

ECC Decision (06)01

The harmonised utilisation of the bands 1920-1980 MHz and 2110-2170 MHz for mobile/fixed communications networks (MFCN) including terrestrial IMT systems

Approved 24 March 2006

Amended 8 March 2019

EXPLANATORY MEMORANDUM

1 INTRODUCTION

This ECC Decision (06)01 which initially entered into force on 24 March 2006 and addressed both paired (1920-1980 MHz and 2110-2170 MHz) and unpaired (1900-1920 MHz and 2010-2025 MHz) frequency bands aimed at providing a common approach:

- for the planning and use of spectrum and channelling arrangements within the bands 1900-1980 MHz, 2010-2025 MHz and 2110-2170 MHz;
- for making available spectrum for IMT-2000/UMTS subject to market demand thus ensuring efficient and effective use of these frequency bands within the CEPT;
- ECC Decision (05)05 [1] follows a similar approach for addressing the IMT-2000/UMTS extension band (2500-2690 MHz).

The original version of ECC Decision/(06)01 replaced the following earlier ERC Decisions:

- ERC Decision (97)07 on the frequency bands for the introduction of the Universal Mobile Telecommunications System (UMTS) [2];
- ERC Decision (99)25 on the harmonised utilisation of spectrum for terrestrial Universal Mobile Telecommunications Systems (UMTS) operating in the bands 1900-1980 MHz, 2010-2025 MHz and 2110-2170 MHz [3];
- ERC Decision (00)01 extending ERC Decision (97)07 on the frequency bands for the introduction of terrestrial Universal Mobile Telecommunications System (UMTS) [4].

ECC conducted in 2010-2011 a review of this ECC Decision taking into account the information on the practical implementation and authorisations in force. ECC conducted in 2018 a review of this ECC Decision and, based on this assessment, developed harmonised least restrictive technical conditions (LRTC) suitable for LTE AAS and 5G (New Radio (NR) including Active Antenna Systems (AAS)) (see ECC Report 298 [5]).

The band 1900-1920 MHz, although licensed in many countries, remains not much used at the time when this revision was made, and the use of frequencies in the band 2010-2025 MHz has been authorised in few countries only. Frequency arrangements for these frequency bands have been removed from the revision of this ECC Decision. Further investigations are needed to develop a suitable ECC framework for those bands.

The bands 1920-1980 MHz and 2110-2170 MHz have been used widely in Europe for IMT-2000 networks deploying UMTS technology and for IMT-Advanced networks deploying LTE technology. For these frequency bands, the technical conditions including the frequency arrangements and the Block Edge Masks (only for the band 2110-2170 MHz) have been updated or introduced.

The updated frequency arrangements allow the deployment of systems with channel bandwidths other than 5 MHz by defining the block edge frequency instead of the carrier centre frequency, enabling the deployment of larger channel bandwidths.

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

AAS (Active Antenna Systems) refers to MFCN base stations and antenna systems where the amplitude and/or phase from the various antenna elements is continually adjusted resulting in an antenna pattern that varies in response to short term changes in the radio environment. This is intended to exclude long term beam shaping such as fixed electrical down tilt.

2 BACKGROUND

WARC-92 identified a total of 230 MHz spectrum for third generation mobile radio systems, known as IMT-2000 (then known as FPLMTS) at 2 GHz.

In 1997 the core frequency bands for Universal Mobile Telecommunications Systems (UMTS) in Europe were identified by the CEPT in ERC Decision (97)07 [2]. This ECC Decision designated 155 MHz of spectrum to terrestrial UMTS applications with an additional 60 MHz for UMTS satellite services. In Europe, the 15 MHz spectrum at 1885-1900 MHz identified by WARC-92 for IMT-2000 was not designated for UMTS in ERC Decision (97)07 due to current usage of this band by DECT. The ECC Decision required that administrations make available at least 2x40 MHz from within these bands by 2002. Subsequently, in response to “Mandate 1” of the European Commission to CEPT, ERC Decision (00)01 [4] extended ERC Decision (97)07 to require that administrations make available the entire 155 MHz of terrestrial spectrum for UMTS and other systems included in the IMT-2000 family by 1 January 2002, subject to geographical spread market demand and national licensing schemes.

Within the IMT-2000 family, the UMTS terrestrial radio access (UTRA) has been developed with 2 modes of operation: a Frequency Division Duplex (FDD) mode and a Time Division Duplex (TDD) mode. The FDD mode provides efficient operation in many UMTS environments, providing wide area coverage and full mobility applications. The TDD mode however may allow operators flexibility in network deployment and to support traffic asymmetry in an efficient way.

In 1999, the ERC adopted ERC Decision (99)25 [3] on the harmonised utilisation of spectrum for terrestrial UMTS operating within the bands 1900-1980 MHz, 2010-2025 MHz and 2110-2170 MHz. This requested that, subject to market demand, administrations make provisions to allow the operation of UMTS self-provided applications in a self-coordinating mode in the frequency band 2010-2020 MHz. It also indicated that the designation of this band for UMTS self-provided applications may be reviewed two years after the date of entry into force. ERC Decision (99)25 was developed under “Mandate 2” of the European Commission to CEPT. More than five years after the entry into force of ERC Decision (99)25, it was clear that the anticipated market for UMTS self-provided applications had not materialised.

In July 1999, the European Commission issued “Mandate 3” for the development of a common plan to identify, with a view to make available between the years 2005 and 2010, additional frequency spectrum for the provision of terrestrial 3G mobile and wireless services in the Community. This resulted in a European Common Proposal (ECP) for 160 MHz of additional spectrum for the terrestrial component of IMT-2000.

“Mandate 4” of the European Commission to CEPT triggered a decision process intended to guarantee that sufficient additional spectrum for third generation mobile and wireless communication systems will be made available in the European Union in due time, in a coordinated manner and based on market demand. The Commission proposed that CEPT should follow a staged approach for the deliverables requested by “Mandate 4”, ultimately leading to the adoption, by 31 March 2003, of an ECC Decision designating the additional frequency bands to be used for IMT-2000 systems and defining a ‘reference date’ by which the additional spectrum should become available. The outcome of the preliminary investigations undertaken by CEPT and the validation of its findings were described in CEPT Report 001 [6]

Finally, in March 2005, the ECC finally adopted ECC Decision (05)05 [1] on the harmonised utilisation of spectrum for IMT-2000/UMTS systems operating within the band 2500-2690 MHz. This ECC Decision was developed in response to “Mandate 5” of the European Commission to CEPT “to harmonise the frequency usage within the additional frequency band of 2500-2690 MHz to be made available for IMT-2000/UMTS systems in Europe”.

In December 2004, the European Commission sent a liaison statement to CEPT highlighting the results of a questionnaire to Member States on use of the band 2010-2025 MHz. This indicated, “... that there does not seem to be any interest for self-provided applications which are currently foreseen in the band 2010-2020 MHz...”.

The first revision of ECC Decision (06)01 aimed at providing the most suitable frequency arrangement for the bands 1920-1980 MHz/2110-2170 MHz to respond to future market demand. That revision modified the band plans and reduced the number of options relative to FDD or TDD operations. The band 1920-1980 MHz has been designated only for FDD uplink operations.

In June 2009, the European Commission issued a mandate to develop common and minimal (least restrictive) technical conditions for the 2 GHz bands.

CEPT Report 39 [7] is the CEPT response to this Mandate. This Report deals with the band plan for the 2 GHz bands as described in the original version of ECC Decision (06)01, with the following assumptions:

- 2x60 MHz FDD in the bands 1920-1980 MHz paired with 2110-2170 MHz;
- the bands 1900-1920 MHz and 2010-2025 MHz can be used for TDD operation or FDD uplink transmission paired with another frequency band.

The CEPT Report 39 was built on the work carried out in ERC Report 065 [8], by considering developments in characteristics of systems operating in adjacent bands and by considering technology neutral approach to allow technologies other than UMTS to be deployed. It was found that the conclusions of ERC Report 065 remain valid.

Further to the review conducted in 2010-2011, ECC decided to focus the revision of this framework on paired bands only. Another framework has been developed for the unpaired bands (see CEPT Report 52).

Consequently, the revision of the ECC Decision has enabled the introduction of the least restrictive technical conditions as defined in Annex 2 (requirements for FDD base stations).

The current revision of this ECC Decision aims to reflect the development of MFCN technologies, in particular the introduction of Active Antenna Systems (AAS). The changes that have been introduced concern the base station BEM, and consist of an alternative BEM for which Total Radiated Power (TRP) is the metric.

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

The implementation of this ECC Decision may encompass different stages at the national level with a varying complexity depending on the legal and regulatory framework as well as the existing licensing situation of each country.

Transition from the existing framework is envisaged to be implemented at the national level, via national consultation processes, when issuing or amending rights of use.

3 REQUIREMENT FOR AN ECC DECISION

The purpose of this ECC Decision is to harmonise the use of the bands 1920-1980 MHz and 2110-2170 MHz for mobile/fixed communications networks (MFCN) including terrestrial IMT systems, while:

- ensuring efficient and effective use of these frequencies within the CEPT;
- defining the use of the bands 1920-1980 MHz/2110-2170 MHz for FDD operation only; and
- including the relevant least restrictive technical conditions, based on CEPT Report 39 [7], as defined in Annex 2 covering the downlink FDD frequency band (i.e. 2110-2170 MHz), complemented by a set of least restrictive technical conditions for AAS MFCN systems.

The ECC recognises that such a harmonisation will maximise the benefit to operators, manufacturers as well as users and will facilitate the continued development of MFCN including terrestrial IMT systems within the CEPT.

ECC DECISION OF 24 MARCH 2006 ON THE HARMONISED UTILISATION OF THE BANDS 1920-1980 MHz AND 2110-2170 MHz FOR MOBILE/FIXED COMMUNICATIONS NETWORKS (MFCN) INCLUDING TERRESTRIAL IMT SYSTEMS (ECC DECISION (06)01), AMENDED 02 NOVEMBER 2012 AND 8 MARCH 2019

“The European Conference of Postal and Telecommunications Administrations,

considering

- a) that there is a large demand for interoperable mobile voice services and interoperable mobile data services;
- b) that terrestrial IMT systems have been developed to meet this demand;
- c) that detailed specifications of IMT radio interfaces are described in Recommendation ITU-R M.1457 [9] and Recommendation ITU-R M.2012 [10];
- d) that IMT comprises IMT-2000, IMT-Advanced and IMT-2020, as defined in Resolution ITU-R 56 [11] (on Naming for International Mobile Telecommunications);
- e) that there is on-going work in ITU-R to define IMT-2020;
- f) that 3GPP has specified New Radio (NR) including Active Antenna Systems (AAS) and also specified AAS support for LTE;
- g) that the deployment of AAS will greatly enhance the capacity and bit rates;
- h) that AAS MFCN systems should not claim more protection than provided to non-AAS MFCN systems;
- i) that ECC Report 298 [5] contains analysis of the suitability and update of the regulatory technical conditions for 5G MFCN and AAS operation in the 1920-1980 MHz and 2110-2170 MHz band;
- j) that AAS in the 2 GHz frequency band only applies to base stations;
- k) that the terrestrial IMT radio interfaces contain two modes of operation: Frequency Division Duplex (FDD) and Time Division Duplex (TDD) but the revision of this ECC Decision addresses FDD operation only;
- l) that a harmonised spectrum scheme for IMT, taking due account of the protection requirements of IMT and other radio services, allows efficient use of the spectrum, in particular in border areas;
- m) that ITU approved Report ITU-R M.2290 [12] on Future spectrum requirements estimate for terrestrial IMT;
- n) that “mobile/fixed communications networks” (MFCN) for the purpose of this ECC Decision includes IMT and other communications networks in the mobile and fixed services;
- o) that there could be differences in the market demand for spectrum for MFCN, in different CEPT countries, which could lead to different timescales for the introduction and evolution of MFCN within the bands 1920-1980 MHz and 2110-2170 MHz;
- p) that, based on CEPT Report 39 [7], the least restrictive technical conditions for non-AAS systems are defined in Annex 2 (requirements for FDD base stations);
- q) that in EU/EFTA countries the radio equipment that is under the scope of this ECC Decision shall comply with the RE Directive [13]. Conformity with the essential requirements of the RE 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 RE Directive;

- r) that ERC Decision (97)07 [2], ERC Decision (99)25 [3] and ERC Decision (00)01 [4] were withdrawn by the original version of this ECC Decision;
- s) that authorisations have been granted for the bands 1900-1920 MHz and 2010-2025 MHz based on the technical conditions as contained in the original version of this ECC Decision of 24 March 2006;
- t) that in the LRTC for this band as described in Annex 2 below, the spurious domain for the base station starts 10 MHz from the band edge and the spurious emissions limits are defined in ERC Recommendation 74-01 (for the coexistence studies in ECC Report 298 the value of -30 dBm/MHz was used) [14];
- u) that NR systems in frequency bands 1920-1980 MHz may operate in Supplemental Uplink (SUL) mode, i.e. NR uplink operation without paired downlink NR channel;
- v) that NR systems in the frequency band 1920-1980 MHz may operate in Supplemental Uplink (SUL) mode, (i.e. NR uplink operation without paired NR downlink channel in the 2110-2170 MHz frequency band);
- w) that SUL operation in the 1920-1980 MHz frequency band is combined with NR downlink operation in MFCN frequency bands other than the 2110-2170 MHz frequency band;
- x) that Non-AAS (non-active antenna systems) refers to MFCN base stations that provide one or more antenna connectors, which are connected to one or more separately designed passive antenna elements to radiate radio waves. The amplitude and phase of the signals to the antenna elements is not continually adjusted in response to short term changes in the radio environment;
- y) that AAS (Active Antenna Systems) refers to MFCN base stations and antenna systems where the amplitude and/or phase between antenna elements is continually adjusted resulting in an antenna pattern that varies in response to short term changes in the radio environment. This is intended to exclude long-term beam shaping such as fixed electrical down tilt,

noting

that UMTS carriers need to be offset 100 kHz from the centre of the blocks defined in the new band plan provided in Annex 1 in order to comply with the harmonised standard

DECIDES

1. that the frequency bands 1920-1980 MHz and 2110-2170 MHz are designated for MFCN including terrestrial IMT systems;
2. that administrations shall make provisions to allow the harmonised utilisation of spectrum in the frequency bands 1920-1980 MHz and 2110-2170 MHz for MFCN including terrestrial IMT systems, as identified in Annexes 1 and 2 to this ECC Decision;
3. that the frequency bands in Decides 2 shall be made available for MFCN including terrestrial IMT systems as from the entry into force of this ECC Decision, subject to market demand and national licensing schemes;
4. that this ECC Decision shall enter into force on date: 8 March 2019
5. that the preferred date for implementation of this ECC Decision shall be date: 8 September 2019;
6. that CEPT Member administrations shall communicate the national measures implementing this ECC Decision to the ECC Chairman and the Office when the ECC Decision is nationally implemented.

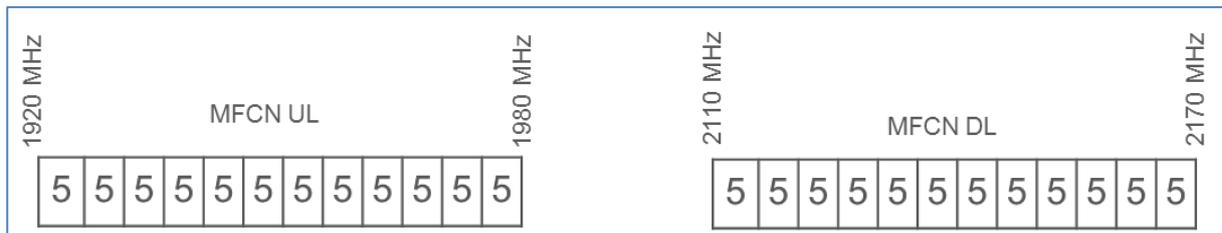
Note:

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

ANNEX 1: HARMONISED SPECTRUM SCHEME FOR MFCN INCLUDING TERRESTRIAL IMT SYSTEMS

1. The frequency band 1920-1980 MHz¹ is paired with 2110-2170 MHz².
2. The duplex direction for FDD carriers in these bands is mobile transmit within the lower band and base transmit within the upper band.
3. For licensing purposes, the bands 1920-1980 MHz and 2110-2170 MHz, are divided into twelve paired blocks and the minimum block size should be in the range 4.8 MHz to 5.0 MHz.
4. In previous revisions of this ECC Decision, the band plan contains 300 kHz guard bands at the lower and upper band edge resulting in the block edge nearest to 1920 MHz starting at 1920.3 MHz or above, the block edge nearest to 1980 MHz ending at 1979.7 MHz or below, the block edge nearest to 2110 MHz starting at 2110.3 MHz or above and the block edge nearest to 2170 MHz ending at 2169.7 MHz or below.
5. It is up to each administration to decide, based on its requirements, and considering the impact on existing authorisations in its country within the band and services in adjacent bands, whether and how to migrate from the band plan in previous revisions of this ECC Decision to the following band plan, and any associated conditions.

Figure 1: Band plan



¹ For SUL operation mode the frequency band 1920-1980 MHz may be used for NR uplink operation without paired downlink NR channel in the frequency band 2110-2170 MHz

² For SDL operation mode the frequency band 2110-2170 MHz may be used for NR downlink operation without paired uplink NR channel in the frequency band 1920-1980 MHz

ANNEX 2: TECHNICAL CONDITIONS BASED ON THE BEM APPROACH APPLICABLE TO FDD BASE STATIONS (IN THE BAND 2110-2170 MHz)

The technical conditions presented in this Annex are in the form of Block Edge Masks (BEMs) based on CEPT Report 39 [7] for non-AAS systems, complemented by a BEM for AAS systems based on ECC Report 298. 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.

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 transition requirements, and b) the in-block requirements (where appropriate). The BEMs are applicable only within the sub-band 2110-2170 MHz.

The BEMs have to be applied together with the requirements of Annex 1 which ensure coexistence between MFCN systems and other applications operating in adjacent bands.

These BEMs are optimised for, but not limited to, mobile/fixed communications networks (two-way). They are derived for macro base stations (BS) only in this Annex, and might not be appropriate for all other classes of base stations.

The BEM is applied as an essential component of the necessary conditions for the coexistence in the absence of bilateral or multilateral agreements between mobile networks in adjacent frequency blocks in the 2 GHz band, without precluding less stringent technical parameters if agreed among the operators of such networks.

An administration should ensure that operators to which it has granted authorisations in this band are free to enter into bilateral or multilateral agreements to develop less stringent technical parameters and, if agreed among all affected parties, these less stringent technical parameters may be used, if the level of protection for other networks (not party to the agreement) is not affected.

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

The studies in ECC Report 298 [5] confirmed that coexistence between AAS and non-AAS networks and between AAS and AAS networks are feasible with the technical conditions in the following section.

A2.1 TECHNICAL CONDITIONS FOR MFCN BASE STATIONS (FDD)

A2.1.1 In-block limits for FDD MFCN Base Station

In-block limits for non-AAS BS and AAS BS are not necessary as long as the “BS FDD to BS TDD” scenario does not need to be addressed. However, administrations may choose to set an e.i.r.p. limit for BS if needed on a national or local basis (e.g. to limit the risk of terminal station receiver blocking).

A2.1.2 Out-of-block limits for FDD MFCN Base Station

Table 1 defines the out-of-block BEM requirements for non-AAS MFCN base stations within the spectrum licensed to operators of MFCN networks. Table 2 contains the corresponding out-of-block BEM requirements for AAS MFCN base stations (see ECC Report 298 [5] for more details).

It should be noted that for non-AAS BS these requirements have been derived from the characteristics of macro base stations, with the assumption of an in-block e.i.r.p. limit of 61 dBm/5 MHz and an antenna gain of 17 dBi.

Table 1: Transition requirements – non-AAS BS BEM out-of-block e.i.r.p. limits per antenna³

Frequency range of out-of-block emissions	Maximum mean out-of-block e.i.r.p.	Measurement bandwidth
-10 to -5 MHz from lower block edge	11 dBm	5 MHz
-5 to 0 MHz from lower block edge	16.3 dBm	5 MHz
0 to +5 MHz from upper block edge	16.3 dBm	5 MHz
+5 to +10 MHz from upper block edge	11 dBm	5 MHz
Other blocks	9 dBm	5 MHz

Note: see also section A2.1.3 below

Table 2: Transition requirements – AAS BS BEM out-of-block TRP limits per cell⁴

Frequency range of out-of-block emissions	Maximum mean out-of-block TRP per cell (1)	Measurement bandwidth
-10 to -5 MHz from lower block edge	3 dBm	5 MHz
-5 to 0 MHz from lower block edge	8 dBm	5 MHz
0 to +5 MHz from upper block edge	8 dBm	5 MHz
+5 to +10 MHz from upper block edge	3 dBm	5 MHz
Other blocks	1 dBm	5 MHz

Note: see also section A2.1.3 below

A2.1.3 Other conditions

The spurious domain for the base station in this frequency band starts 10 MHz from the band edge and the corresponding spurious emission limits are defined in ERC Recommendation 74-01 [14].

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

³ The BEM level for base stations is defined as per antenna. It is applicable to base station configurations with up to four antennas per sector.

⁴ In a multi-sector base station, the radiated power limit applies to each one of the individual sectors.

ANNEX 3: LIST OF REFERENCES

This annex contains the list of relevant reference documents.

- [1] ECC Decision (05)05: The harmonised utilisation of spectrum for IMT-2000/UMTS systems operating within the band 2500-2690 MHz”, amended on 3 July 2015
- [2] ERC Decision (97)07: “The frequency bands for the introduction of the Universal Mobile Telecommunications System (UMTS)”, withdrawn March 2006
- [3] ERC Decision (99)25: “The harmonised utilisation of spectrum for terrestrial Universal Mobile Telecommunications Systems (UMTS) operating in the bands 1900-1980 MHz, 2010-2025 MHz and 2110-2170 MHz”, withdrawn March 2006
- [4] ERC Decision (00)01 extending ERC Decision (97)07 on the frequency bands for the introduction of terrestrial Universal Mobile Telecommunications System (UMTS), withdrawn March 2006
- [5] ECC Report 298: “Analysis of the suitability and update of the regulatory technical conditions for 5G MFCN and AAS operation in the 1920-1980 MHz and 2110-2170 MHz band, approved 8 March 2019
- [6] CEPT Report 001: “Report from CEPT to the European Commission under Mandate 4: Frequency usage to facilitate a co-ordinated implementation in the community of third generation mobile and wireless communication systems operating in additional frequency bands as identified by the WRC-2000 for IMT-2000 systems”, November 2002’
- [7] CEPT Report 39: “Report from CEPT to the European Commission in response to the Mandate to develop least restrictive technical conditions for 2 GHz bands”, June 2010
- [8] ERC Report 065: “Adjacent band compatibility between UMTS and other services in the 2 GHz band”, November 1999
- [9] Recommendation ITU-R M.1457-13: “Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2000 (IMT-2000)”
- [10] Recommendation ITU-R M.2012-3: “Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications Advanced (IMT-Advanced)”
- [11] Resolution ITU-R 56: “Naming for International Mobile Telecommunications”
- [12] Report ITU-R M.2078-0: “Estimated spectrum bandwidth requirements for the future development of IMT-2000 and IMT-Advanced”
- [13] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC
- [14] ERC Recommendation 74-01: “Unwanted emissions in the spurious domain”