Band overview
2300 MHz frequency band

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1. Summary

The 2300-2400 MHz frequency band (hereinafter referred to as the 2300 MHz frequency band) is one of the less used bands, and opportunities to increase efficiency have been sought at European level. At the initiative of the European Commission, a harmonisation process was launched in 2014 to define the least restrictive technical requirements at EU level. Based on the results of CEPT[[1]](#footnote-1) investigations, shared use could allow the introduction of broadband radio applications and the use of the 2300 MHz frequency band for terrestrial electronic communications networks (MFCNs[[2]](#footnote-2)) allowing broadband data transmission on a non-exclusive basis, while protecting existing services.

Due to the widely differing use of the band in the Member States of the European Union (hereinafter: EU), the harmonisation process has stalled and no EU legislation has been adopted to impose obligations on Member States. However, CEPT investigation results and the resulting CEPT documents (report, decision) are available. Some European countries have already made the 2300 MHz frequency band available for wireless broadband networks. CEPT is currently examining the most appropriate regulatory and harmonised technical conditions to enable the use of 5G.

According to domestic legislation, the 2300-2370 MHz (70 MHz) sub-band can be used for civil purposes in Hungary, while the 2370-2400 MHz (30 MHz) sub-band is for non-civil purposes. The 70 MHz part of the spectrum available for civil use has a planned status for terrestrial electronic communications networks with TDD[[3]](#footnote-3) access. The non-civil sub-band is already designated to similar TDD access systems; in addition, military telemetry and telecommand as well as military mobile systems can still operate in this sub-band.

In line with international efforts, ensuring the radio spectrum needed for the further development of mobile broadband services and making it available on demand, as well as ensuring efficient use of radio spectrum and supporting innovative solutions are among the NMHH’s priority strategic objectives. It is important to understand the needs and ideas for the MFCN in order to develop regulations for the future use of the 2300-2370 MHz frequency band for civil use and to make decisions on its use, including the detailed technical conditions of use and the method of distribution. The issue of the utilisation of the 2300 MHz frequency band has been raised at previous public consultations (most recently in December 2019), but no substantiated market demand was expressed at that time. It is also possible to deploy a nationwide system in the band. In this respect, the NMHH is investigating the competitive procedure as a possible distribution method, at least for a part of the frequency band.

1. Introduction

In Hungary the 2300-2400 MHz frequency band is allocated for civil purposes in the 2300-2370 MHz range, and for non-civil purposes above it up to 2400 MHz.

Pursuant to Decree No. 7/2015 (XI. 13.) NMHH on the national frequency allocation and the rules of using frequency bands (hereinafter: NFFF Decree), the 70 MHz sub-band available for civil purposes has a planned status for mobile/fixed communication networks (MFCN) of terrestrial electronic communications networks. The civil part of the band is designated for amateur radio and short-range radiodetermination applications. Occasional use based on short-term licenses is typical.

Radio licences issued for longer term are typical in the sub-band designated for non-civil use on the basis of the NFFF Decree, and the intensity of frequency band use have already started to increase, and a further increase can be expected.

The civil part of the band has so far been used for video PMSE[[4]](#footnote-4) purposes, which the EU considers to be a particularly important application. The general objective of the RSPP[[5]](#footnote-5) is to provide PMSE with the necessary frequencies. A harmonised rule for PMSE purposes has been established twice since the creation of the RSPP[[6]](#footnote-6). The RSPG[[7]](#footnote-7) aimed at creating a long-term PMSE strategy, and in its comprehensive opinion adopted in November 2017, the RSPG concluded that there was no need for harmonisation of additional bands for video PMSE yet, and that the demand needed to be addressed at member state level.

The EU gave a mandate to the CEPT in March 2014 to develop harmonised conditions for the use of the band.[[8]](#footnote-8) On the basis of the reports prepared, the shared use of the band between radio services is feasible, but Member States use the band significantly differently and the harmonisation process has been stopped at committee procedural (comitology) level. In theory, existing CEPT regulations and relevant ETSI standards allow the use of both MFCN and PMSE, and test results of various pilot projects are now available, all of which promise good results and easy deployment. In the CEPT, in the spring of 2020, a revision of Decision ECC/DEC/(14)02[[9]](#footnote-9) on harmonised conditions for the use of spectrum was launched in order to lay down the technical conditions for the use of next generation mobile systems (5G NR[[10]](#footnote-10)), including the possibility of using active antenna systems, with appropriate protection for other services and applications.

In order to develop detailed domestic regulation of the 2300-2370 MHz sub-band for civil use, it is necessary to know the needs of spectrum use. As a result of a public consultation, a decision can be taken, inter alia, on the method of distribution, that is, on the type of licensing and on possible limitations. So far, there has been no established market demand for use of the frequency band.

1. Regulation of 2300-2400 frequency band
	1. International regulation

International regulations on the frequency band have recently changed mainly to facilitate the use of the band for MFCN purposes, while taking into account the very different radio spectrum uses at European level, thereby facilitating more efficient use of the band.

Typically, the following systems and services operate in the band in the CEPT countries:

* telemetry (terrestrial/aeronautical);
* military use (e.g. UAS[[11]](#footnote-11));
* video-PMSE;
* amateur radio service (on a secondary basis);
* MFCN.

A typical method of introducing the MFCN is the designation of a frequency band/sub-band for this purpose. Even then, the maintenance of existing applications, which may need to be continued in the band, should be taken into account. In this case, the MFCN may share the band with other applications by dividing the band into sub-bands. Another solution is to use some other method based on shared radio spectrum usage in order to avoid band clearance. One possible way of sharing is licensed shared access (hereinafter referred to as LSA). The LSA is the regulatory approach proposed by the CEPT to Member States for the introduction of MFCN within the band if they wish to retain incumbent applications. Necessary conditions for the introduction of LSA should be developed at national level to ensure continuity in the use of radio spectrum by incumbents, i.e. their smooth use without compromising the quality of the service.

* + 1. ITU

Pursuant to the Radio Regulations (hereinafter: RR), in Region 1 the 2300-2450 MHz band is allocated on a primary basis to the fixed and mobile services and on a secondary basis to amateur and radiolocation services (Table 3.1.1).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | A | B | C | D |
| 1   | RR TABLE OF FREQUENCY ALLOCATIONS  | RR ALLOCATION RELEVANT TO HUNGARY  |
| 2   | REGION 1 | REGION 2 | REGION 3 |

|  |  |  |  |
| --- | --- | --- | --- |
| 368 | 2300–2450 MHzFIXEDMOBILE 5.384AAmateurRadiolocation | 2300–2450 MHzFIXEDMOBILE 5.384ARADIOLOCATIONAmateur | 2300–2450 MHzFIXEDMOBILE 5.384AAmateurRadiolocation |
|   |   5.150 5.282 5.395 |    5.150 5.282 5.393 5.394 5.396 |   5.150 5.282 |

Table 3.1.1

In Hungary, according to Annex 2 of the NFFF Decree, only the 2300-2400 MHz band is allocated to the fixed and mobile services. Footnote 5.384A applies to the mobile service:

*“The frequency bands 1710-1885 MHz, 2300-2400 MHz and 2500-2690 MHz, or portions thereof, are identified for use by administrations wishing to implement International Mobile Telecommunications (IMT) in accordance with Resolution 223 (Rev.WRC-15). This identification does not preclude the use of these frequency bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. (WRC‑15)”*

In the allocation according to the RR, in addition to the footnote above, footnotes 5.150 and 5.282 concern Hungary within the 2300-2450 MHz band (Annex 1 of the NFFF Decree), which only set rules for the sub-band above 2400 MHz.

According to the preferred frequency arrangement in Section 6 of the Annex to Recommendation ITU-R M.1036-6[[12]](#footnote-12), IMT[[13]](#footnote-13) systems can be implemented on a TDD basis in the whole 100 MHz sub-band.

Recommendation ITU-R SM.2404-0[[14]](#footnote-14) on regulatory tools to support enhanced shared use of the spectrum discusses LSA as a suitable method of spectrum allocation.

There is currently no ongoing modification process in the ITU concerning the regulation of the 2300-2400 MHz frequency band.

* + 1. CEPT

Decision ECC/DEC(14)02[[15]](#footnote-15) contains the least restrictive technical conditions for the use of the 2300-2400 MHz frequency band in order to facilitate, to direct in a common direction for CEPT Member States and to harmonise (on an optional basis) radio spectrum use in the frequency band for wireless broadband (WBB[[16]](#footnote-16)) applications without making incumbent applications impossible. For this purpose, it defines the technical parameters summarized as block edge mask (BEM) and also specifies the proposed channel spacing (20 blocks of 5 MHz, which can be combined to reach channels with a larger bandwidth).



Figure 3.1.2. Channel spacing

Upon establishing the BEM, the CEPT does not take into account coexistence with adjacent services below 2300 MHz. To address this issue, the use of the guideline described in ECC Report 172[[17]](#footnote-17) is recommended, which studies the compatibility issues within the band and between the applications within the band and those in adjacent bands.

International coordination rules for cross-border coordination (MFCN – MFCN; MFCN – other applications) are set out in Recommendation ERC/REC/(14)04[[18]](#footnote-18).

The concept and conditions for licensed shared access (LSA) are described in ECC Report 205[[19]](#footnote-19).

Recommendation ECC/REC/(15)04[[20]](#footnote-20) provides guidance for administrations for the introduction of a regulatory framework for sharing between MFCN and PMSE in the 2300-2400 MHz frequency band .

In response to the EU mandate, the CEPT produced three technical reports which set out the technical conditions for the use of WBB applications (CEPT Report 55[[21]](#footnote-21)), as well as the conditions and regulatory options that would allow for the shared use of the band for WBB and incumbent applications (CEPT Report 56[[22]](#footnote-22)) and between WBB and specifically PMSE as incumbent application (CEPT Report 58[[23]](#footnote-23)).

In the spring of 2020, the revision of Decision ECC/DEC/(14)02 on harmonised technical and regulatory conditions for the use of the band 2300-2400 MHz for Mobile/Fixed Communications Networks (MFCN) began in order to allow for the use of 5G technology and, if possible, the introduction of active antenna systems, with appropriate protection for other services and applications. The deadline for the completion of the technical studies on which the review is based is 4 November 2022. According to the ECC work programme, the expected deadline for the adoption of the amended decision is 3 March 2023.

* + 1. EU

On the basis of the results of the technical studies carried out, the CEPT reports commissioned by the EU have been prepared as part of the EU harmonisation procedure, which had begun, but this process was ultimately not completed. Due to the widely differing use of the spectrum in the Member States, no harmonised EU rules for the 2300-2400 MHz band, which are mandatory for EU Member States, have been adopted.

The RSPG discussed the question of LSA in 2013, detailing its advantages and disadvantages in the form of an opinion[[24]](#footnote-24). Based on the recommendations in the opinion, the member states must be engaged in active dialogue with stakeholders in order to develop the possible LSA solutions. In particular, the opinion based its recommendations on the fact that, based on the LSA concept and taking into account incumbent applications, the bands currently used can be made available for new uses, thereby increasing the amount of spectrum available and the efficiency of spectrum use.

* + 1. Standards

The band has been identified by the 3GPP[[25]](#footnote-25) as a possible TDD band[[26]](#footnote-26) since LTE Release 8 and is included in Technical Specification 38.104 V15 as a 5G band with the name n40. As a result, the 5G-ready mobile devices of major device manufacturers are now suitable for use in the band.

In countries where the use of the band for MFCN is planned but cannot be ensured without restrictions due to incumbent use, the use of the LSA architecture can be a solution. Documents ETSI TS 103 235, ETSI TS 103 379, ETSI TS 103 154 and ETSI TR 103 113 describe the LSA system architecture applicable in the 2300 MHz band to enable the deployment of terrestrial electronic communications networks in these cases.

* 1. National regulation

The rules for domestic use of the 2300-2400 MHz band are set out in the NFFF Decree.

Within the 2300-2400 MHz frequency band, the 2300-2370 MHz sub-band is planned for civil use, while the 2370-2400 MHz sub-band is designated for non-civil use for terrestrial electronic communications networks. In addition, radio systems within the scope of the radio amateur service may operate on a secondary basis throughout the band, and short-range devices (SRD[[27]](#footnote-27)) may operate on a tertiary basis. Military telemetry and telecommand as well as military mobile systems may still operate in the 2370-2400 MHz band.

* + 1. Provisions of NFFF Decree
1. **2300-2400 MHz (full frequency band)**

The rules for the entire 2300-2400 MHz frequency band are set out in Table 3.2.1a:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Radio service | Allocation by use | Nature of application | Availability | Application | Document |
| Amateur | Civil | 2 | Designated | Amateur radio service | ECC/REC/(02)01MSZ EN 301783 |
| \* | Civil - non-civil | 3 | Designated | SRD: radiodetermination applications |  |

Table 3.2.1.a

The detailed rules for amateur radio service and SRD radiodetermination applications are included in Annex 3 of the NFFF Decree.

1. **2300-2370 MHz frequency band in civil application**

The rules for the 2300-2370 MHz sub-band in civil use are set out in Table 3.2.1.b:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Radio service | Nature of application | Availability | Application | Document |
| FIXED | 1 | Planned | Terrestrial electronic communications networks (IMT, BWA, WiMAX, WiBro, LTE) | ECC/DEC/(14)02 |
| MOBILE (5.384A) | 1 | Planned | Terrestrial electronic communications networks (IMT, BWA, WiMAX, WiBro, LTE) | ECC/DEC/(14)02  |

Table 3.2.1.b

1. **2370 – 2400 MHz frequency band in non-civil application**

The rules for the 2370-2400 MHz sub-band in non-civil use are set out in Table 3.2.1.c:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Radio service | Nature of application | Availability | Application | Document |
| FIXED | 1 | Designated | Terrestrial electronic communications networks (IMT, BWA, WiMAX, WiBro, LTE) | ECC/DEC/(14)02 |
| MOBILE (5.384A, NJE) | 1 | Designated | Terrestrial electronic communications networks(BWA, WiMAX, WiBro, LTE) | ECC/DEC/(14)02 |
| MOBILE (5.384A, NJE) | 1 | Designated | Military telemetry and telecommand systems | ERC/REC 62-02 |
| MOBILE (5.384A, NJE) | 1 | Designated | Military mobile systems |  |
| \* | 3 | Designated | Low power wireless broadband data transmission |  |

Table 3.2.1.c

Additional rules for the “Low power wireless broadband data transmission” application:

- Power: max. 100 mW EIRP

- Duty cycle: ≤ 100%

* + 1. Conditions of use of non-civil terrestrial electronic communications networks in the 2370-2400 MHz frequency band

The detailed rules are included in Annex 3 of the NFFF Decree. Accordingly, the 2370-2400 MHz band is designated to electronic communications networks with TDD mode.

The subdivision of the band into TDD basic blocks is included in Table 3.2.2:

|  |  |
| --- | --- |
| **Basic block** | **Block band [MHz]** |
| 1 | 2370–2375 |
| 2 | 2375–2380 |
| 3 | 2380–2385 |
| 4 | 2385–2390 |
| 5 | 2390–2395 |
| 6 | 2395–2400 |

Table 3.2.2

Conditions for obtaining entitlement to and right of radio spectrum use, and that of band use are outlined in Table 3.2.2 b:

|  |  |
| --- | --- |
| **Subject of condition:** | **Requirement** |
| Purpose of use | audio and data transmission |
| Available systems | BWA, WiMAX, WiBro, LTE |
| Territorial coverage of entitlement to radio spectrum use | nationwide |

Table 3.2.2 b

Radio spectrum management requirements are contained in Table 3.2.2 c:

|  |  |
| --- | --- |
| **Subject of requirement** | **Requirement** |
| Duplex spacing | – |
| Nominal channel spacing | WiMAX: 5 MHz |
| LTE: 5 MHz, 10 MHz, 15 MHz, 20 MHz |
| Mode of access | only TDD |
| Power density | max. 31 dBW/5 MHz peak EIRP for central station and repeater station – user station link |
| max. 5 dBW/5 MHz peak EIRP for fixed-site user station |
| max. 1 dBW/5 MHz peak EIRP for transportable user station |
| max. 5 dBW/5 MHz peak EIRP for repeater station – central station link |

Table 3.2.2.c

* + 1. Other applications in the 2300–2400 MHz frequency band

The 2300–2400 MHz frequency band overlaps with the bands of several UWB[[28]](#footnote-28) type SRD applications as follows:

* 30 MHz–12.4 GHz - GPR/WPR[[29]](#footnote-29) (not harmonized);
* 2200–8000 MHz - Material sensing devices (harmonized).
1. Current use

In the 2300-2370 MHz sub-band, there is no licence for civil use other than short-term licences. Licences for short-term events (for civil purposes) are generally required for events such as concerts or sports events (e.g. Formula 1), usually for video PMSE applications.

The radio spectrum use by radio amateurs is not subject to occasional or connection-based licences, but we use a system of personal amateur licences that provide a legal basis for the use of the frequency band, similar to the other CEPT member states, so the use of the frequency band by amateurs is possible in the territory of Hungary.

Longer-term radio licences for non-civil radio spectrum use have been issued in the 2370-2400 MHz sub-band and the intensity of the use of the frequency band is expected to increase further. The possibility of interference by systems operating on the basis of radio licences issued in the non-civil sub-band must also be taken into account in the part of the band below 2370 MHz.

1. National regulatory plans

In line with international efforts, ensuring the radio spectrum needed for the further development of mobile broadband services and making it available on demand, as well as ensuring efficient use of radio spectrum and supporting innovative solutions are among the NMHH’s priority strategic objectives for the period between 2021-2025.

The NMHH’s radio spectrum strategy also aimed to satisfy PMSE needs and to study the possibilities of shared use (as a possible means of efficient spectrum use). These objectives coincide in the 2300-2400 MHz band.

Since the band is suitable for the introduction of 5G, the possibilities of using it for 5G purposes must be examined. With the efficient use of spectrum in mind, the solution increasingly used at international level, the utilisation of radio spectrum on a regional/local basis comes into view, thus the frequency band may be suitable for meeting the needs of private networks.

Considering that there is currently no significant use in the 2300-2370 MHz sub-band, it is necessary to understand the needs for this frequency band in order to determine future steps. Depending on the outcome of this assessment, it may be decided, inter alia, on the detailed regulatory conditions for the utilisation of the band for mobile purposes and if any amendment to the NFFF Decree is necessary. If there is a demand not only for the applications of a single radio service, then the options and possible conditions of shared use, even the possibility of introducing LSA-based use, must be examined. There is a long-term need for non-civil, primarily military use of the 2370-2400 MHz sub-band; the detailed technical specifications for non-civil use are already included in the NFFF Decree.

* 1. Options for future use

In order to ensure compatibility between current and future use, the most obvious solution is to divide the frequency band into sub-bands of an appropriate size, thereby separating the applications. The advantage of such use is that each sub-band can be used without a dedicated “co-tenant”, the disadvantage being the reduction in the amount of available radio spectrum. Compatibility with incumbent applications can also be achieved using other methods, but the solution depends on what needs arise and between which systems the compatibility must be ensured. This can be decided by the NMHH once the needs have been discovered.

Taking into account the existing use is important for the development of detailed technical rules for the use of the 2300 MHz frequency band. The frequency band is designated for use as a radio amateur, is affected by military use, and use for video-PMSE purposes should also be considered.

The band is not designated for PMSE applications, typically short-term video-PMSE licences are issued on some occasions in the band, so the right of radio spectrum use would not be violated from the PMSE side. If the 2300 MHz frequency band (or part of it) cannot be used in the future for video-PMSE applications, they must be operated in other suitable bands. Capacity issues with video-PMSE bands are not typical in Hungary, but in the case of high-profile events the means of communication have limited the available frequency set, so the use of the 2300 MHz frequency band for PMSE was a good solution.

There are several options for the introduction of mobile broadband applications (4G, 5G) in the 2300 MHz frequency band:

* possibility of nationwide networks in the whole band or in specific sub-bands,
* possibility of local/regional networks,
* which may include the possibility of 4G/5G-based private network solutions as a subtype,
* for all these, it is necessary to consider different licensing options (e.g. competitive tendering, “first come first served”) separately, but also collectively.

Understanding the needs of spectrum use, including for civil and non-civil purposes, is of paramount importance for the purpose of selecting the appropriate options.

Considering that under international regulations MFCN networks can be operated only with TDD access in this band, the issue of synchronization between networks is also important, as in the absence of this, appropriate guard bands must be used in order to avoid interferences between systems operating in adjacent frequency ranges. Distribution at regional/local level can also be a good tool for creating compatibility with existing applications by making possible the territorial separation between different systems of different applications or identical applications operating in parallel, thus resolving the issue of interference.

1. Radio spectrum use in border areas

For the 2300 MHz frequency band, Hungary does not have an international coordination agreement with neighbouring countries. In the event of the introduction of MFCN networks, it will be necessary to conclude bilateral and multilateral international coordination agreements with neighbouring countries to ensure efficient spectrum use in border areas. The technical basis for cross-border frequency use is set out in Recommendation ERC/REC/(14)04.

1. Radio spectrum fees

Pursuant to the NFFF Decree, the right holder acquiring entitlements to radio spectrum use shall pay a monthly band fee, in the case of radio spectrum for service purposes acquired as a result of a competitive procedure, as a result of the extension of the entitlement to radio spectrum use, or as a result of the renewal of the entitlement to radio spectrum use, and resold after acquisition, during the term of the entitlement to radio spectrum use, starting from the earliest date of the validity of the radio licence determined in Section 22(3) of Decree 4/2011 (X. 6.) NMHH on the Rules of Auctioning and Tendering to Acquire Entitlements to Frequency Usage.

The method of calculation for regular radio spectrum fees is prescribed by Decree 1/2011 (III.31.) NMHH on frequency reservation and usage fees (hereinafter: Fees Decree).

In order to determine the band fee payable for the use of the 2300 MHz frequency band, the Fees Decree needs to be amended, as this frequency band is not included in Section 20 entitled “Fees payable for bands within the scope of block management” and Annex 9 of the Fees Decree.

The criteria for determining the fees must include the chosen conditions of use of the band as a result of the market needs assessment. If, based on the intentions and needs of the applicants, the entitlements that can be obtained may be valid for a smaller than national area, the Fees Decree must be amended in accordance with the new circumstances.

1. European Conference of Postal and Telecommunications Administrations [↑](#footnote-ref-1)
2. Mobile/Fixed Communications Networks - In the context of convergence of fixed and mobile wireless communications services, the CEPT regulation introduced the term MFCN (Mobile/Fixed Communications Networks). This also includes IMT (International Mobile Telecommunication) systems as defined by the ITU. [↑](#footnote-ref-2)
3. Time division duplex, a method of time-division duplexing of communications [↑](#footnote-ref-3)
4. [↑](#footnote-ref-4)
5. Decision No 243/2012/EU of the European Parliament and of the Council of 14 March 2012 establishing a multiannual radio spectrum policy programme – Radio Spectum Policy Programme, RSPP [↑](#footnote-ref-5)
6. Commission Implementing Decisions 2014/641/EU and 2016/339/EU [↑](#footnote-ref-6)
7. Radio Spectrum Policy Group [↑](#footnote-ref-7)
8. EC, DG-CONNECT (1103207): „Mandate to CEPT to develop harmonised technical conditions for the 2300-2400 MHz ('2.3 GHz') frequency band in the EU for the provision of wireless broadband electronic communications services”, (2014.03.) <https://ec.europa.eu/digital-single-market/en/news/radio-spectrum-cept-mandates-0> [↑](#footnote-ref-8)
9. Electronic Communications Committee [↑](#footnote-ref-9)
10. New Radio [↑](#footnote-ref-10)
11. Unmanned Aerial System [↑](#footnote-ref-11)
12. ITU-R Recommendation ITU-R M.1036-6: Frequency arrangements for implementation of the terrestrial component of International Mobile Telecommunications in the bands identified for IMT in the Radio Regulations (10/2019) [↑](#footnote-ref-12)
13. International Mobile Telecommunication [↑](#footnote-ref-13)
14. ITU-R Report ITU-R SM.2404-0: Regulatory tools to support enhanced shared use of the spectrum (2017.06.) [↑](#footnote-ref-14)
15. ECC/DEC/(14)02: Harmonised technical and regulatory conditions for the use of the band 2300-2400 MHz for Mobile/Fixed Communications Networks (MFCN) [↑](#footnote-ref-15)
16. wireless broadband [↑](#footnote-ref-16)
17. ECC Report 172: Broadband Wireless Systems Usage in 2300-2400 MHz (2012.03.) [↑](#footnote-ref-17)
18. ERC/REC/(14)04: Cross-border coordination for mobile/fixed communications networks (MFCN) and between MFCN and other systems in the frequency band 2300-2400 MHz (2014.05.30.) [↑](#footnote-ref-18)
19. ECC Report 205: Licensed Shared Access (LSA), CEPT, (2014.02.) [↑](#footnote-ref-19)
20. ECC/REC/(15)04: Guidance for the implementation of a sharing framework between MFCN and PMSE within 2300-2400 MHz (2015.07.03.) [↑](#footnote-ref-20)
21. CEPT Report 55: Technical conditions for wireless broadband usage of the 2300-2400 MHz frequency band. [↑](#footnote-ref-21)
22. CEPT Report 56: Technological and regulatory options facilitating sharing between Wireless broadband applications (WBB) and the relevant incumbent services/applications in the 2.3 GHz band, CEPT, March 2015 [↑](#footnote-ref-22)
23. CEPT Report 58: Technical sharing solutions for the shared use of the 2 300‑2 400 MHz band for WBB and PMSE, CEPT, May 2015 [↑](#footnote-ref-23)
24. RSPG13-538: Opinion on Licensed Shared Access, Radio Spectrum Policy Group, November 2013 <https://circabc.europa.eu/sd/d/3958ecef-c25e-4e4f-8e3b-469d1db6bc07/RSPG13-538_RSPG-Opinion-on-LSA%20.pdf> [↑](#footnote-ref-24)
25. 3rd Generation Partnership Project [↑](#footnote-ref-25)
26. 3GPP TS 36.104 V8.1.0 (2008-03).: 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception (Release 8), March 2008[https://portal.3gpp.org/ChangeRequests.aspx?q=1&versionId=39719&release=182](https://portal.3gpp.org/ChangeRequests.aspx?q=1&amp;amp;versionId=39719&amp;amp;release=182) [↑](#footnote-ref-26)
27. Short Range Device, SRD [↑](#footnote-ref-27)
28. Ultra-Wideband [↑](#footnote-ref-28)
29. Ground Probing Radar/Wall Probing Radar [↑](#footnote-ref-29)