CEPT Report 60

Report B from CEPT to the European Commission in response to the Mandate

"to develop harmonised technical conditions for the 694[1]-790 MHz ('700 MHz') frequency band in the EU for the provision of wireless broadband and other uses in support of EU spectrum policy objectives"

Report approved on 01 March 2016 by the ECC

[1] Provisional lower band edge subject to precise definition within the scope of this Mandate

0 EXECUTIVE SUMMARY

This CEPT Report has been developed within the European Conference of Postal and Telecommunications Administrations (CEPT) in the framework of the EC Mandate on the 700 MHz (see ANNEX 1:).

CEPT was mandated to undertake the following tasks:

1. Develop a *preferred technical (including channelling) arrangement* and identify *common* and *minimal (least restrictive) technical conditions*[2] for wireless broadband use in the 694[3]-790 MHz frequency band for the provision of electronic communications services, subject later to a precise definition of the lower band edge under task (3), as well as PPDR services that can make use of such technical conditions.

   These conditions should be sufficient:
   a) to avoid interference between wireless broadband use and other services in the 694[3]-790 MHz band and in adjacent bands, and in particular to ensure the appropriate protection of broadcasting and PMSE services below the lower band edge, as well as compliance with EU harmonised conditions for the 790-862 MHz band[4];
   b) to facilitate cross-border coordination, including at the EU external borders;

2. In performing (1), study the possibility of identifying *suitable spectrum to accommodate* incumbent uses in the 694[3]-790 MHz band such as PMSE (in particular wireless microphones)[5], and develop *common technical conditions* for the coexistence of such uses with wireless broadband use in the band, taking into account spectrum sharing requirements and efficient spectrum use;

3. In addition to and based on (1) and taking utmost account of the possibility of international harmonisation[6], assess the need to refine the conditions developed under (1), in particular *the common and minimal (least restrictive) technical conditions*, in order to ensure that they are sufficiently precise for the development of EU-wide equipment. The overall aim of a coordinated European approach should be considered, as implemented through detailed national decisions on frequency rearrangements in line with international frequency coordination obligations.

Tasks 1 and 2 have been addressed and answered in CEPT Report 53 [1]. This CEPT Report is a response to Task 3 of the EC mandate 700 MHz (see ANNEX 1:). The European Commission requested an early delivery of the CEPT response to Task 3 (see ANNEX 2:).

No particular modification has been introduced with respect to the provisions already included in CEPT Report 53 as a result of the outcome of WRC-15.

The channelling arrangement for Mobile/Fixed Communications Networks (MFCN) including an optional unpaired channelling arrangement (SDL) as contained in CEPT Report 53 was reviewed and no need to revise this arrangement was identified. The channelling arrangement for MFCN as contained in CEPT Report 53 is therefore confirmed.

The information on national options other than SDL (PMSE, PPDR and M2M) as contained in CEPT Report 53 was reviewed and is updated in this report, concerning BB PPDR band plans, based on the latest information available within CEPT. However, all these options are to be realised on national basis only according to national needs.

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[2] Such as the definition of appropriate BEMs (Block Edge Masks)
[3] This provisional lower band edge is subject to a precise definition within the scope of this Mandate. It is identical with the provisional lower limit stipulated in WRC-12 Resolution 232 which is subject to additional refinement at the WRC-15
[4] Subject to Commission Decision 2010/267/EU
[5] For example in unused parts of the band such as a centre gap of a potential FDD arrangement
[6] Such as resolutions at the ITU WRC-15

In this report the following terms are used:

- PPDR: *'public protection and disaster relief radio communications' means radio public safety and security services used by national authorities or relevant operators responding to the relevant national needs in public safety and security including in emergency situation.*

- M2M: *Machine to Machine communications is a general term and corresponds to a complex ecosystem including IoT (Internet of Things). This report refers to Machine to Machine communications based on cellular technologies.*

- PMSE: *Programme making and special events. For the purpose of this report, only the wireless audio component of PMSE is addressed.*

Furthermore, the information on the Least Restrictive Technical Conditions / BEM as contained in CEPT Report 53 was reviewed and is updated in this report based on the latest information available within CEPT[7]. CEPT recommends the technical conditions hereafter as the basis for the LRTC to be included in the future harmonisation measures for this band.

Finally, the technical conditions for wireless audio component of PMSE as contained in CEPT Report 53 was reviewed and is clarified in this report based on the latest information available within CEPT.

CEPT confirms that for the following items, the results in CEPT Report 53 remain valid, and they are thus not addressed in this report:

- Additional considerations on the coexistence between MFCN and broadcasting below 694 MHz

- Interference from broadcasting to MFCN

- Compatibility with harmonised conditions of wireless broadband at 790-862 MHz

- Non radio issues (potential impact on non-radio end-user equipment for fixed broadcasting and broadband electronic communication services)

These national options may result in several scenarios of cross-border coexistence between CEPT administrations. A conventional duplex approach ensures that cross-border coordination between PPDR networks and MFCN SDL systems is manageable with appropriate field-strength levels to be defined later by CEPT in relevant ECC Recommendations for cross-border coordination. Bilateral cross-border coordination agreements signed by national administrations in that regard will not impact those technical conditions as described below.

The cross-border coordination issues between MFCN and other services in the band 694-790 MHz were addressed by WRC-15 and are covered in Resolution 760 (WRC-15) “Provisions relating to the use of the frequency band 694-790 MHz in Region 1 by the mobile, except aeronautical mobile, service and by other services”.

[7] ECC/DEC/(15)01 [2]

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LIST OF ABBREVIATIONS

Abbreviation	Explanation
BB-PPDR	Broadband Public Protection and Disaster Relief
BEM	Block Edge Mask
BS	Base Station
CEPT	European Conference of Postal and Telecommunications Administrations
DL	Downlink
DTT	Digital Terrestrial Television
DVB-T2	Digital Video Broadcasting Terrestrial, 2nd Generation
EC	European Commission
ECC	Electronic Communications Committee
ECS	Electronic Communications Services
e.i.r.p.	equivalent isotropically radiated power
ETSI	European Telecommunication Standard Institute
FDD	Frequency Division Duplex
IMT	International Mobile Telecommunications
ITU	International Telecommunication Union
LRTC	Least Restrictive Technical Conditions
LTE	Long Term Evolution
MCL	Minimum Coupling Loss
MFCN	Mobile/Fixed Communications Networks
M2M	Machine-to-Machine
OOB (OOBE)	Out-of-band (Out of band emission)
PMSE	Programme Making and Special Events
PPDR	Public Protection and Disaster Relief
QoS	Quality of Service
SEAMCAT	Spectrum Engineering Advanced Monte Carlo Analysis Tool
SEM	Spectrum Emission Mask
SDL	Supplemental Downlink
TRP	Total Radiated Power
TS	Terminal Station
UL	Uplink
WBB	Wireless broadband
WRC-15	World Radiocommunication Conference 2015

1 INTRODUCTION

This CEPT Report responds to task 3 of the EC mandate 700 MHz (see ANNEX 1:). Based on the information contained in CEPT Report 53 [1], the results delivered in this report address the following topics:

- Review of the Mobile/ Fixed Communications Networks (MFCN) channelling arrangement;
- Review of the national options for SDL, PMSE, PPDR and M2M;
- Review of the Least Restrictive Technical Conditions (based on the BEM approach) for commercial MFCN, as well as for PPDR if used in the frequency bands identified for MFCN;
- Review of the technical conditions for PMSE.

2 REVIEW OF THE TECHNICAL CONDITIONS FOR MFCN

Further to the review of technical conditions for MFCN, CEPT confirmed that they are in the form of

(a) a paired (2x30 MHz) channelling arrangement that also contains an optional element to allow administrations to implement zero or up to four block(s) of 5 MHz for SDL, and

(b) common least restrictive technical conditions (LRTC) defined as block-edge masks (BEMs). BEMs are related to spectrum licensing and the avoidance of interference between users of spectrum.

MFCN channelling arrangement

The channelling arrangement for MFCN as contained in CEPT Report 53 [1] was reviewed and no need to revise this arrangement was identified. The channelling arrangement for MFCN was therefore confirmed as follows:

- The block sizes shall be in multiples of 5 MHz, which does not preclude smaller channel bandwidths within a block;
- A paired frequency arrangement (FDD);
  - terminal station transmitter: 703-733 MHz;
  - base station transmitter: 758-788 MHz;
- An unpaired frequency arrangement (SDL) on optional basis;
  - SDL using 'zero or up to four' of the following frequency blocks: 738-743 MHz, 743-748 MHz, 748-753 MHz and 753-758 MHz. The decision on the number of contiguous blocks would be taken at national level. This approach ensures flexibility for combination with other options described hereafter.

694-703	703-708	708-713	713-718	718-723	723-728	728-733	733-738	738-743	743-748	748-753	753-758	758-763	763-768	768-773	773-778	778-783	783-788	788-791
Guard band	Uplink						Gap	SDL (A)				Downlink						Guard band
9 MHz	30 MHz (6 blocks of 5 MHz)						5 MHz	20 MHz (zero up to 4 blocks of 5 MHz)				30 MHz (6 blocks of 5 MHz)						3 MHz

(A) SDL Option: "The zero or up to 4 blocks of 5 MHz approach" provides flexibility for combination with other options being considered in CEPT

As alternatives to the optional unpaired frequency arrangement (SDL), administrations could choose other options such as Programme Making and Special Events (PMSE), Public Protection and Disaster Relief (PPDR), Machine to Machine (M2M) or combinations thereof that could respond to demands by using all or part of the duplex gap of the paired band plan (733-758 MHz) and, if appropriate, the guard bands.

These national options may result in several scenarios of cross-border coexistence between CEPT administrations. A conventional duplex approach ensures that cross-border coordination between PPDR networks and MFCN SDL systems is manageable with appropriate field-strength levels to be defined later by CEPT in relevant ECC Recommendations for cross-border coordination. Bilateral cross-border coordination agreements signed by national administrations in that regard will not impact those technical conditions as described below.

The cross-border coordination issues between MFCN and other services in the band 694-790 MHz were addressed by WRC-15 and are covered in Resolution 760 (WRC-15) "Provisions relating to the use of the frequency band 694-790 MHz in Region 1 by the mobile, except aeronautical mobile, service and by other services".

Least restrictive technical conditions (LRTC)

During the review process, CEPT identified the need to update the MFCN Base Station BEM including Table 1:, Table 3: and Table 5: and the titles of Table 4:, Table 6:, Table 7:, Table 8: and relevant similar tables included in the CEPT Report 53 [1]. CEPT reviewed and confirmed the MFCN Terminal Station BEM. The technical conditions applicable to MFCN Base Stations were updated to incorporate relevant conditions regarding protection of possible national options for PPDR and M2M in guard bands and the duplex gap outside the 2x30MHz MFCN channelling arrangements.

CEPT recommends the technical conditions hereafter as the basis for the LRTC to be included in the future EC framework on Electronic Communications Services (ECS).

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.

The technical conditions derived in this Report for the frequency range 694-790 MHz are optimised for, but not limited to, fixed/mobile communications networks (two-way). Therefore, they are derived both for base stations (BS), applicable also to SDL blocks, and terminal stations (TS). The BEMs have been developed to ensure coexistence with other MFCN blocks (including the option for SDL), as well as other services and applications in the band and in adjacent bands. Additional measures may be required at a national level to achieve coexistence with other services and applications using the guard bands or the duplex gap. BEMs for BS and TS are applicable to equipment used in commercial mobile networks, as well as for PPDR applications operating in the MFCN paired channelling arrangement (703-733 and 758-788 MHz) based on the assumption that the BB-PPDR network has the same performance requirements and similar topology as commercial networks.

In the derivation of the BEM elements for protection of PPDR and M2M frequency blocks, it has been assumed that the same protection requirements as for MFCN should be applied. These requirements are applicable when PPDR and M2M options are implemented in the guard bands or the duplex gap at a national level. Those options for PPDR and M2M are being studied in CEPT. For PPDR, it is assumed that the bandwidth used is either 3 MHz or 5 MHz. For M2M it is assumed that the bandwidth is between 200 kHz and 3 MHz. BEM requirements for TSs and BSs to protect broadcasting below 694 MHz are also sufficient for the protection of PMSE operating below 694 MHz. Technical conditions applicable to either PPDR or M2M national options are not covered by this report and are outside the scope of the mandate.

2.1 BASE STATION

The MFCN Base Station (BS) BEM consists of several elements. The in-block power limit is applied to a block licensed to an operator. The out-of-block elements consist of a baseline level, designed to protect the spectrum of other MFCN operators as well as adjacent services, and transitional levels enabling filter roll-off from in-block to baseline levels. Additionally, elements are provided for guard bands between MFCN and other services and between the MFCN uplink (UL) and downlink (DL). The BEM is based on minimum coupling loss (MCL) analysis and simulations.

Table 1: contains the different elements of the BS BEM, and Table 2: to Table 8: contain the power limits for the different BEM elements.

To obtain a BS BEM for a specific block in the paired FDD or the optional unpaired spectrum, the BEM elements that are defined in Table 1: are used as follows:

- In-block power limit is used for the block assigned to the operator.
- Transitional regions are determined, and corresponding power limits are used. The transitional regions may overlap with guard bands, adjacent bands and the duplex gap, in which case transitional power limits are used.

- For remaining spectrum assigned to MFCN UL and DL (including SDL spectrum, if applicable), for DTT spectrum below 694 MHz, for spectrum used for MFCN above 790 MHz or used for PPDR or M2M (UL or DL), baseline power limits are used.
- For remaining guard band spectrum (i.e. not covered by transitional regions or used by PPDR or M2M) guard band power limits are used.
- For spectrum between 733 and 758 MHz not used by MFCN (including SDL) or by PPDR or M2M national options, FDD duplex gap requirements apply.

Operators of mobile/fixed communications networks in the 694-790 MHz band may agree, on a bilateral or multilateral basis, less stringent technical parameters provided 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.

Table 1: MFCN BS BEM elements for blocks in the paired frequency arrangement (2x30 MHz) and SDL blocks

BEM Element	Defintion
In-block	Block for which the BEM is derived.
Baseline	Spectrum used for MFCN UL and DL (including SDL, if applicable), for DTT, for MFCN above 790 MHz (UL and DL), for PPDR or M2M UL or DL.
Transitional region	The transitional region applies from 0 to 10 MHz below and above the block assigned to the operator. In a frequency range where transitional regions and spectrum used by MFCN, PPDR or M2M uplinks overlap, transitional power limits do not apply.
Guard bands	- Spectrum between the DTT allocation below 694 MHz and the lower edge of the MFCN uplink (694-703 MHz). - Spectrum between the upper edge of MFCN downlink (788 MHz) and the lower edge of the 800 MHz frequency band MFCN downlink (791 MHz) In case of overlap between transitional regions and guard bands, transitional power limits are used. When spectrum is used by PPDR or M2M, baseline or transitional power limits are used.
Duplex Gap	Spectrum in the FDD duplex gap, 733-758 MHz. In case of overlap between transitional regions and the part of the FDD duplex gap not used by SDL, PPDR or M2M, transitional power limits are used.

Table 2: MFCN BS in-block power limit

Frequency range	Maximum mean e.i.r.p.	Measurement Bandwidth
Block assigned to the operator	Not mandatory. In case an upper bound is desired by an administration, a value of 64 dBm/5 MHz per antenna may be applied	5 MHz

Table 3: MFCN BS baseline requirements

Frequency range	Bandwidth of protected block	Maximum mean e.i.r.p.	Measurement Bandwidth
Uplink frequencies in the range 698-736 MHz [2]	≥ 5 MHz	-50 dBm per cell [1]	5 MHz
	3 MHz	-52 dBm per cell [1]	3 MHz [2]
	≤ 3 MHz	-64 dBm per cell [1]	200 kHz [2]
Uplink frequencies in the range 832-862 MHz	≥ 5 MHz	-49 dBm per cell [1]	5 MHz
Downlink frequencies in the range 738-791 MHz	≥ 5 MHz	16 dBm per antenna	5 MHz
	3 MHz	14 dBm per antenna	3 MHz
	< 3 MHz	2 dBm per antenna	200 kHz
Downlink frequencies in the range 791-821 MHz	≥ 5 MHz	16 dBm per antenna	5 MHz

[1] In a multi sector site "cell" refers to one of the sectors.
[2] Administrations may select a measurement bandwidth of 3 MHz or 200 kHz for protection of block size 3 MHz depending on national options implemented.

Table 4: MFCN BS transition requirements in the range 733-788 MHz

Frequency range	Maximum mean e.i.r.p.	Measurement Bandwidth
–10 to –5 MHz from lower block edge	18 dBm per antenna	5 MHz
–5 to 0 MHz from lower block edge	22 dBm per antenna	5 MHz
0 to +5 MHz from upper block edge	22 dBm per antenna	5 MHz
+5 to +10 MHz from upper block edge	18 dBm per antenna	5 MHz

Table 5: MFCN BS transition requirements above 788 MHz

Frequency range	Maximum mean e.i.r.p.	Measurement bandwidth
791-796 MHz for block with upper edge at 788 MHz	19 dBm per antenna	5 MHz
791-796 MHz for block with upper edge at 783 MHz	17 dBm per antenna	5 MHz
796-801 MHz for block with upper edge at 788 MHz	17 dBm per antenna	5 MHz
788-791 MHz for block with upper edge at 788 MHz	21 dBm per antenna	3 MHz
788-791 MHz for block with upper edge at 783 MHz	16 dBm per antenna	3 MHz
788-791 MHz for block with upper edge at 788 MHz for protection of systems with bandwidth < 3 MHz	11 dBm per antenna	200 kHz
788-791 MHz for block with upper edge at 783 MHz for protection of systems with bandwidth < 3 MHz	4 dBm per antenna	200 kHz

Table 6: MFCN BS Requirements for the part of the FDD duplex gap not used by SDL, PPDR or M2M

Frequency range	Maximum mean e.i.r.p.	Measurement Bandwidth
-10 to 0 MHz offset from DL lower band edge or lower edge of the lowest SDL block, but above uplink upper band edge	16 dBm per antenna	5 MHz
More than 10 MHz offset from DL lower band edge or lower edge of the lowest SDL block, but above uplink upper band edge	-4 dBm per antenna	5 MHz

Table 7: MFCN BS Requirements for spectrum in guard bands not used by PPDR or M2M

Frequency range	Maximum mean e.i.r.p.	Measurement Bandwidth
Spectrum between broadcasting band edge and FDD uplink lower band edge (694-703 MHz)	-32 dBm per cell (1)	1 MHz
Spectrum between downlink upper band edge and downlink of 800 MHz MFCN (788-791 MHz)	14 dBm per antenna	3 MHz

(1) In a multi sector site "cell" refers to one of the sectors.

Table 8: MFCN BS Baseline requirements for DTT spectrum

Frequency range	Maximum mean e.i.r.p.	Measurement bandwidth
For DTT frequencies below 694 MHz where broadcasting is protected	-23 dBm per cell (1)	8 MHz

(2) In a multi sector site "cell" refers to one of the sectors.

2.2 TERMINAL STATION

The terminal station (TS) BEM consists of an in-block level, elements for the spectrum between the MFCN UL and DL (including SDL, if applicable), requirements for the guard band between DTT and the MFCN UL, and a baseline level for DTT spectrum, see Table 9: to Table 12:. Further requirements will have to be taken into account by ETSI in the harmonised standards, which may require close cooperation between ETSI, CEPT and Standard Developing Organisations.

The power limits are specified as e.i.r.p. for terminal stations designed to be fixed or installed and as total radiated power (TRP) for terminal stations designed to be mobile or nomadic[8].

Administrations may relax the in-block power limit in certain situations, for example fixed TS in rural areas, provided that protection of other services, networks and applications is not compromised and cross-border obligations are fulfilled.

[8] 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, e.i.r.p. and TRP are equivalent. For a directional antenna radiation pattern, e.i.r.p. in the direction of the main beam is (by definition) greater than the TRP.

Table 9: TS in-block emission limit

Maximum mean in-block power
23 dBm

Note: 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.

Table 10: TS Requirements for guard band (694-703 MHz)

Frequency range of out-of-block emissions	Maximum mean out-of-block e.i.r.p.	Measurement Bandwidth
694-698 MHz	-7 dBm	4 MHz
698-703 MHz	2 dBm	5 MHz

Table 11: TS requirements for duplex gap (733-758 MHz)

Frequency range of out-of-block emissions	Maximum mean out-of-block e.i.r.p.	Measurement Bandwidth
733-738 MHz	2 dBm	5 MHz
738-753 MHz	-6 dBm	5 MHz
753-758 MHz	-18 dBm	5 MHz
Note: This table is provided for information. The values in the table have been derived from the Spectrum Emission Mask specified in clause 4.2.3 of ETSI EN 301 908-13 v6.2.1, which means that LTE equipment will comply inherently with the emission limits specified in the table. As such, no additional test procedure is required to ensure compliance of such equipment with the emission limits specified above.		

Table 12: Unwanted emissions requirements for TS over frequencies occupied by broadcasting

Frequency range of unwanted emissions	Maximum mean unwanted emission power (see Notes)	Measurement Bandwidth
470-694 MHz	-42 dBm	8 MHz

Note 1: Unwanted emission limit is based on broadcasting using DVB-T2 and derived for an MFCN system with a bandwidth of 10 MHz for a DTT-MFCN centre frequency separation of 18 MHz (assuming an 8 MHz TV channel, 9 MHz guard band and a 10 MHz MFCN bandwidth).
If administrations wish to allow the deployment of MFCN on a national basis with a bandwidth greater than 10 MHz and in case an out-of-band power higher than -42 dBm/8 MHz is generated in the band below 694 MHz, they should consider:
either implementing the greater MFCN bandwidth starting at a frequency higher than 703 MHz so that the required limit of out-of-band power is still met;
and/or applying mitigation techniques (see Note 3).
Note 2: This value has been derived with regard to fixed DTT reception. Administrations who wish to consider portable-indoor DTT reception may need, on a case-by-case basis, to implement further measures at a national/local level (see Note 3).
Note 3: Examples of potential mitigation techniques which may be considered by administrations include using additional DTT filtering, reducing the in-block power of the TS, reducing the bandwidth of the TS transmissions, or using techniques contained in the non-exhaustive list of potential mitigation techniques given in CEPT Report 30 [3].

3 REVIEW OF ALTERNATIVE OPTIONS FOR PMSE, PPDR, M2M ON A NATIONAL BASIS WITHIN THE GIVEN CHANNELLING ARRANGEMENT FOR MFCN IN THE 700 MHz BAND INCLUDING FDD (2x30 MHz)

CEPT Report 53 [1] describes options other than MFCN that are being considered within CEPT as an alternative to the SDL option within the given channelling arrangement for MFCN in the 700 MHz band including FDD (2x30 MHz): see section 2 “Alternative options for PMSE, PPDR, M2M and other services on a national basis within the given channelling arrangement for MFCN in the 700 MHz band including FDD (2x30 MHz)”. All these options are to be realised on a national basis only according to national needs.

The analysis and description provided in CEPT Report 53 remain valid except on the list of PPDR band plans which have been updated as follows:

National BB-PPDR usage is planned to be accommodated within the 700 MHz range by either designating spectrum for dedicated BB-PPDR, use of commercial MFCN or a combination of both (hybrid) as necessary to fulfil national PPDR requirements. The band plans are summarised below:

- For BB-PPDR in dedicated spectrum outside the given FDD MFCN channelling arrangement (2x30 MHz), the following options are being considered: 2x5 MHz in 698-703/753-758 MHz and/or 2x3 MHz in 733-736/788-791 MHz.
- BB-PPDR usage could be anywhere within the given FDD MFCN channelling arrangement (2x30 MHz) and use a conventional duplex with 55 MHz spacing and blocks of 5 MHz.

It should be noticed that the combination of PPDR or M2M UL, 733-736 MHz, with the lowest SDL block, 738-743 MHz, will result in a frequency separation of only 2 MHz. As explained in ECC Report 218 this configuration is manageable by administrations although it is noted that particular measures may be needed and taken on a case-by-case basis.

4 REVIEW OF TECHNICAL CONDITIONS FOR THE WIRELESS AUDIO COMPONENT OF PMSE

The technical conditions for PMSE in CEPT Report 53 [1] ensure protection of MFCN in the band 694-790 MHz and are derived from the body loss values used for PMSE in the duplex gap 1785-1805 MHz (CEPT Report 50 [4]). Further to a review of these technical conditions, CEPT confirmed the conclusion derived in CEPT Report 53 including the PMSE power restrictions presented in Table 13: and Table 14: of that report.

Professional PMSE systems need to ensure a certain QoS; i.e. these systems will be operated only if the setup procedure ensures an interference free operation in the frequency band under consideration. This procedure will guarantee vice versa the protection of MFCN.

4.1 TECHNICAL CONDITIONS FOR PMSE

CEPT reviewed the technical conditions for PMSE and confirmed its analysis hereafter:

PMSE usage of spectrum in the MFCN duplex gap has been studied. Based on simulations of PMSE interference to MFCN UL and DL, power restrictions as presented in Table 13: and Table 14: have been derived. The PMSE unwanted emission has been derived from the PMSE emission mask defined in [6]. Note that these power restrictions do not cover PMSE out-of-block emission in the MFCN duplex gap. A spectrum emission mask may be applied for that spectrum on a national basis. For additional details, see [6].

The compatibility situation at the boundary between PMSE and MFCN around the uplink upper band edge, also applies at the lower band edge of the MFCN uplink, if PMSE is used in the guard band below the MFCN UL (694-703 MHz), due to the fact that the equipment is the same.

Table 13: Power restrictions for handheld microphone

Frequency Range	e.i.r.p.	Measurement bandwidth	Reasoning
MFCN, PPDR and M2M uplink frequencies	-45 dBm(unwanted emissions)	200 kHz	ETSI EN 300 422 [5]
More than -4.2 MHz offset from MFCN or PPDR downlink lower band edge or lower edge of the lowest SDL block	19 dBm(in-block power)	200 kHz	Annex 2 of ECC Report 221 [6]
-4.2 to -2.8 MHz offset from MFCN or PPDR downlink lower band edge or lower edge of the lowest SDL block	13 dBm(in-block power)	200 kHz	
- 2.8 to 0 MHz offset from MFCN downlink lower band edge or lower edge of the lowest SDL block (guard band)	guard band	-	
MFCN, PPDR downlink and SDL frequencies	-45 dBm(unwanted emissions)	200 kHz	ETSI EN 300 422 [5]

Table 14: Power restrictions for body worn microphone

Frequency Range	e.i.r.p.	Measurement bandwidth	Reasoning
MFCN, PPDR and M2M uplink frequencies	-45 dBm(unwanted emissions)	200 kHz	ETSI EN 300 422 [5]
More than -1.2 MHz offset from MFCN or PPDR downlink lower band edge or lower edge of the lowest SDL block	19 dBm(in-block power)	200 kHz	Annex 2 of ECC Report 221 [6]
- 1.2 to 0 MHz offset from MFCN or PPDR downlink lower band edge or lower edge of the lowest SDL block (guard band)	guard band	-	
MFCN,PPDR downlink and SDL frequencies	-45 dBm(unwanted emissions)	200 kHz	ETSI EN 300 422 [5]

Table 13: and Table 14: provide power restrictions for PMSE in order to protect MFCN. These power restrictions are based on the body loss values assumed in CEPT Report 50 [4], applicable to the frequency range 1785-1805 MHz.

It can be concluded that audio PMSE equipment will not be able to operate in the compatibility scenarios that were studied. However PMSE is able to find an operational channel with sufficient Quality of Service with the assumption of certain spatial distances between the PMSE equipment and the MFCN equipment. The most critical case is when the PMSE is close to a MFCN TS but if the separation distance is increased the probability of interference decreases accordingly.

PMSE should be operated only if a check of quality of service in the radio environment is performed before use and results in sufficient quality. The PMSE setup indicates whether enough PMSE channels with no interference are available to guarantee the needed quality of service. This procedure is described in Annex 5 of the ECC Report 191 [7].

4.2 PROTECTION OF PMSE BELOW 694 MHz

The CEPT noted that the 470-694 MHz band is currently available and will continue to be available for PMSE equipment on a sharing basis with the broadcasting service and that it is used on a daily basis.

Based on Monte Carlo SEAMCAT results and also with consideration of requirements on MFCN TS OOB emissions to protect the broadcasting service below 694 MHz (see CEPT Report 53 [1]), it can be concluded that MFCN TS above 703 MHz and PMSE below 694 MHz can coexist.

5 CONCLUSIONS

The channelling arrangement for MFCN including an optional unpaired channelling arrangement (SDL) as contained in CEPT Report 53 [1] was reviewed and no need to revise this arrangement was identified. The channelling arrangement for MFCN as contained in CEPT Report 53 is therefore confirmed.

The information on national options other than SDL (PMSE, PPDR and M2M) as contained in CEPT Report 53 was reviewed and updated, concerning BB PPDR band plans, based on the latest information available within CEPT. However, all these options are to be realised on a national basis only according to national needs.

Furthermore, the information on the Least Restrictive Technical Conditions / BEM as contained in CEPT Report 53 was reviewed and is updated in this report based on the latest information available within CEPT. CEPT recommends the technical conditions in this report as the basis for the LRTC to be included in the future harmonisation measures for this band. The bilateral cross border coordination agreements signed by national administrations will not impact those technical conditions.

Finally, the technical conditions for PMSE as contained in CEPT Report 53 were reviewed and clarified based on the latest information available within CEPT.

CEPT confirms that for the following items, the results in CEPT Report 53 remain valid, and they are thus not addressed in this report:

- Additional considerations on the coexistence between MFCN and broadcasting below 694 MHz;
- Interference from broadcasting to MFCN;
- Compatibility with harmonised conditions of wireless broadband at 790-862 MHz;
- Non radio issues (potential impact on non-radio end-user equipment for fixed broadcasting and broadband electronic communication services).

ANNEX 1: EC MANDATE 700 MHz

EUROPEAN COMMISSION
Directorate-General for Communications Networks, Content and Technology

The Director General

Brussels,
DG CONNECT/B4

MANDATE TO CEPT TO DEVELOP HARMONISED TECHNICAL CONDITIONS FOR THE 694[9]-790 MHZ ('700 MHZ') FREQUENCY BAND IN THE EU FOR THE PROVISION OF WIRELESS BROADBAND ELECTRONIC COMMUNICATIONS SERVICES AND OTHER USES IN SUPPORT OF EU SPECTRUM POLICY PRIORITIES

1. Purpose

The 2012 ITU World Radiocommunication Conference (WRC-12) agreed on an allocation of the 694[9]-790 MHz ('700 MHz') band to the mobile service[10] in ITU Region 1 with immediate effect after WRC-15, alongside broadcasting services., This created the challenge for EU spectrum policy to define a roadmap for a political decision-making process supported by technical specifications for the future use of the 700 MHz band in a coordinated way, in order to shape the ongoing process of international harmonisation of this band[11] while ensuring a balance of interests between incumbent and new users of spectrum and taking into account trends in technology and consumer behaviour.

In order to deal with this challenge in an efficient and forward-looking manner, EU spectrum policy should establish a long-term view of the future use of the whole UHF band currently allocated to terrestrial TV broadcasting in the EU (470-790 MHz[12]) taking into account the long-term developments of digital terrestrial television and their societal value, as well as the possibility of long-term convergence in broadcasting and wireless broadband to deliver voice, data and audio-visual services via a converged platform.

This mandate aims at developing **technical conditions** for the introduction of **wireless broadband** in the 700 MHz band by also studying the possibility of **shared spectrum use** with certain incumbent uses such as PMSE. The technical conditions should ensure the deployment of wireless broadband services while also taking into account **other priority areas of EU spectrum policy** such as public protection and disaster relief (PPDR) and should ensure appropriate protection for incumbent uses, primarily broadcasting services and PMSE, below the 700 MHz band, Appropriate protection of PMSE applications (such as wireless microphones) below the 700 MHz band should take into account the regulatory status of those applications.

The results of this mandate should constitute a **technical input to the EU-level political process** through a timely provision of the technical parameters for any strategic scenarios. The results of this mandate should also complement on high level deliverables of the Radio Spectrum Policy Group (RSPG), in particular the RSPG Opinions on wireless broadband[13] and the definition of common policy objectives for WRC-15[14].

[9] This provisional lower band edge is subject to a precise definition within the scope of this Mandate. It is identical with the provisional lower limit stipulated in WRC-12 Resolution 232 which is subject to additional refinement at the WRC-15
[10] In ITU terminology
[11] Within the ITU Joint Task Group JTG 4-5-6-7 working on Agenda Items 1.1 (spectrum requirements for wireless broadband) and 1.2 (use of the 700 MHz band for mobile services) for WRC-15
[12] Subject to the release of the 800 MHz band from broadcasting services in all EU Member States in the future

[13] RSPG12-415 "Request for an Opinion on Strategic Challenges facing Europe in addressing the Growing Spectrum Demand for Wireless Broadband"
[14] RSPG12-422 "Request for an Opinion on the preparation of Common Policy Objectives for WRC-15"

The exploitation of the results of this mandate does not necessarily entail the development of a technical implementation measure under the Radio Spectrum Decision. Any common regulatory action at EU-level should be guided by an EU-level political agreement on the long-term use of the 700 MHz band. In particular, the results of this mandate **do not prejudice the outcome of the inventory process** set up by the Radio Spectrum Policy Programme (RSPP)[15], which has to assist identifying suitable frequency bands in support of specific EU policies. The inventory process, which involves assessment of spectrum supply and demand, will examine the efficiency of spectrum use in WAPECS[16] and other relevant frequency bands and may justify an implementation measure for re-organising the 700 MHz band at an early stage also in view of international developments.

The deliverables on this mandate should contribute to consolidating Member States' positions in the ongoing activities at CEPT and ITU on defining the technical and regulatory conditions for use of the 700 MHz band for wireless broadband alongside broadcasting services[17]. In addition, they should provide a basis for any Member State that may decide to proceed with WBB in the 700 MHz band at an early stage after WRC-15, so as to avoid fragmentation in the internal market. Therefore, the scope and schedule of the mandate reflect the need for a timely and coordinated EU position on harmonised technical conditions in time for WRC-15.

2. EU Policy objectives

The Digital Agenda for Europe (DAE) has set ambitious **broadband targets** by 2020, namely ubiquitous fast broadband coverage in the EU of at least 30 Mb/s as well subscriptions to super-fast broadband of at least 100 Mb/s for 50% of the EU households. WBB is expected to play an important role in achieving these objectives.

Pursuant to the adoption of the revised regulatory framework in electronic communications in 2009, the RSPP gives priority to ensuring sufficient spectrum for the implementation of **specific Union policies**, in particular wireless broadband access, the provision of innovative audio-visual media services (subject to clearly substantiated demand), public safety, civil protection and disaster relief as well as programme making and special events (PMSE)[18].

In its discussion paper on the future use of the 700 MHz band presented to the RSPG[19], the Commission services set out some of the policy considerations and possible options from an EU perspective in order to launch a strategic discussion with Member States on a long-term vision on the future use of this band, including the scenario of **broadband-broadcasting convergence**.
Furthermore, in the course of the **inventory process** established by the RSPP and in light of the objective to identify at least 1200 MHz for wireless broadband by 2015, opportunities are being studied to designate additional spectrum for WBB based on balancing spectrum supply and demand and an evaluation of whether efficiency gains can be envisaged (e.g. via re-allocation, re-farming or sharing).
Therefore, within the tasks of this mandate as specified in the Section “Task order and schedule”", the Commission requests CEPT to take into account that use of the 700 MHz band should contribute to several **important EU policy objectives**, namely:

- strengthen the Internal Market for potential mass market services and equipment which will operate in the band both for legacy uses and potential new uses;
- contribute to the DAE broadband targets, which rely on a mix of technologies, including wireless broadband;
- support the development of the audio-visual media sector in developing innovative and converging services also by ensuring an appropriate level of protection of media services against interference from other spectrum uses;

[15] Decision 243/2012/EU of the European Parliament and of the Council of 14 March 2012
[16] Wireless Access Policy for Electronic Communications Services (see COM/2007/0050 final)
[17] In support of the studies at ITU level mandated by ITU Resolutions 232 and 233 (WRC-12)
[18] See Articles 3(b) and 6-8 of the RSPP (Decision 243/2012/EU)
[19] RSPG12-425 "Commission services' discussion paper on the future use of the 700 MHz band in the EU"

- meet spectrum demand in support of specific Union policies, in particular wireless broadband, public safety, civil protection and disaster relief, and PMSE;
- promote innovation and investment through enhanced flexibility in spectrum use;
- foster shared use of spectrum as well as encourage passive infrastructure sharing.

3. Justification

Pursuant to Article 2 of the Radio Spectrum Decision, activities under the Decision must facilitate policy making with regard to the strategic planning and harmonisation of radio spectrum use as well as ensure the effective implementation of radio spectrum policy in the EU. Furthermore, they shall take due account of the work of international organisations related to spectrum management such as the ITU.

Pursuant to Article 4(2) of the Radio Spectrum Decision[20] the Commission may issue mandates to the CEPT for the development of technical implementing measures with a view to ensuring harmonised conditions for the availability and efficient use of radio spectrum necessary for the functioning of the internal market. Such mandates shall set the tasks to be performed and their timetable.

WRC-12 allocated on a co-primary basis the 694[9]-790 MHz band to the mobile service[10] in ITU Region 1 (including all EU Member States) from 2015, and mandated the development of technical and regulatory conditions in time for WRC-15, subject to ongoing studies at ITU level. These studies have the objective to evaluate spectrum requirements, refine the lower edge of the band and define channelling arrangements. They must also take into account the existing EU harmonisation in the 800 MHz band ('digital dividend')[21]. The importance of shaping the international negotiations arises from the unique opportunity offered by the ITU process to promote global technical alignment in a particular spectrum band which potentially translates into economies of scale, lower cost of investment and improved conditions for roaming, thus bringing benefits to EU economy and citizens. Therefore, a coherent EU position in support of the single market should be developed when developing and promoting relevant proposals in international negotiations.

Currently, the 700 MHz band is licensed for terrestrial TV broadcasting in Member States. The Geneva 2006 (GE-06) agreement has laid the framework for cross-border frequency coordination within the broadcasting services as well as between the broadcasting and other services. There is a need to assess the compatibility of any re-allocation of the 700 MHz band affecting broadcasting. While the technical conditions developed through this Mandate inter alia shall ensure coexistence between radio applications, the Mandate shall also indicate the potential impact on non-radio end-user equipment for fixed broadcasting and broadband electronic communications services in support of standardisation work relating to interference mitigation.

Sub-1GHz spectrum is a valuable and scarce frequency resource suitable for ubiquitous wireless coverage. This could make the 700 MHz band suitable not only for electronic communications services or broadcasting delivery services but also for public safety services such as **public protection and disaster relief (PPDR)**[22]. In particular, broadband PPDR may in the future be deployed based on commercial WBB technology, which could result in synergies *inter alia* for spectrum designation and use. Different options for spectrum use are currently under consideration for broadband PPDR, including the 700 MHz band. This Mandate addresses potential PPDR services in the 700 MHz band. Member States should benefit in terms of cost savings and interoperability from harmonised technical conditions for WBB spectrum use, which may also allow the deployment of broadband PPDR applications in the same frequency band already dedicated to WBB. This is without prejudice to national competences regarding the designation and authorisation of spectrum for PPDR and should not limit WBB use in those Member States which make use of the full spectrum range already dedicated to WBB.

Furthermore, the 470-790 MHz band already accommodates other incumbent applications such as PMSE, in particular wireless microphones. It must be noted that finding enough available spectrum for PPDR and PMSE is also priority of the RSPP. Therefore, the exclusive designation of the 700 MHz band to a single

[20] Decision 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community, OJL 108 of 24.4.2002

[21] Subject to Commission Decision 2010/267/EU

[22] PPDR as a public service does not represent an electronic communications service in the meaning of the Framework Directive (2002/21/EC) as amended by Directive 2009/140/EC, and thus is not considered as a WBB service. However, it could nevertheless make use of harmonised conditions for WBB use, subject to national demand.

application such as WBB may not appear to be a sustainable approach. It is the high socio-economic value of this spectrum that calls for studying sharing opportunities between certain incumbent and potential new uses, either based on traditional frequency separation or on innovative approaches. In this regard, a mandate has already been issued to CEPT[23] to identify suitable frequency bands for wireless microphones and cordless cameras. Another mandate to CEPT to study alternative uses of the unpaired terrestrial 2 GHz band[24] highlights PMSE as one priority application.

Therefore, the Commission considers that international developments set in the context of consistent implementation of the RSPP objectives through the inventory process justify the need for technical studies to identify suitable spectrum in the 700 MHz band for WBB and other specific EU policy areas and harmonised technical conditions of use, in support of the EU-level policy process relating to the future use of this band.

4. Task order and schedule

CEPT is herewith mandated to undertake work to develop technical harmonisation conditions for the use of the 694[9]-790 MHz frequency band for the provision of wireless broadband electronic communications services and shared use with other services or applications in support of EU spectrum policy priorities.

In the work carried out under the Mandate, the general and specific policy objectives of the RSPP, such as effective and efficient spectrum use and the support for specific Union policies shall be given utmost consideration. In implementing this mandate, CEPT shall, where relevant, take utmost account of EU law applicable and support the principles of service and technological neutrality, non-discrimination and proportionality insofar as technically possible.

CEPT is also requested to collaborate actively with the European Telecommunications Standards Institute (ETSI) which develops harmonised standards for conformity under Directive 1999/5/EC. In this regard, CEPT must indicate the potential impact of the deliverables on this Mandate on non-radio end-user equipment for fixed broadcasting and broadband electronic communications services in support of standardisation work relating to interference mitigation.

In particular, CEPT is mandated to carry out technical studies intended to support the policy objectives presented above, in fulfilment of the following tasks:

(1) Develop a *preferred technical (including channelling) arrangement* and identify *common and minimal (least restrictive) technical conditions*[25] for wireless broadband use in the 694[9]-790 MHz frequency band for the provision of electronic communications services, subject later to a precise definition of the lower band edge under task (3), as well as PPDR services that can make use of such technical conditions. These conditions should be sufficient:

   (a) to avoid interference between wireless broadband use and other services in the 694[9]-790 MHz band and in adjacent bands, and in particular to ensure the appropriate protection of broadcasting and PMSE services below the lower band edge, as well as compliance with EU harmonised conditions for the 790-862 MHz band[26];

   (b) to facilitate cross-border coordination, including at the EU external borders;

(2) In performing (1), study the possibility of identifying *suitable spectrum to accommodate* incumbent uses in the 694[9]-790 MHz band such as PMSE (in particular wireless microphones)[27], and develop *common technical conditions* for the coexistence of such uses with wireless broadband use in the band, taking into account spectrum sharing requirements and efficient spectrum use;

[23] RSCOM11-59 rev1 "Mandate to CEPT on technical conditions regarding spectrum harmonisation options for wireless radio microphones and cordless cameras (PMSE equipment)"
[24] RSCOM12-17 rev3: "Mandate to CEPT to undertake studies on the harmonised technical conditions for the 1900-1920 MHz and 2010-2025 MHz frequency bands in the EU"
[25] Such as the definition of appropriate BEMs (Block Edge Masks)
[26] Subject to Commission Decision 2010/267/EU
[27] For example in unused parts of the band such as a center gap of a potential FDD arrangement

(3) In addition to and based on (1) and taking utmost account of the possibility of international harmonisation[28], assess the need to refine the conditions developed under (1), in particular *the common and minimal (least restrictive) technical conditions,* in order to ensure that they are sufficiently precise for the development of EU-wide equipment. The overall aim of a coordinated European approach should be considered, as implemented through detailed national decisions on frequency rearrangements in line with international frequency coordination obligations.

The Commission may provide CEPT with further guidance on this mandate depending on future agreements at EU level (which may involve the European Parliament and the Council) concerning spectrum resources to be made available in the context of specific EU policies, as well as relevant impact assessments the Commission may undertake in this context. Also, the impact of spectrum demand assessments for different uses at national level may require to be taken into account during the work on the Mandate.

CEPT should provide deliverables under this Mandate according to the following schedule:

Delivery date	Deliverable	Subject
November 2013	Interim Report from CEPT to the Commission	Description of work undertaken and interim results on tasks (1) and (2)
July 2014[29]	Final Draft Report A from CEPT to the Commission	Description of work undertaken and final results on tasks (1) and (2)
November 2014	Final Report A from CEPT to the Commission, taking into account the outcome of the public consultation	Description of work undertaken and final results taking into account the results of the public consultation on tasks (1) and (2)
March 2016[29]	Final Draft Report B from CEPT to the Commission	Considering international developments such as outcomes of the ITU WRC-15 - description of work undertaken and final results of the Mandate on task (3) as well as review of the results of the Final Report on tasks (1) and (2)
July 2016	Final Report B from CEPT to the Commission	Considering international developments such as outcomes of the ITU WRC-15 - description of work undertaken and final results of the Mandate on task (3) as well as review of the results of the Final Report on tasks (1) and (2), taking into account the results of the public consultation.

CEPT is requested to report on the progress of its work pursuant to this Mandate to all meetings of the Radio Spectrum Committee taking place during the course of the Mandate.

The Commission, with the assistance of the Radio Spectrum Committee and pursuant to the Radio Spectrum Decision, may consider applying the results of this mandate in the EU, pursuant to Article 4 of the Radio Spectrum Decision and subject to the results of the inventory process and the guidance of the RSPG.

[28] Such as resolutions at the ITU WRC-15
[29] Subject to subsequent public consultation

ANNEX 2: LETTER TO CEPT REQUESTING AN EARLY DELIVERY OF THE CEPT REPORT IN RESPONSE TO TASK 3

EUROPEAN COMMISSION
Directorate-General for Communications Networks, Content and Technology

Director-General

Brussels,
DG CNECT/B4/BSt/dd

Mr Eric Fournier
Chairman CEPT ECC
ANFR
78 avenue du Général de Gaulle
94704 Maisons-Alfort
France

Request for early delivery of the final CEPT Report 53 (B) in response to the Commission mandate on the 700 MHz band in time for the 55th meeting of the Radio Spectrum Committee of 16-17 March 2016

Dear Mr Fournier,

The Mandate to CEPT of 11 March 2013 to develop harmonised technical conditions for the 694 -790 MHz ('700 MHz') frequency band in the EU for the provision of wireless broadband and other uses in support of EU spectrum policy objectives lays down a delivery date for the final draft report B in March 2016 and of the final report B in July 2016, after the WRC-15.

In the meantime rapid developments have taken place in some Member States like Germany[1] and France regarding the release and authorisation of the 700 MHz band for mobile broadband services. A coordinated approach to this important frequency band would benefit from early guidance and regulatory certainty at the EU level provided by a Commission harmonisation measure.

The initial intention back in early 2013 when setting the above deadlines for the final report was to give CEPT appropriate time for incorporating major developments at WRC-15. Given the current stable process of preparing Agenda Item 1.2 of WRC-15, which is close to finalisation, such developments seem unlikely. In any case, while minor amendments to CEPT Report 53 may still be needed in the aftermath of WRC-15, they could hopefully be covered by the CEPT in a shorter time frame than initially foreseen.

Therefore, in view of the paramount importance to adopt a timely harmonisation measure regarding the 700 MHz band at the EU level based on the final CEPT Report 53 (B) while allowing CEPT to respond to anticipated WRC-15 developments, I would like to request CEPT to consider early delivery of Report 53 (B) already in March 2016, in time for the 55th meeting of the Radio Spectrum Committee (16-17 March 2016). In this regard, the Commission services plan to table for initial discussion a draft harmonisation

[1] Germany plans to start a spectrum auction including the 700 MHz band on 27 May 2015

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ANNEX 3: LIST OF REFERENCE

[1] CEPT Report 53: Report A from CEPT to the European Commission in response to the Mandate
[2] ECC Decision (15)01 “Harmonised technical conditions for mobile/fixed communications networks (MFCN) in the band 694-790 MHz including a paired frequency arrangement (Frequency Division Duplex 2x30 MHz) and an optional unpaired frequency arrangement (Supplemental Downlink)”
[3] CEPT Report 30: The identification of common and minimal (least restrictive) technical conditions for 790 - 862 MHz for the digital dividend in the European Union
[4] CEPT Report 50: Technical conditions for the use of the bands 821-832 MHz and 1785-1805 MHz for wireless radio microphones in the EU
[5] ETSI EN 300 422: Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; Part 1: Technical characteristics and methods of measurement
[6] ECC Report 221: Adjacent band compatibility between MFCN and PMSE audio applications in the 700 MHz frequency band.
[7] ECC Report 191: Adjacent band compatibility between MFCN and PMSE audio applications in the 1785-1805 MHz frequency range