

ELECTRONIC COMMUNICATIONS COMMITTEE

ECC Decision
of 30 October 2009

on harmonised conditions for
mobile/fixed communications networks (MFCN)
operating in the band 790 - 862 MHz¹

(ECC/DEC/(09)03)



¹ Comparable technical specifications to those given in this ECC Decision are given in Commission Decision 2010/267/EU. EU Member States and, if so approved by the EEA Joint Committee, Iceland, Liechtenstein and Norway are obliged to implement the Commission Decision.

EXPLANATORY MEMORANDUM

1 INTRODUCTION

WRC-07 allocated on a primary basis the 790-862 MHz band to mobile services in Region 1 as from 17 June 2015, and in some CEPT countries it is possible to utilise this band for mobile services before 2015, in accordance with the provisions of the Radio Regulations.

The 22nd meeting of ECC (Vienna, March 2009) agreed to develop a Decision on harmonised technical and regulatory conditions in the band 790 - 862 MHz in order to meet the needs of industry and administrations.

This Decision, developed in response to this agreement, contains annexes defining the frequency arrangements and technical conditions for this band. These annexes are based on studies undertaken by ECC and described in CEPT Reports 30 and 31.

ECC has also undertaken studies on cross-border coordination, which are described in CEPT Report 29, and on the continuation of PMSE services operating in the band 470-862MHz, which are described in CEPT Report 32.

These CEPT Reports were produced in response to a mandate from the European Commission², which requested CEPT to carry out investigations to define the technical conditions applicable for the sub-band 790-862 MHz optimised for, but not limited to, mobile/fixed communications networks (two-way). In addition, CEPT Reports 21 to 25 have been produced in response to an earlier Mandate from the European Commission³.

2 BACKGROUND

The CEPT has recognised the importance of the availability of common and minimal (least restrictive) technical conditions for the band 790-862 MHz. These technical conditions will provide significant economies of scale and facilitate the introduction of new applications depending on national decisions.

To maintain the required flexibility for administrations regarding the non-mandatory introduction of mobile/fixed communications networks in these bands, block edge masks have been developed without assuming full or partial implementation of the harmonised frequency (channelling) arrangements.

The following principles have been applied to define the frequency arrangements:

- 1) Common frequency arrangements have been defined, to the greatest extent possible, to facilitate roaming, border coordination and to achieve economies of scale for equipment, whilst maintaining the flexibility to adapt to national circumstances and market demand.
- 2) All duplex methods TDD, FDD full duplex (FDD-FD) and FDD half duplex (FDD-HD) have been initially considered with the aim to define a solution to accommodate spectrum for operators who would wish to use different technologies, while paying due attention to coexistence issues and spectrum efficiency.
- 3) The time frame for availability of the band for mobile/fixed communications networks and future technology evolution has been taken into account to define location and size of the duplex gap.
- 4) Careful consideration has been given to the block sizes for the band plans.
- 5) Recognizing the advantage of a single harmonised frequency arrangement, the preferred frequency arrangement is based on FDD. TDD frequency arrangements and other approaches can be used on a national basis.
- 6) The trade off between increasing the frequency separation at 790 MHz and reducing the duplex gap has been carefully studied. In weighing up this trade off it has been decided that the frequency separation should be 1 MHz and the duplex gap 11 MHz.

² For the text of this Mandate, see Annex 1 of CEPT Report 31. This includes a description of the tasks undertaken by CEPT in response to the Mandate.

³ For the text of this Mandate, see Annex 1 of CEPT Report 25. This includes a description of the tasks undertaken by CEPT in response to the Mandate.

- 7) The implementation of the frequency arrangement by national administrations will require coordination with any other administration whose broadcasting service and/or other primary terrestrial services are considered to be affected. For broadcasting, the coordination procedure would be pursuant to the GE-06 agreement.

3 REQUIREMENT FOR AN ECC DECISION

The ECC recognises that implementation of mobile/fixed communications networks in the band 790-862 MHz based on common and minimal (least restrictive) technical conditions and on harmonised frequency arrangements will maximise the opportunities and benefits for end users, will reduce capital expenditure for operators and cost of manufacturing equipment and will secure future investments by providing economy of scale. Access to the 790-862 MHz band will facilitate more complete coverage for mobile/fixed communications networks in particular in rural areas and allow improved in-building penetration (when compared to the use of higher frequencies).

The ECC recognises that for mobile/fixed communications networks to continue to develop successfully, industry stakeholders must be given the confidence and certainty to make the necessary investment. The ECC believes that the continued development of mobile/fixed communications services will be facilitated by the introduction of harmonised frequency arrangements across countries wishing to implement mobile/fixed communications networks in the band 790-862 MHz. However, ECC also recognises that administrations need flexibility to adapt their use of the band 790-862 MHz to national circumstances and that adopting common and minimal (least restrictive) technical conditions, without assuming full or partial implementation of the harmonised frequency arrangements would also be beneficial in specific national cases. A commitment by CEPT member countries to implement this Decision will provide a clear indication for manufacturers to develop equipment for this band and for operators to prepare for investment.

The ECC recognises that an ECC Decision harmonising the use of the frequency band 790 - 862 MHz leaves flexibility for administrations to retain broadcasting use in all or portions of this frequency band.

**ECC Decision
of 30 October 2009**

**Harmonised conditions for mobile/fixed communications networks (MFCN)
operating in the band 790-862 MHz**

(ECC/DEC/(09)03)

“The European Conference of Postal and Telecommunications Administrations,

considering

- a) that the frequency band 790-862 MHz has been allocated to the mobile service on a primary basis in a number of countries in Region 1 for more than 20 years subject to provisions of RR 5.316;
- b) that WRC-07 allocated the band 790-862 MHz to the mobile service on a primary basis in additional countries in Region 1 from 1 January 2009 subject to the provisions of RR 5.316A;
- c) that WRC-07 allocated the band 790-862 MHz to the mobile service on a primary basis in the whole of Region 1 from 17 June 2015 subject to the provisions of RR 5.316B and identified this band for IMT (see RR 5.317A);
- d) that “mobile/fixed communications networks” for the purpose of this Decision includes IMT and other communications networks in the mobile and fixed services;
- e) that harmonised frequency arrangements facilitate economies of scale and availability of low-cost equipment;
- f) that the designation of a frequency band for a specific application does not prevent the same frequency band from being designated for other applications;
- g) that the band 470-862 MHz is widely used for the broadcasting service, and is also used by PMSE (SAB/SAP applications);
- h) that there could be differences in the market demand for spectrum for mobile/fixed communications networks and different licensing schemes across CEPT countries could lead to different timescales concerning the introduction of mobile/fixed services in the band 790-862 MHz;
- i) that global roaming is facilitated by harmonised frequency arrangements and circulation arrangements for the use of mobile/fixed communications networks terminals;
- j) that some administrations may not make available all frequencies in the band 790-862 MHz because they have already been allocated to other services and applications;
- k) that the block edge mask (BEM) concept has been developed by CEPT to facilitate implementation of spectrum rights of use which are as technology neutral as possible;
- l) the need for protection of broadcasting service below 790 MHz or in TV channels above 790 MHz if an administration wishes to have broadcasting networks or both mobile/fixed communications networks and broadcasting networks in the frequency band 790-862 MHz;
- m) that the protection of broadcasting may require adoption of additional measures at the national level to mitigate the possible remaining interference cases;
- n) that the GE-06 Agreement provides the necessary regulatory procedures for co-ordination between countries that are members of the Agreement and to identify administrations to be involved in the coordination process between mobile service in one country and broadcasting service in another country;
- o) that a detailed coordination methodology, including a careful interference assessment, may need to be developed by the administrations concerned during bilateral or multilateral discussions using the guidance provided in CEPT Report 29;
- p) that this ECC Decision leaves flexibility to administrations to determine at a national level the use of this frequency band for broadcasting and/or other services;

- q) that administrations may authorize low power applications such as Programme Making and Special Events (PMSE) in the duplex gap of the preferred harmonised frequency arrangement (821-832 MHz) or the guard band of the TDD frequency arrangement;
- r) that CEPT Report 30 concludes a guard band of at least 7 MHz is required between TDD and broadcasting;
- s) that for FDD and TDD networks the preferred block size is 5 MHz, which does not preclude smaller channel bandwidths within a block;
- t) that coexistence between TDD and FDD networks and between unsynchronized TDD networks in adjacent blocks are in particular difficult;
- u) that studies on sharing between mobile and other primary services are currently conducted in ITU-R, for WRC-12 to consider under agenda item 1.17 and take appropriate regulatory action;
- v) that in accordance with RR 5.312 the band 645-862 MHz is allocated to the aeronautical radionavigation service on a primary basis in some CEPT countries;
- w) that in some CEPT countries the implementation of this Decision is possible after concluding a bilateral agreement concerning the use of stations in the mobile service in one country and stations of other primary services in another country (e.g. stations of aeronautical radionavigation service);
- x) that CEPT Report 30 addresses the common and minimal (least restrictive) technical conditions for the 790-862 MHz digital dividend;
- y) that CEPT Report 31 addresses frequency arrangements for the 790-862 MHz band;
- z) that in EU/EFTA countries the radio equipment that is under the scope of this Decision shall comply with the R&TTE Directive. Conformity with the essential requirements of the R&TTE 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 R&TTE Directive.

DECIDES

1. that the frequency band 790-862 MHz is designated to mobile/fixed communications networks, while enabling administrations to continue to use all or portions of the frequency band 790-862 MHz for broadcasting and other services;
2. that those administrations wishing to implement mobile/fixed communications networks based on FDD in the entire frequency band 790-862 MHz should adhere to the preferred harmonised frequency arrangement given in Annex 1;
3. that those administrations wishing to implement mobile/fixed communications networks in the frequency band 790-862 MHz with frequency arrangements other than the preferred harmonised arrangement in Annex 1 should follow Annex 2;
4. that administrations implementing mobile/fixed communications networks, in accordance with Decides 2 or 3, shall adopt the common and minimal (least restrictive) technical conditions specified in Annex 3 to this Decision;
5. that administrations wishing to implement low power applications and PMSE in the centre gap of the FDD frequency arrangement given in Annex 1 or PMSE in the guard band of the TDD frequency arrangement given in Annex 2 shall adopt the common and minimal (least restrictive) technical conditions specified in Annex 3 to this Decision;
6. that this Decision enters into force on 30 October 2009;
7. that the preferred date for implementation of the Decision shall be 1 May 2010;
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 web site (<http://www.ero.dk>) for the up to date position on the implementation of this and other ECC Decisions.

ANNEX 1

Preferred harmonised frequency arrangement

The harmonised frequency arrangement is 2 x 30 MHz with a duplex gap of 11 MHz, based on a block size of 5 MHz, paired and with reverse duplex direction, and a guard band of 1 MHz starting at 790 MHz. The FDD downlink starts at 791 MHz and FDD uplink starts at 832 MHz.

790-791	791-796	796-801	801-806	806-811	811-816	816-821	821-832	832-837	837-842	842-847	847-852	852-857	857-862
Guard band	Downlink						Duplex gap	Uplink					
1 MHz	30 MHz (6 blocks of 5 MHz)						11 MHz	30 MHz (6 blocks of 5 MHz)					

ANNEX 2

Guidance for administrations not implementing the preferred frequency arrangement in Annex 1

Administrations which do not wish to use the preferred harmonised frequency arrangement as described in Annex 1 or which do not have the full band 790 – 862 MHz available (e.g. where an Administration cannot make all channels in the band available because they have already been allocated to other services or are not able to coordinate the use of frequencies with neighboring countries), may consider:

- partial implementation of frequency arrangement described in Annex 1;
- the introduction of TDD frequency arrangement in all or part of the frequency band 790 – 862 MHz, based on a block size of 5 MHz starting at 797 MHz, with a guard band of 7 MHz starting at 790 MHz;

790-797	797-802	802-807	807-812	812-817	817-822	822-827	827-832	832-837	837-842	842-847	847-852	852-857	857-862
Guard band	Unpaired												
7 MHz	65 MHz (13 blocks of 5 MHz)												

- a mixed introduction of TDD and FDD frequency arrangements as described in Annex 5 of CEPT Report 31;
- implementation of a 1 MHz channel raster.

It should further be noted that:

- filtering is required at the DTT receiver for TDD operation in the lowest 5 MHz block of the TDD frequency arrangement, as described in Annex 3 of CEPT Report 30;
- administrations who wish to protect portable-indoor DTT reception would need to adopt a guard band that is larger than 7 MHz, and may also require filtering at the DTT receiver, as described in Annex 3 of CEPT Report 30.

ANNEX 3

Technical conditions based on BEM approach

The technical conditions presented in this annex are in the form of block-edge masks (BEMs) as derived in CEPT Report 30. BEMs are related to spectrum licensing and the avoidance of interference between users of spectrum.

A BEM is an emission mask that is defined, as a function of frequency, relative to the edge of a block of spectrum that is licensed to an operator. It consists of in-block and out-of-block components which specify the permitted emission levels over frequencies inside and outside the licensed block of spectrum respectively. The out-of-block component of the BEM itself consists of a baseline level and, where applicable, intermediate (transition) levels which describe the transition from the in-block level to the baseline level as a function of frequency.

Accordingly, the BEM levels are built up by combining the values listed in the tables below in such a way that the limit at any frequency is given by the highest (least stringent) value of a) the baseline requirements, b) the transition requirements, and c) the in-block requirements (where appropriate).

The BEMs in the 790-862 MHz band are optimised for, but are not limited to, FDD and TDD mobile/fixed communications networks (two-way). The least restrictive conditions given in this annex apply to the preferred harmonised frequency arrangement as described in Annex 1 and to the frequency arrangements as described in Annex 2.

In addition, a number of technical conditions have also been derived for Programme Making and Special Events (PMSE) equipments and low-power applications in the FDD duplex gap or PMSE in the TDD guard band. Therefore, the emission masks are derived for base stations (BS), terminal stations (TS), low-power applications and PMSE equipments.

The BEMs have been derived to allow coexistence between applications in the 790 - 862 MHz band and other applications in adjacent bands but in the same geographical area. The derived BEMs do not take account of coexistence with aeronautical radio navigation systems (ARNS) operating in some CEPT countries (RR 5.312). Therefore, the BEMs have to be associated with other requirements in such instances. This can be done at a national level or with cross-border coordination developed by bilateral or multilateral agreements.

BEMs shall be applied as an essential component of the technical conditions necessary to ensure coexistence between services at a national level. However, it should be understood that the derived BEMs do not always provide the required level of protection of victim services and additional mitigation techniques would need to be applied in order to resolve any remaining cases of interference.

Operators of mobile/fixed communications networks (MFCN) in the 790-862 MHz band may agree, on a bilateral or multilateral basis, less stringent technical parameters providing that they continue to comply with the technical conditions applicable for the protection of other services, applications or networks and with their cross-border obligations. Administrations should ensure that these less stringent technical parameters can be used, if agreed among all affected parties (e.g. between synchronised TDD operators⁴).

The BEMs are presented as upper limits on the mean EIRP or TRP (total radiated power) over an averaging time interval, and over a measurement frequency bandwidth. In the time domain, the EIRP or TRP is averaged over the active portions of signal bursts and corresponds to a single power control setting. In the frequency domain, the EIRP or TRP is determined over the measurement bandwidth (e.g. MFCN block or TV channel) specified in the following tables. It should be noted that the actual measurement bandwidth of the measurement equipment used for purposes of compliance testing may be smaller than the measurement bandwidth provided in the tables. For requirements with a measurement bandwidth of 5 MHz, the measurement bandwidth is aligned within a block.

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. For an isotropic antenna radiation pattern, EIRP and TRP are equivalent. For a directional antenna radiation pattern, EIRP in the direction of the main beam is (by definition) greater than the TRP.

⁴ The BEMs for TDD devices are derived here with the assumption that TDD networks in adjacent frequencies are unsynchronised.

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 MFCN base station transition requirements which are specified per antenna.

The term *block edge* refers to the frequency boundary of spectrum licensed to a mobile/fixed communication network. The term *band edge* refers to the boundary of a range of frequencies allocated for a certain use (e.g., 790 MHz is the upper band edge for broadcasting, while 832 MHz is the lower band edge for FDD uplink).

Illustrative examples of emission masks can be found in Annex 4 of this Decision in relation with FDD and TDD frequency arrangements.

1. Technical conditions for FDD or TDD base stations

An administration may choose to specify an in-block EIRP limit for base stations. Such limit may range from 56 dBm/{5 MHz} to 64 dBm/{5 MHz} based on compatibility studies and deployment requirements in this band. It should be noted that administrations may consider authorising higher in-block EIRPs in specific circumstances, e.g. in rural deployments.

Tables 1 to 3 define the out-of-block BEM requirements for base stations within the spectrum allocated to mobile/fixed communications networks (MFCNs).

Frequency range of out-of-block emissions	Maximum mean out-of-block EIRP	Measurement bandwidth
Frequencies allocated to FDD uplink	-49.5 dBm	5 MHz
Frequencies allocated to TDD	-49.5 dBm	5 MHz

Table 1: Baseline requirements – BS BEM out-of-block EIRP limits

Frequency range of out-of-block emissions	Maximum mean out-of-block EIRP	Measurement bandwidth
-10 to -5 MHz from lower block edge	18 dBm	5 MHz
-5 to 0 MHz from lower block edge	22 dBm	5 MHz
0 to +5 MHz from upper block edge	22 dBm	5 MHz
+5 to +10 MHz from upper block edge	18 dBm	5 MHz
Remaining FDD downlink frequencies	11 dBm	1 MHz

Table 2: Transition requirements – BS BEM out-of-block EIRP limits per antenna⁵ over frequencies of FDD downlink and TDD

Frequency range of out-of-block emissions	Maximum mean out-of-block EIRP	Measurement Bandwidth
Guard band between broadcasting band edge and FDD downlink band edge	17.4 dBm	1 MHz
Guard band between broadcasting band edge and TDD band edge	15 dBm	1 MHz
Guard band between FDD downlink band edge and FDD uplink band edge (duplex gap)	15 dBm	1 MHz
Guard band between FDD downlink band edge and TDD band edge	15 dBm	1 MHz
Guard band between FDD uplink band edge and TDD band edge	15 dBm	1 MHz

Table 3: Transition requirements – BS BEM out-of-block EIRP limits per antenna⁴ over frequencies (e.g. above 790 MHz) used as guard band

⁵ For one to four antennas.

Table 4 shows the out-of-block BEM baseline requirements for MFCN base stations within the spectrum allocated to the broadcasting (DTT) service.

Case	Frequency range of out-of-block emissions	Condition on base station in-block EIRP, P dBm/{10 MHz}	Maximum mean out-of-block EIRP	Measurement bandwidth
A	For DTT frequencies where broadcasting is protected	$P \geq 59$	0 dBm	8 MHz
		$36 \leq P < 59$	(P-59) dBm	8 MHz
		$P < 36$	-23 dBm	8 MHz
B	For DTT frequencies where broadcasting is subject to an intermediate level of protection	$P \geq 59$	10 dBm	8 MHz
		$36 \leq P < 59$	(P-49) dBm	8 MHz
		$P < 36$	-13 dBm	8 MHz
C	For DTT frequencies where broadcasting is not protected	No conditions	22 dBm	8 MHz

Table 4: Baseline requirements – BS BEM out-of-block EIRP limits over frequencies occupied by broadcasting

The three different cases A, B, and C listed in Table 4 can be applied on a per-channel and/or per-region basis, i.e. for the same channel different cases can be applied in different geographic areas (e.g. area related to DTT coverage) and different cases can be applied to different channels in the same geographic area. For the protection of digital terrestrial broadcasting channels in use at the time of deployment of MFCNs, the baseline requirement in case A shall be applied. In circumstances where the relevant broadcasting channels are not in use at the time of deployment of MFCNs, an administration may choose between the baseline requirements in cases A, B and C (illustrative examples of emission masks can be found in Annex 4 of this Decision in relation with FDD and TDD frequency arrangements). An administration may choose baseline requirement in case A where it intends to bring the relevant broadcasting channels into use in the foreseeable future and the administration wishes to provide these with the same level of protection as other broadcasting channels already in use. The baseline requirement in case B may be used where an administration wishes to reserve the option of bringing the relevant broadcasting channels into use at a future date, but can accept a lower level of protection for these channels. Baseline requirement in case C may be used where an administration does not intend to bring the relevant broadcasting channels into use.

Other baseline requirements can be applied in specific circumstances subject to agreements between the broadcasting authority, MFCN operators and the administration if required.

2. Technical conditions for FDD or TDD terminal stations

In Tables 5 to 9, the power limits are specified as EIRP for TS designed to be fixed or installed and as TRP for the TS designed to be mobile or nomadic. Note that EIRP and TRP are equivalent for isotropic antennas.

2.1 In-block requirements for all terminal stations

Table 5 defines the maximum value of the in-block emission level for FDD or TDD terminal stations (TS). Administrations may relax this limit in certain situations, for example fixed TS in rural areas, providing that protection of other services, networks and applications is not compromised and cross-border obligations are fulfilled.

Maximum mean in-block power	23 dBm ⁶
-----------------------------	---------------------

Table 5: FDD or TDD TS in-block emission limit

⁶ It is recognised that this value is subject to a tolerance of up to +2 dB, to take account of operation under extreme environmental conditions and production spread.

2.2. Out-of-band requirements for terminal stations

The requirements given in this section apply without prejudice to spurious emission requirements (which continue to apply). This document does not address spurious emission levels; this is the responsibility of the standards development organisations (SDOs)⁷. The technical conditions for these terminals are defined relative to the channel edge to enable them to be taken into account by the SDOs.

The term *channel edge* refers to the lowest and highest frequency of the occupied bandwidth.

2.2.1. Out-of-band requirements for FDD terminal stations for the preferred harmonised frequency arrangement

Table 6 defines the out-of-band emission requirements for FDD TS for the preferred harmonised frequency arrangement.

Frequency range of out-of-band emissions	Maximum mean out-of-band power	Measurement bandwidth
Below 790 MHz	-65dBm*	8 MHz
790 to 791 MHz	-44 dBm	1 MHz
791 to 821 MHz	-37 dBm	5 MHz
821 to 822 MHz	-13 dBm	1 MHz
822 MHz to -5 MHz from FDD uplink lower channel edge	-6 dBm	5 MHz
-5 to 0 MHz from FDD uplink lower channel edge	1.6 dBm	5 MHz
0 to +5 MHz from FDD uplink upper channel edge	1.6 dBm	5 MHz
+5 MHz from FDD uplink upper channel edge to 862 MHz	-6 dBm	5 MHz

Table 6: Out-of-band requirements for FDD TS

* Full duplex FDD terminal stations designed to operate in the preferred harmonised FDD channelling arrangement are expected to be inherently compliant with this out-of-band emission level.

2.2.2. Out-of-band requirements for other FDD terminal stations and for TDD terminal stations

Tables 7 to 9 define the out-of-band requirements for FDD and TDD terminal stations, except FDD terminal stations for the preferred harmonised frequency arrangement.

Frequency range of out-of-band emissions	Maximum mean out-of-band power	Measurement bandwidth
Frequencies allocated to FDD downlink	-37 dBm	5 MHz

Table 7: Out-of-band requirements for TS over frequencies of the FDD downlink

⁷ The CEPT recommended spurious emission limits given in ERC Recommendation 74-01.

Frequency range of out-of-band emissions	Maximum mean out-of-band power	Measurement bandwidth
-10 to -5 MHz from lower channel edge	-6 dBm	5 MHz
-5 to 0 MHz from lower channel edge	1.6 dBm	5 MHz
0 to +5 MHz from upper channel edge	1.6 dBm	5 MHz
+5 to +10 MHz from upper channel edge	-6 dBm	5 MHz
Remaining TDD frequencies	-37 dBm	5 MHz
Remaining FDD uplink frequencies	-13 dBm	1 MHz
Frequencies allocated to broadcasting	-65 dBm	8 MHz

Table 8: Out-of-band requirements for TS over frequencies of TDD, FDD uplink and broadcasting

Frequency range of out-of-band emissions	Maximum mean out-of-band power	Measurement bandwidth
Guard band between broadcasting band edge and FDD downlink band edge	-44 dBm	1 MHz
Guard band between broadcasting band edge and TDD band edge	-5.4 dBm	1 MHz
Guard band between FDD downlink band edge and FDD uplink band edge (duplex gap)	-5.4 dBm	1 MHz
Guard band between FDD downlink band edge and TDD band edge	-5.4 dBm	1 MHz
Guard band between FDD uplink band edge and TDD band edge	-5.4 dBm	1 MHz

Table 9: Out-of-band requirements for TS over frequencies used as guard band

3. Technical conditions for PMSE and low-power (LP) applications within the duplex gap of the FDD frequency arrangement or the guard band of the TDD frequency arrangement

PMSE devices (channel bandwidth ≤ 200 kHz) and low-power (LP) applications (channel bandwidth ≥ 5 MHz) are allowed on a non-protected, non-interfering basis within the duplex gap of a FDD frequency arrangement. PMSE devices (channel bandwidth ≤ 200 kHz) are also allowed on a non-protected, non-interfering basis within the guard band of the TDD frequency arrangement.

The technical conditions in this section can be relaxed at a national level subject to specific restrictions (e.g., minimum spatial distance between interferer and victim), or where it is judged that no material interference would arise.

In Tables 10, 11, 14 and 15, the power limits are specified as TRP for PMSE equipment and low power TS. Note that EIRP and TRP are equivalent for isotropic antennas.

3.1 Technical conditions for PMSE equipment

Table 10 defines the maximum permitted in-band emission level for PMSE equipment operating within the duplex gap of the FDD frequency arrangement or within the guard band of the TDD frequency arrangement.

Frequency range of in-band emissions	Maximum mean in-band TRP
+5 MHz from FDD downlink upper band edge to FDD uplink lower band edge	20 dBm
From broadcasting upper band edge to -5 MHz from TDD lower band edge	
+5 MHz from TDD upper band edge to broadcasting lower band edge	
+2 to +5 MHz from FDD downlink upper band edge	13 dBm handheld terminals 20 dBm bodyworn terminals
-5 to -2 MHz from TDD lower band edge	
+2 to +5 MHz from TDD upper band edge	

Table 10: In-band requirements – PMSE equipment

Table 11 defines the out-of-band BEM requirements for PMSE equipment within the spectrum allocated to MFCNs.

Frequency range of out-of-band emissions	Maximum mean out-of-band TRP	Measurement bandwidth
Frequencies allocated to FDD downlink	-43 dBm	5 MHz
0 to +2 MHz from FDD downlink upper band edge	-20.6 dBm	2 MHz
Frequencies allocated to FDD uplink	-25 dBm	5 MHz
-2 to 0 MHz from the TDD lower band edge	-20.6 dBm	2 MHz
Frequencies allocated to TDD	-43 dBm	5 MHz
0 to +2 MHz from TDD upper band edge	-20.6 dBm	2 MHz

Table 11: Out-of-band requirements – PMSE equipment

3.2 Technical conditions for low-power applications

3.2.1 Technical conditions for low-power base stations (LP base stations)

Table 12 defines the maximum permitted in-block EIRP for LP base stations operating within the duplex gap of the FDD frequency arrangement.

Frequency range of in-block emissions	Maximum mean in-block EIRP	Measurement bandwidth
+5 MHz from FDD downlink upper band edge to FDD uplink lower band edge	13dBm	5 MHz

Table 12: In-block requirements – LP base stations

Table 13 defines the out-of-block BEM requirements for LP base stations within the spectrum allocated to mobile/fixed communication networks and broadcasting.

Frequency range of out-of-block emissions	Maximum mean out-of-block EIRP	Measurement bandwidth
Frequencies allocated to FDD downlink	-43dBm	5 MHz
0 to +5 MHz from FDD downlink upper band edge	-9 dBm	5 MHz
Frequencies allocated to FDD uplink	-43 dBm	5 MHz
Frequencies allocated to TDD	-43 dBm	5 MHz
Frequencies allocated to broadcasting	-65 dBm	8 MHz

Table 13: Out-of-block requirements – LP base stations

The above BEM specifications for LP base stations have been derived based on a LP base station antenna height of 4 metres. Administrations who wish to authorise deployment of LP base stations with antenna heights that are greater than 4 metres may need to apply more restrictive BEM requirements.

3.2.2. Technical conditions for low-power terminal stations

Table 14 defines the maximum permitted in-block TRP for LP TS operating within the duplex gap of the FDD frequency arrangement.

Frequency range of in-block emissions	Maximum mean in-block TRP
+5 MHz from FDD downlink upper band edge to FDD uplink lower band edge	20 dBm

Table 14: In-block requirements –LP TS

Table 15 defines the out-of-band BEM requirements for LP terminal stations within the spectrum allocated to mobile/fixed communication networks and broadcasting.

Frequency range of out-of-band emissions	Maximum mean out-of-band TRP	Measurement bandwidth
Frequencies allocated to FDD downlink	-43 dBm	5 MHz
0 to +5 MHz from FDD downlink upper band edge	1.6 dBm	5 MHz
Frequencies allocated to FDD uplink	-25 dBm	5 MHz
Frequencies allocated to TDD	-43dBm	5 MHz
Frequencies allocated to broadcasting	-65dBm	8 MHz

Table 15: Out-of-band requirements –LP TS

ANNEX 4

Illustrations of emission masks for different frequency arrangements

Figures 1 to 8 illustrate the base station block edge masks and terminal station emission masks which are defined in Sections 1 and 2 of Annex 3. These are shown in the context of the preferred harmonised frequency arrangement (Annex 1) and examples of other frequency arrangements (Annex 2). Cells marked in uniform grey represent out-of-block requirements for BS and out-of-of-band requirements for TS.

4.1. BS emissions for the preferred harmonised frequency arrangement

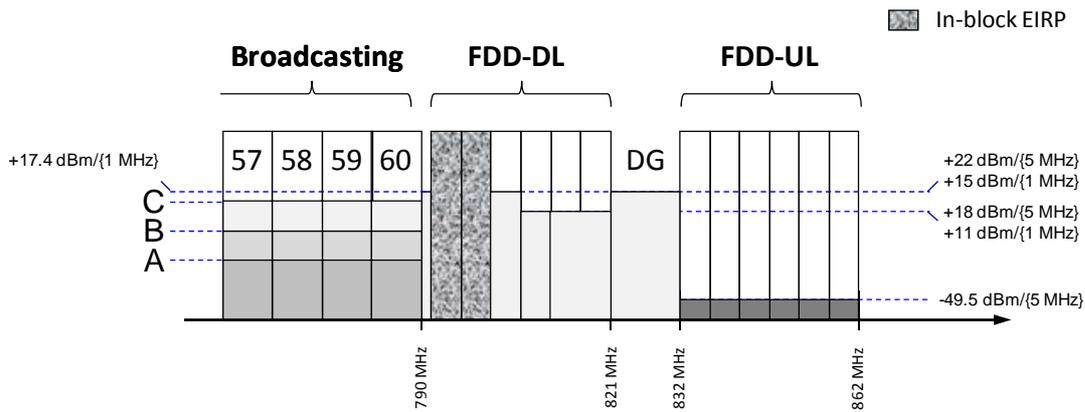


Figure 1: BS BEM for a FDD operator in the lowest two 5 MHz blocks in the preferred harmonized frequency arrangement

The baseline requirement A shall be systematically applied for the protection of digital terrestrial broadcasting channels in use at the time of deployment of MFCNs.

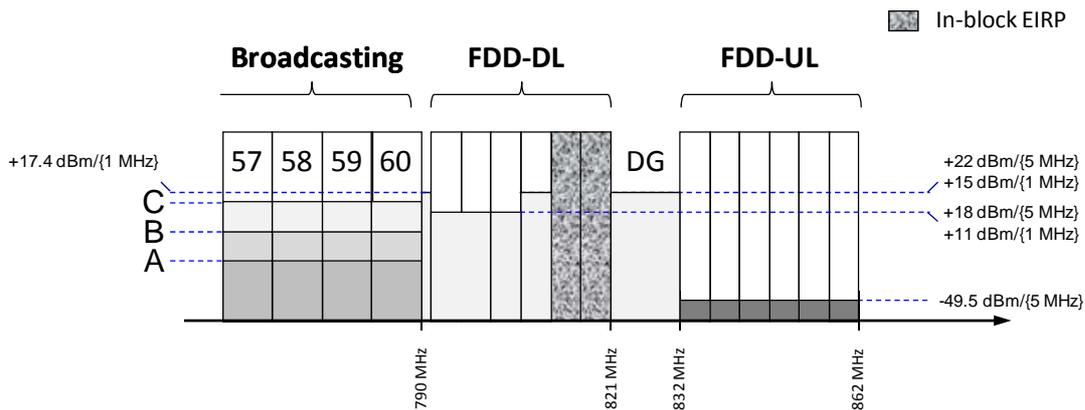


Figure 2: BS BEM for a FDD operator in the upper two 5 MHz blocks in the preferred harmonized frequency arrangement

4.2. BS emissions for the examples of other frequency arrangements

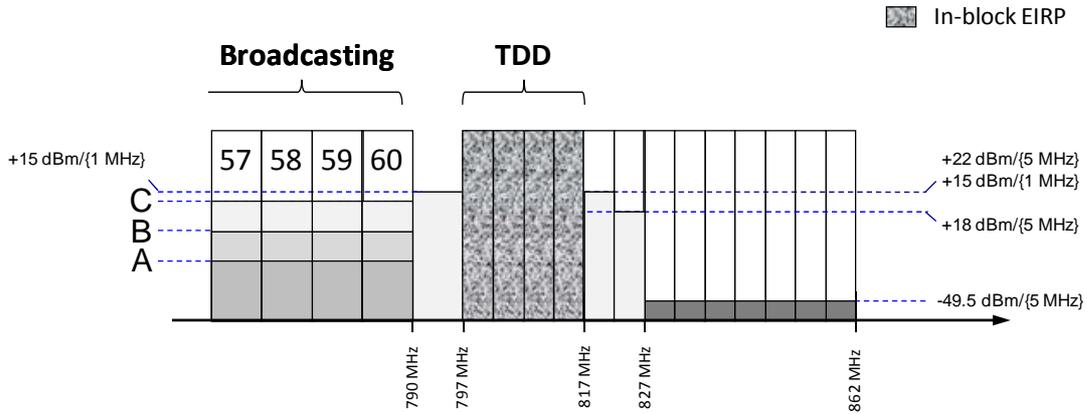


Figure 3: BS BEM for a TDD operator in the lowest four 5 MHz blocks where the 790-862 MHz band is allocated to TDD MFCN

The baseline requirement A shall be systematically applied for the protection of digital terrestrial broadcasting channels in use at the time of deployment of MFCNs.

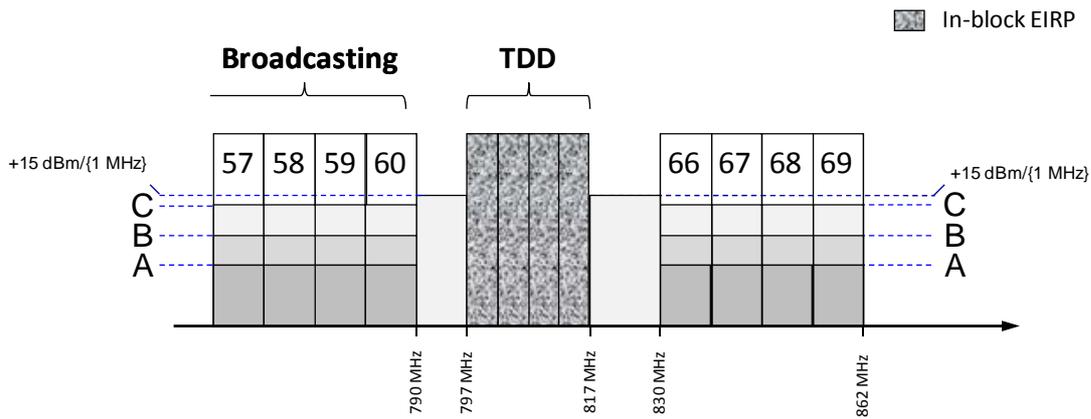


Figure 4: BS BEM for a TDD operator in the lowest four 5 MHz blocks where the 790-862 MHz band is used by a mixture of TDD MFCN and DTT

The baseline requirement A shall be systematically applied for the protection of digital terrestrial broadcasting channels in use at the time of deployment of MFCNs.

4.3. TS emissions for the preferred harmonised frequency arrangement

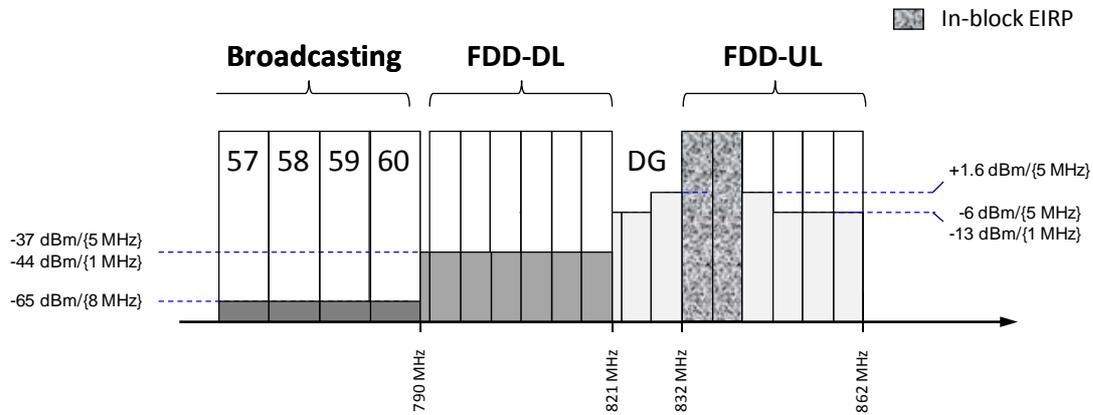


Figure 5: TS emission mask for a FDD operator in the lowest two 5 MHz blocks in the preferred harmonized frequency arrangement

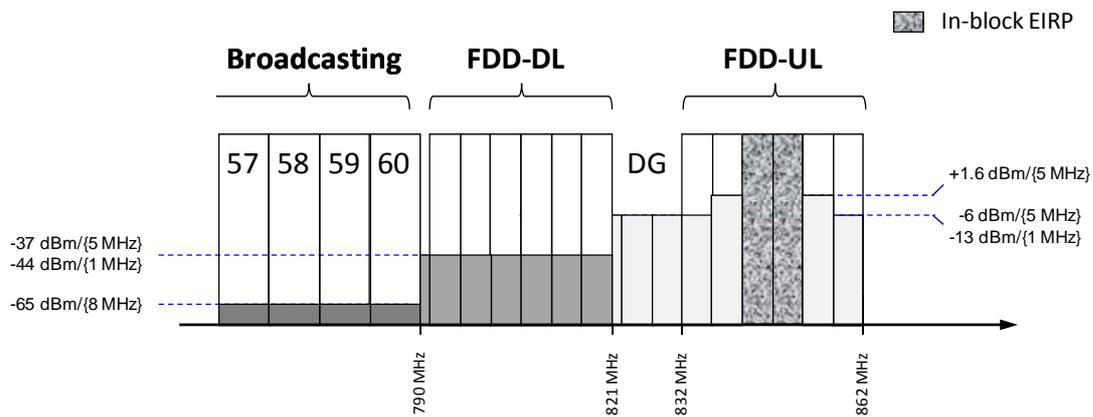


Figure 6: TS emission mask for a FDD operator in the middle two 5 MHz blocks in the preferred harmonized frequency arrangement

4.4. TS emissions for the examples of other frequency arrangements

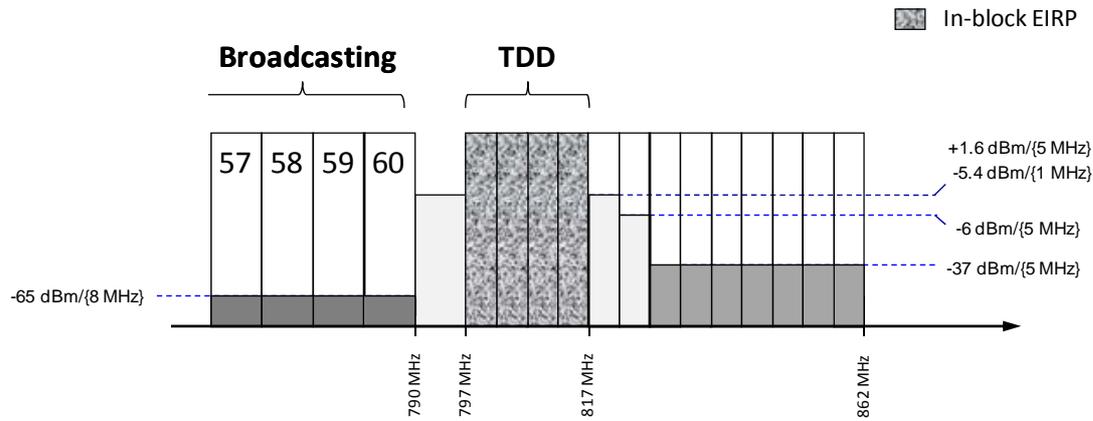


Figure 7: TS emission mask for a TDD operator in the lowest four 5 MHz blocks where the 790-862 MHz band is allocated to TDD MFCN

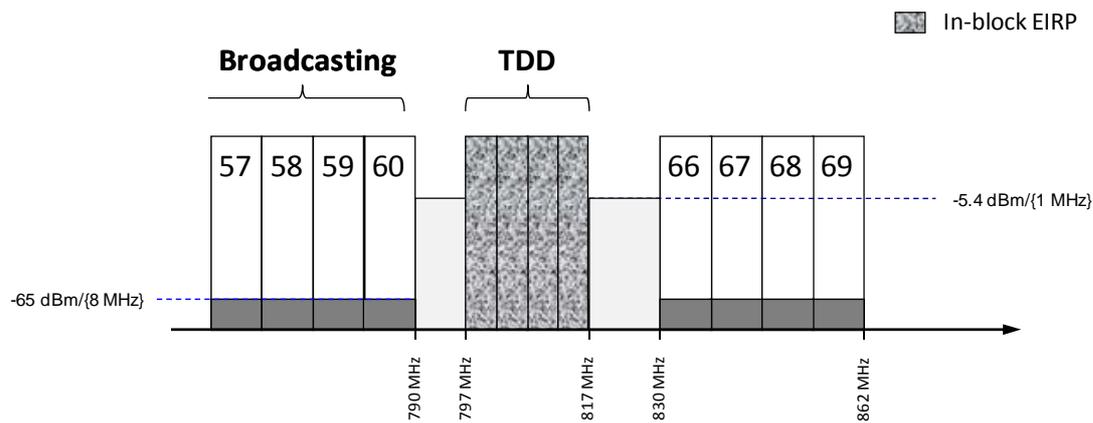


Figure 8: TS emission mask for a TDD operator in the lowest four 5 MHz blocks where the 790-862 MHz band is used by a mixture of TDD MFCN and DTT