SparkLink

iSLA Technical Report

Task Group 1: Spectrum Study

Regulatory Landscape and Deployment Scenarios for mmWave Communications in the EU Countries

Version History

Version	Date	Modification made by
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1. DEFINITIONS, SYMBOLS AND ABBREVIATIONS

1.1. DEFINITIONS

For the purposes of the present document, the following definitions apply:

[UICC application Id: a unique identifier allowing UICC application to be identified in IMS network. (Example)]

1.2. SYMBOLS

For the purposes of the present document, the following symbols apply:

[|| Concatenation (Example)]

1.3. ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

BW Bandwidth

DFS

eMBB **Enhanced mobile broadband**

FWA **Fixed wireless access**

mmW **Millimeter-wave**

mmWave **Millimeter-wave**

RLAN **Radio local area network**

SRC **Short-range communications**

TPC

1. INTRODUCTION & SCOPE OF THE STUDY

Millimeter-wave (mmWave) communication plays a crucial role in shaping the future of wireless connectivity, particularly within local area, 5G networks and beyond. The mmWave spectrum offers exceptional data transmission rates, making it ideal for applications such as enhanced mobile broadband (eMBB), fixed wireless access (FWA), and short-range communications (SRC). This report delves into the regulatory landscape governing mmWave usage in the European Union (EU), covering both licensed and unlicensed bands, while also exploring deployment scenarios for short-range communication in various EU countries.

Regulations governing mmWave spectrum within the EU are primarily shaped by the European Electronic Communications Code (EECC) Directive (EU) 2018/1972, alongside policies set forth by the European Conference of Postal and Telecommunications Administrations (CEPT), the European Telecommunications Standards Institute (ETSI), and national regulatory authorities (NRAs) of each EU member state.

The European process of standardization and regulation for radiocommunication devices and systems is described in [5]. ETSI and CEPT are related in the sense that ETSI ERM prepares a system reference document (SRDoc) that is given as an input to CEPT/ECC that processes it, gives feedback to ETSI if needed, with an intention to publishing either a Spectrum regulation or a Report [5]. EU gives mandate to ETSI and CEPT and they provide reports and standards to EU.

2. REGULATORY FRAMEWORK FOR UNLICENSED MMWAVE BANDS IN EU

Without requiring individual license, unlicensed mmWave bands give flexibility for innovation and development in wireless technologies. CEPT and national authorities manage the governance of these EU bands. Important controlling factors include:

a) The main mmWave bands for unlicensed use span the 57–66 GHz range (V-band), harmonized across the EU under CEPT ECC Decision (ECC/DEC/(09)01) [1]. High-speed short-range wireless communications including WiGig (IEEE 802.11ad/ay) make extensive use of the 60 GHz band [2].
b) Power transmission limits are applied to reduce interference. Permissible power levels are specified in the ETSI EN 305 550-2 standard [3], allowing in particular cases up to 40 dBm EIRP.
c) Some EU members use adaptive spectrum allocation to maximize use while minimizing possible interference.
d) The Radio Equipment Directive (RED) (2014/53/EU) requires that devices running within these ranges follow fundamental safety, interoperability, and electromagnetic compatibility criteria [4].

3. UNLICENSED MMWAVE GUIDELINES THROUGHOUT EU

While CEPT promotes regulatory harmonization, each EU country may set specific rules on power limits, use conditions, and certification criteria for unlicensed mmWave bands. Here is a synopsis of the rules among the 27 EU members:

1. **Austria:** RTR supervises 60 GHz band compliance with ECC/DEC/(09).
2. **Belgium:** BIPT lets unlicensed access within the 57–66 GHz spectrum under controlled power limits.
3. **Bulgaria:** CRC guarantees follow-through to CEPT recommendations for unlicensed bands.
4. **Croatia:** HAKOM controls short-range mmWave consumption.
5. **Cyprus:** OCECPR applies spectrum rules covering the EU.
6. **The Czech Republic:** CTU adherues to CEPT mmWave spectrum recommendations.
7. **Denmark:** Energistyrelsen oversees unlicensed band national spectrum policies.
8. **Estonia:** The Technical Regulatory Authority conforms rules to CEPT.
9. **Finland:** Traficom lets unapproved use of the 57-66 GHz spectrum.
10. **France:** ARCEP follows CEPT recommendations in controlling mmWave unlicensed bands.
11. **Germany:** BNetzA applies ECC/DEC/(09)01 under further operational restrictions.
12. **Greece:** EETT allows only restricted unlicensed mmWave use.
13. **Hungary:** NMHH controls mm Wave spectrum access under CEPT rules.
14. **Ireland:** ComReg grants unlicensed uses access to the 60 GHz band.
15. **Italy:** AGCOM uses CEPT guidance on unlicensed mmWave spectrum.
16. **Latvia:** SPRK follows CEPT-aligned unlicensed mmWave policies.
17. **Lithuania:** RRT develops national guidelines for unapproved mmWave spectrum.
18. **Luxembourg:** ILR permits unapproved 60 GHz band access.
19. **Malta:** MCA guarantees spectrum policies compliant to EU for unlicensed bands.
20. **Netherlands:** Agentschap Telecom controls mm Wave spectrum access.
21. **Poland:** UKE follows spectrum policy aligned with CEPT.
22. **Portugal:** ANACOM lets unapproved use of the 57–66 GHz spectrum.
23. **Romania:** AN COMply with ECC/DEC/(09)01.
24. **Slovakia:** RU adhers to CEPT mmWave guidelines.
25. **Slovenia:** AKOS controlsmmWave spectrum policies.
26. **Spain:** CNMC lines its spectrum rules with EU-wide guidelines.
27. **Sweden:** PTS lets unlicensed usage of the 60 GHz band.

4. UNLICENSED MMWAVE BAND @ 60GHZ [6]

4.1. TECHNICAL PARAMETER RESTRICTIONS

In Table 1, the technical parameter restriction for 60 GHz unlicensed bandwidth is presented for wideband data transmission devices.

Table 1: Technical Parameter Restrictions

Parameter	Value
Frequency Range	57 - 71 GHz
Are there DFS requirements?	Not specifically regulated. Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonized standards adopted under Directive 2014/53/EU must be used.
Are there TPC requirements?	Not specifically regulated. Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques

Parameter	Value
	described in harmonized standards adopted under Directive 2014/53/EU must be used.
BW Restrictions	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonized standards adopted under Directive 2014/53/EU must be used.
Channelization	Not regulated
Indoor/Outdoor	Indoor and Outdoor. Please, refer to the power restrictions section. Automotive: On 8 February 2019, the CEPT/ECC issued the "Explanatory paper related to RLAN equipment using the 5 GHz bands in vehicles, including the usage under the non-specific SRD regulation". According to this document "RLAN use inside cars (passenger cars, lorries, buses) in the band 5150-5250 MHz is allowed at a maximum e.i.r.p. of 25 mW as this power restriction results in at least an equivalent attenuation as foreseen for RLAN operation inside buildings and therefore the necessary attenuation to facilitate sharing is provided." This power restriction was first included in the Annex A of the ERC Recommendation (70-03) October 2018 edition. Each CEPT member may decide about the adoption of this recommendation.
Is spectrum license required?	No.
Power restrictions	Effective Isotropic Radiated Power (E.I.R.P.) <= 40 dBm and 23 dBm/MHz e.i.r.p. density. Fixed outdoor installations are excluded. Effective Isotropic Radiated Power (E.I.R.P.) <= 55 dBm, 38 dBm/MHz e.i.r.p. density and a transmit antenna gain ≥ 30 dBi. This set of usage conditions is only available to fixed outdoor installations. Effective Isotropic Radiated Power (E.I.R.P.) <= 40 dBm , 23 dBm/MHz e.i.r.p. density and maximum transmit power of 27 dBm at the antenna port or ports

4.2. ADDITIONAL INFORMATION

In Table 2, additional spectrum regulation for 60GHz band is given, whereas in Table 3 an updated (end of 2024) list with EU regulations is presented.

Table 2: Additional information for 60GHz band.

Frequency bands	Spectrum regulation Information
60 GHz	- Wideband Data Transmission Systems (57 – 71 GHz): Commission Decision of 9 November 2006 on harmonization of the radio spectrum for use by short-range devices and subsequent amendments. Latest consolidated version: Commission Implementing Decision (EU) 2022/180 of 8 February 2022 amending Decision 2006/771/EC as regards the update of harmonized technical conditions in the area of radio spectrum use for short-range devices. - Sub-class 141, 142, 143 (as applicable): Wideband Data Transmission Systems (57 – 71 GHz)

4.3. EU REGULATIONS

Table 3: EU Regulations for 60GHz bands.

Regulation name	Version	Link
COMMISSION IMPLEMENTING DECISION (EU) 2022/179 of 8 February 2022 on the harmonized use of radio spectrum in the 5 GHz frequency band for the implementation of wireless access systems including radio local area networks and repealing Decision 2005/513/EC	8 February 2022	Link
Commission Decision 2006/771/EC	09 November 2016	Link
Commission Implementing Decision (EU) 2021/1067 of 17 June 2021 on the harmonized use of radio spectrum in the 5 945-6 425 MHz frequency band for the implementation of wireless access systems including radio local area networks (WAS/RLANs).	17 June 2021	
Commission Implementing Decision (EU) 2022/180 of 8 February 2022 amending Decision 2006/771/EC as regards the update of harmonized technical conditions in the area of radio spectrum use for short-range devices	8 February 2022	Link
Commission Implementing Decision (EU) 2022/2307 of 23 November 2022 amending Implementing Decision (EU) 2022/179 as regards designating and making available the 5150-5250 MHz, 5250-5350 MHz and 5470-5725 MHz frequency bands in accordance with the technical conditions set out in the Annex	23 November 2022	Link
Commission Implementing Decision 2024/3157 of 17 December 2024 amending Implementing Decision (EU) 2021/1067 on the harmonized use of radio spectrum in the 6 425–6 425 MHz frequency band for the implementation of wireless access systems including radio local area networks (WAS/RLANs)	19/12/2024	COMMISSION IMPLEMENTING DECISION (EU) 2024/3157 - Official Journal
ECC Decision (11)05	09 December 2011	Link Link
ECC Decision (20)01 - On the harmonized use of the frequency band 5945-6425 MHz for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN)	20 November 2020	ECC Decision (20)01

Regulation name	Version	Link
ECC Report 277	27 April 2018	Link
ERC/REC 70-03 - Relating to the use of Short Range Devices (SRD)	8 March 2024	
RED subclasses - Publication in accordance with Article 1(3) of Commission Decision 2000/299/EC	19 January 2020/	Link

4.4. TESTING STANDARDS

According to 'Directive 2014/53/EU' conformity assessment with the following aspects is required:

- **ELECTRICAL SAFETY:**

In accordance with the article 3.1(a), the protection of Electrical Safety as per 'Directive 2014/35/EU'. The application of the harmonized standards is the most straightforward method to show compliance, although alternate test methods can be employed.

- EN 62368-1:2014 + EN 62368-1:2014/AC:2015.
- EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + AC:2011 + A2:2013 (until 20 December 2020).

- **EMF:**

In accordance with the article 3.1(a), the protection of Health as per 'Directive 2014/35/EU'. The application of the harmonized standards is the most straightforward method to show compliance, although alternate test methods can be employed. If power less than 20 mW then EN 62479:2010, in other case, EN 62311:2008

- **EMC:**

In accordance with the article 3.1(b), an adequate level of electromagnetic compatibility as set out in Directive 2014/30/EU.

- ETSI EN 301 489-1 V2.2.3

- ETSI EN 301 489-17 V3.3.1 (2024-09) (Not published in the OJEU yet).

All the EU documents are presented in **Table 4**

Table 4: EU Testing Standards for 60GHz bands.

Frequency bands	Regulation name	Version	Link
60 GHz	Commission Implementing Decision (EU) 2022/498 of 22 March 2022 amending Implementing Decision (EU) 2020/167 as regards harmonized standards for avalanche beacons, satellite earth stations and systems, land mobile earth stations, maritime mobile earth stations, IMT cellular networks equipment, fixed radio systems, digital terrestrial TV transmitters, mobile communication on board aircraft systems, multi Gbps radio equipment, broadcast sound receivers, audio frequency induction loop drivers, primary surveillance	22 March 2022	Commission Implementing Decision (EU) 2022/498 of 22 March 2022
60 GHz	ETSI EN 301 489-17	V3.3.1 (2024-09)	ETSI EN 301 489-17 V3.3.1 (2024-09)
60 GHz	ETSI EN 302 567	V2.2.1 (2021-07)	ETSI EN 302 567 V2.2.1 (2021-07)
All	ETSI EN 302 567	18 July 2017	
All	Summary list of titles and references of harmonized standards under Directive 2014/53/EU on radio equipment	12 April 2022	Directive 2014/53/EU on radio equipment - Summary list as pdf document

4.5. CERTIFICATION REQUIREMENTS

The current type approval regulation at European Union level, Radio equipment Directive (RED), is in effect as of 13th June 2016, with a transition period that expires on 12th June 2017. After 12th June 2017 all devices must meet the RED requirements, so that devices in compliance with R&TTE must be re-certified in order to be placed on the European market after such date.

Since there are harmonized standards available to show compliance with all the essential requirements, conformity assessment can be carried out following annex II or III of the RE Directive.

While no harmonized standards available to show compliance with RED requirements, it is required to follow the Annex III or IV Conformity assessment procedure (Notified Bodies involvement) to show compliance with the RED.

At 60GHz bands Devices working in the 60 GHz frequency band are classified as Class 2 devices.

5. LICENSED MMWAVE BAND REGULATORY FRAMEWORK

High-priority uses including 5G networks, satellite services, and private wireless deployments fall under licensed mmWave spectrum. Important regulatory factors consist in:

- **Frequency Allocations:** Under Decision (EU) 2019/784 the 24.25–27.5 GHz band (26 GHz) has been set aside for 5G services in the EU.
- **Licensing Methods:** Direct assignments, beauty contests, or auctions all help to allocate spectrum**.**
- **Interference Management:** Operators have to follow spectrum sharing guidelines described in ECC Recommendation (19)01.

6. LICENSED MMWAVE RULES THROUGHOUT EUROPEAN UNION

Licenced mmWave spectrum allocation varies throughout EU countries. Here is a synopsis of the various regulatory strategies:

- **Germany, France, Italy, Spain:** 5G installations have been auctioned over the 26 GHz spectrum.
- **Scandinavian Countries:** Provide flexible licenses for commercial and industrial application.
- **Eastern and Central European Nations:** Gradually phasing in licensed mmWave.

7. EU DEPLOYMENT SCENARIOS FOR SHORT-RANGE COMMUNICATIONS (SRC)

Short-range communications (SRC) leverage mmWave spectrum for diverse applications, including:

a) **Industrial 5G Networks**: Private mmWave 5G deployments enhance connectivity in manufacturing, logistics, and smart factories, guided by ECC Recommendation (20)01.
b) **Vehicle-to-Everything (V2X) Systems**: Autonomous vehicle networks rely on mmWave for ultra-low latency communication, regulated under ETSI EN 302 571.
c) **Public Wi-Fi and FWA**: Urban and remote areas benefit from high-speed wireless access using mmWave bands under ETSI EN 305 550.
d) **Immersive AR/VR**: Virtual reality applications depend on mmWave's high-bandwidth capabilities, governed by IEEE 802.11ay standards.

8. FACTORS FOR SRC DEPLOYMENT

a) **Regulatory Compliance**: Adhering to EU and national standards ensures legal and functional interoperability.
b) **Overcoming Signal Attenuation**: Advanced MIMO techniques and beamforming mitigate mmWave path loss.
c) **Spectrum Sharing Efficiency**: Dynamic allocation strategies enhance coexistence between users.

9. CONCLUSION

This report offers a preliminary exploration of mmWave regulations and short-range deployment strategies and regulations across the EU. It highlights the potential for Sparklink technology to be a competitive short range communication standard across EU countries.

REFERENCES

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[4] https://single-market-economy.ec.europa.eu/sectors/electrical-and-electronic-engineering-industries-eei/radio-equipment-directive-red_en
[5] European process of standardisation and regulation for radiocommunications devices and systems – cooperation between CEPT/ECC and ETSI, related to MoU between CEPT and ETSI, June 2018.
[6] European Union – Spectrum and Certification, Technical Report, DEKRA, 26.12.2024.