligations;
8. The coordination process must be both accurate and fast to enable all operators to efficiently plan spectrum utilisation and network deployments;
9. Operators should have access to registered band usage to maximise the successful coordination of spectrum through propagation modelling without physical measurement at the planning stage;
10. All parties are responsible for the efficient use of spectrum. In deploying new MFCN stations and new FSS Earth stations, operators should be cognisant of the need to minimise constraints on the other service;
11. These guidelines primarily relate to co-ordination within national boundaries. For the situation where MFCN and FSS stations are within the territories of different administrations, the use of these guidelines within bilateral agreements may help to expedite cross border co-ordination<sup>2</sup>;
12. All parties should undertake reasonable efforts to successfully complete the coordination exercise as quickly as possible;
13. Either party has the inherent right to refer the co-ordination to the relevant NRA(s) if agreement cannot be reached.

In some CEPT countries military radiolocation systems that are deployed below 3400 MHz need a fixed limit for protection from base station interference (cases A and B in Table 5 – Annex 2). Other mitigation measures like geographical separation, coordination on a case-by-case basis or an additional guard band may be necessary. For UEs other mitigation measures may be necessary such as e.g. geographical separation or an additional guard band.

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<sup>2</sup> For cross-border coordination with non-EU administrations not listed in the 5.430A footnote of RR the provisions of this footnote should be taken into account.

## ANNEX 4: LIST OF REFERENCE

This annex contains the list of relevant reference documents.

- [1] Recommendation ITU-R M.1036-5: "Frequency arrangements for implementation of the terrestrial component of International Mobile Telecommunications (IMT) in the bands identified for IMT in the Radio Regulations"
- [2] Recommendation ITU-R M.2083-0: "IMT Vision - "Framework and overall objectives of the future development of IMT for 2020 and beyond"
- [3] ECC Report 203: "Least Restrictive Technical Conditions suitable for Mobile/Fixed Communication Networks (MFCN), including IMT, in the frequency bands 3400-3600 MHz and 3600-3800 MHz", corrected March 2014"
- [4] ECC Report 254: "Operational guidelines for spectrum sharing to support the implementation of the current ECC framework in the 3600-3800 MHz range", November 2016
- [5] ECC Report 281: "Analysis of the suitability of the regulatory technical conditions for 5G MFCN operation in the 3400-3800 MHz band", 6 July 2018
- [6] CEPT Report 015: "Conditions relating to the provision of harmonised radio frequency bands in the European Union for Broadband Wireless Access applications", March 2007
- [7] CEPT Report 049: "Technical conditions regarding spectrum harmonisation for terrestrial wireless systems in the 3400-3800 MHz frequency band", Corrected March 2014
- [8] CEPT Report 67: "Harmonised technical conditions for spectrum use in support of the introduction of next-generation (5G) terrestrial wireless systems in the Union", 6 July 2018
- [9] ECC Report 287: "Guidance on defragmentation of the frequency band 3400-3800 MHz", October 2018
- [10] ITU Radio Regulations Edition of 2016
- [11] ERC Report 25: "The European table of frequency allocations and applications in the frequency range 8.3 kHz to 3000 GHz", updated October 2017
- [12] Resolution ITU-R 56: "Naming for International Mobile Telecommunications"
- [13] Recommendation ITU-R M.1457-13: "Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2000 (IMT-2000)"
- [14] Recommendation ITU-R M.2012-2: "Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications Advanced (IMT-Advanced) "
- [15] Recommendation ITU-R M.1645-0: "Framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000"
- [16] ECO Report 03: "The Licensing of Mobile Bands in CEPT", updated May 2018
- [17] Report ITU-R M.2109-0: "Sharing studies between IMT Advanced systems and geostationary satellite networks in the fixed-satellite service in the 3 400-4 200 and 4 500-4 800 MHz frequency bands"
- [18] Report ITU-R S.2368-0: "Sharing studies between International Mobile Telecommunication-Advanced systems and geostationary satellite networks in the fixed-satellite service in the 3 400-4 200 MHz and 4 500-4 800 MHz frequency bands in the WRC study cycle leading to WRC-15"
- [19] 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
- [20] 3GPP TS 38.104 V15.0.0 (2017-12): "NR; Base Station (BS) radio transmission and reception (Release 15)"