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Short Range Devices (SRD)
using Ultra Wide Band (UWB);
Part 3: Worldwide UWB regulations between 3,1 and 10,6 GHz

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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document is part 3 of a multi-part deliverable covering UWB signal characteristics and related mitigation techniques, as identified below:

Part 1: "UWB signal characteristics and overview CEPT/ECC and EC regulation";

Part 2: "UWB mitigation techniques";

Part 3: "Worldwide UWB regulations between 3,1 GHz and 10,6 GHz".

Modal verbs terminology

In the present document "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

1 Scope

The present document presents a summary of the worldwide regulatory situation relating to UWB.

NOTE: The present document is a snapshot of the known UWB regulation worldwide in June 2018. The reader is invited to report any changes and additional information on UWB regulations and standards to ETSI.

2 References

2.1 Normative references

Normative references are not applicable in the present document.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ETSI EN 302 065-1 (V2.1.1): "Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 1: Requirements for Generic UWB applications".

[i.2] ETSI EN 302 065-2 (V2.1.1): "Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 2: Requirements for UWB location tracking".

[i.3] ETSI EN 302 065-3 (V2.1.1): "Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 3: Requirements for UWB devices for ground based vehicular applications".

[i.4] ETSI EN 302 065-4 (V1.1.1): "Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 4: Material Sensing devices using UWB technology below 10,6 GHz".

[i.5] ETSI EN 302 065-5 (V1.1.1): "Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU; Part 5: Devices using UWB technology onboard aircraft".

[i.6] ETSI EN 302 066-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Ground- and Wall- Probing Radar applications (GPR/WPR) imaging systems; Part 1: Technical characteristics and test methods".

[i.7] ETSI EN 302 066 (V2.1.1): "Short Range Devices (SRD); Ground- and Wall- Probing Radar applications (GPR/WPR) imaging systems; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

[i.8] Industry Canada: "Devices Using Ultra-Wideband (UWB) Technology", RSS-220, Issue 1, March 2009.

[i.9] FCC Code of Federal Regulations 47.

[i.10] CITC RI085 Issue 1, 10/01/2010.

[i.11] Radio communications (Low Interference Potential Devices) Class Licence 2015 including Variation Notice 2016 (No. 1).

[i.12] MIIT File 354.

[i.13] ARIB: "UWB (Ultra-Wideband) Radio Systems", STD-T91 Version 2.0.

[i.14] Ministry of Science and ICT - Notification No.2018-4, "Technical standards of radio equipment for radio stations that can be used without notification".

[i.15] Communications and Multimedia Commission SKMM SRSP-549 UWB.

[i.16] New Zealand Gazette, Radiocommunications Regulations (General User Radio Licence for Ultra-Wide Band Devices) Notice 2017, 2/2/2017, Notice Number 2017-go406, Issue Number 11.

[i.17] IDA: "Technical Specification - Ultra Wideband (UWB) Devices", Issue 1 Rev1, October 2016.

[i.18] ETSI TR 103 181-1 (V1.1.1): "Short Range Devices (SRD) using Ultra Wide Band (UWB); Technical Report Part 1: UWB signal characteristics and overview CEPT/ECC and EC regulation".

[i.19] ETSI TR 103 181-2 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD) using Ultra Wide Band (UWB);Transmission characteristics Part 2: UWB mitigation techniques".

[i.20] ETSI EN 302 065 (V1.2.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD) using Ultra Wide Band technology (UWB) for communications purposes; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive".

[i.21] Recommendation ITU-R SM 1754: "Measurement techniques of ultra-wideband transmissions".

[i.22] Recommendation ITU-R SM.1757: "Impact of devices using ultra-wideband technology on systems operating within radiocommunication services".

[i.23] ETSI TS 103 060: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Method for a harmonized definition of Duty Cycle Template (DCT) transmission as a passive mitigation technique used by short range devices and related conformance test methods".

[i.24] ECC Recommendation 70-03: "Relating to the use of Short Range Devices (SRD)".

[i.25] CEPT ECC/DEC/(06)04 of 24 March 2006 amended 9 December 2011: "The harmonised conditions for devices using Ultra-Wideband (UWB) technology in bands below 10.6 GHz".

[i.26] ETSI EN 302 500-2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD) using Ultra WideBand (UWB) technology; Location Tracking equipment operating in the frequency range from 6 GHz to 9 GHz; Part 2: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive".

[i.27] ETSI EN 301 489-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements".

[i.28] ETSI EN 301 489-32: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 32: Specific conditions for Ground and Wall Probing Radar applications".

[i.29] ETSI EN 301 489-33: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 33: Specific conditions for Ultra Wide Band (UWB) communications devices".

[i.30] Addendum 16 the GRFC decision May 7, 2007, No. 07-20-03-001.

[i.31] Addendum to the GRFC decision from December 15, 2009, No. 5/9/02-05-02.

[i.32] Anatel Act No. 11542 of August 23, 2017.

[i.33] Ministry of Information and Communications, Circular No. 46/2016/TT-BTTTT, 26 December 2016.

[i.34] Communications Regulatory Authority: "Qatar National Frequency Allocation Plan and Specific Assignments", November 2016.

[i.35] Telecommunications Regulatory Authority: "Regulations for Ultra-Wide Band and Short Range Devices", version 2.0, 18 May 2016.

[i.36] ETSI EN 302 500-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD) using Ultra WideBand (UWB) technology; Location Tracking equipment operating in the frequency range from 6 GHz to 9 GHz; Part 1: Technical characteristics and methods of measurement".

[i.37] ETSI EN 302 435-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Technical characteristics for SRD equipment using Ultra WideBand technology (UWB); Building Material Analysis and Classification equipment applications operating in the frequency band from 2,2 GHz to 8,5 GHz; Part 1: Technical characteristics and test methods".

[i.38] Commission Decision 2007/131/EC of 21 February 2007 on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community (notified under document number C(2007) 522).

[i.39] CEPT Report 45: "Report from CEPT to the European Commission in response to the Fifth Mandate to CEPT on ultra-wideband technology to clarify the technical parameters in view of a potential update of Commission Decision 2007/131/EC; Report approved on 21 June 2013 by the ECC".

[i.40] Commission Decision 2014/702/EU of 7 October 2014 amending Decision 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community (notified under document C(2014) 7083).

[i.41] ECC Recommendation (11)09 on UWB Location Tracking Systems Type 2 (LT2), October 2011.

[i.42] ECC Recommendation (11)10 on Location Tracking Application for Emergency and Disaster Situations, October 2011.

[i.43] ECC/DEC/(07)01: "ECC Decision of 30 March 2007 on specific Material Sensing devices using Ultra-Wideband (UWB) technology (amended 26 June 2009)".

[i.44] Commission Decision 2009/343/EC of 21 April 2009 amending Decision 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonized manner in the Community (notified under document number C(2009) 2787) (Text with EEA relevance).

[i.45] CEPT ECC/DEC/(12)03 of 2 November 2012: "The harmonised conditions for UWB applications onboard aircraft".

[i.46] ECC Decision of 1 December 2006 on the conditions for use of the radio spectrum by Ground- and Wall- Probing Radar (GPR/WPR) imaging systems, ECC/DEC/(06)08.

[i.47] Recommendation ITU-R SM.1755: "Characteristics of ultra-wideband technology".

[i.48] Recommendation ITU-R SM.1896: "Frequency ranges for global or regional harmonization of short-range devices".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

activity factor: reflects the effective transmission time ratio

maximum mean e.i.r.p. spectral density: highest signal strength measured in any direction at any frequency within the defined range

NOTE: The mean e.i.r.p. spectral density is measured with a 1 MHz resolution bandwidth, an RMS detector and an averaging time of 1 ms or less.

maximum peak e.i.r.p.: highest signal strength measured in any direction at any frequency within the defined range

NOTE: The peak e.i.r.p. is measured within a 50 MHz bandwidth centred on the frequency at which the highest mean radiated power occurs.

3.2 Symbols

For the purposes of the present document, the symbols given in ETSI TS 103 060 [i.23] and the following apply:

f_C	Centre frequency
f_M	frequency at which the highest radiated emission occurs

3.3 Abbreviations

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

AC	Alternating Current
ACMA	Australian Communications and Media Authority
ARIB	Association of Radio Industries and Businesses (Japan)
CEPT	Commission Européenne des Postes et Télécommunications
CFR	Code of Federal Regulations (USA)
CISPR	Comité International Spécial des Perturbations Radioélectriques
CITC	Communications and Information Technology Commission (Saudi Arabia)
DAA	Detect And Avoid
e.i.r.p	equivalent isotropically radiated power
EC	European Commission
ECC	European Communication Comity
EIRP	Effective Isotropic Radiated Power
EMEA	Europe, Middle East and Africa
FCC	Federal Communications Commission (USA)
GPR	Ground Probing Radar
GRFC	General Radio Frequency Centre
IDA	Info-communication Development Authority of Singapore
ILAC	International Laboratory Accreditation Cooperation
LAES	Location tracking Application for Emergency and disaster Situations
LDC	Low Duty Cycle
MIIT	Ministry of Industry & Information Technology (China)
RLM	Robotic Lawn Mower
RMS	Root Mean Square
SKMM	Suruhanjaya Komunikasi dan Multimedia Malaysia (Malaysian Communications and Multimedia Commission)
TBC	To Be Confirmed
UAE	United Arab Emirates
USA	United States of America
WPR	Wall Probing Radar

4 Global Summary

4.1 Introduction

This clause presents a summary of the global regulatory situation relating to UWB in the frequency range from 3,1 GHz to 10,6 GHz. Each jurisdiction in the world is considered and the current situation presented in tabular form. This clause is only concerned with UWB as a communications medium, it does not concern itself with other UWB uses for which there may be additional regulations (e.g. ground penetrating radar, through wall imaging systems or automotive radar applications).

Recommendation ITU-R SM.1755 [i.47] contains recommendations regarding how UWB should be treated in regulations. Attention is specifically drawn to "considering" j) that devices using UWB technology normally operate on a non-protected, non-interference basis; and "recommends" that the following notes will be considered as part of this Recommendation.

NOTE 1: Administrations authorizing or licensing devices using UWB technology should ensure, pursuant to the provisions of the Radio Regulations, that these devices, will not cause interference to and will not claim protection from, or place constraints, on the radiocommunication services of other administrations as defined in the Radio Regulations and operating in accordance with those Regulations.

NOTE 2: Upon receipt of a notice of interference to the radiocommunication services referred to in note 1 above from devices using UWB technology, administrations should take immediate action(s) to eliminate such interference.

The importance of worldwide harmonisation for UWB is reflected in the inclusion of UWB in the draft recommendation Recommendation ITU-R SM.1896 [i.48].

Within CEPT, UWB is regarded as a short-range device and consequently cannot claim protection from any other service operating in the same frequency range as the UWB devices and shall not cause interference to any other service operating in the same frequency band.

Attention is further drawn to the European Commission Decision (2007/131/EC) [i.38] which states in whereas (14):

"The use of radio spectrum by equipment using ultrawideband technology under this Decision is to be allowed on a non-interference and non-protected basis and therefore should be subject to Article 5(1) of Directive 2002/20/EC of the European Parliament and of the Council of 7 March 2002 on the authorisation of electronic communications networks and services".

and in article 2(2):

"Non-interference and non-protected basis' means that no harmful interference may be caused to any radiocommunication service and that no claim may be made for protection of these devices against harmful interference originating from radiocommunication services".

All short-range devices, including UWB, in Europe are subject to the Radio Equipment Directive (RED), and therefore subject to recital 10:

"In order to ensure that radio equipment uses the radio spectrum effectively and supports the efficient use of radio spectrum, radio equipment should be constructed so that: in the case of a transmitter, when the transmitter is properly installed, maintained and used for its intended purpose it generates radio waves emissions that do not create harmful interference, while unwanted radio waves emissions generated by the transmitter (e.g. in adjacent channels) with a potential negative impact on the goals of radio spectrum policy should be limited to such a level that, according to the state of the art, harmful interference is avoided; and, in the case of a receiver, it has a level of performance that allows it to operate as intended and protects it against the risk of harmful interference, in particular from shared or adjacent channels, and, in so doing, supports improvements in the efficient use of shared or adjacent channels".

And recital 11:

"Although receivers do not themselves cause harmful interference, reception capabilities are an increasingly important factor in ensuring the efficient use of radio spectrum by way of an increased resilience of receivers against harmful interference and unwanted signals on the basis of the relevant essential requirements of Union harmonisation legislation".

Colours are used to give a visual indication of the status with the following meanings.

Table 1: Colour legend

Table Colour	What does this mean?
	Specific UWB regulations exist in the named jurisdiction
	Specific UWB regulations do not exist in the named jurisdiction. Either: • the regulatory regime remains to be clarified; or • the technical requirements that most typically apply (usually FCC or ETSI) are listed.

The various headings in the tables that follow have the following meanings.

Table 2: Heading legend

Table Heading	What does this mean?	Potential responses
Country	The name of the jurisdiction	
Do Specific UWB regulations exist?	Has the communications regulatory body in this jurisdiction introduced specific regulations governing the use of UWB in this jurisdiction?	Y = Yes N = No
What is the regulatory regime?	What is the source of the regulations governing the use of UWB in this jurisdiction?	Where the jurisdiction has implemented specific regulations the source reference is listed. Where the jurisdiction has not implemented specific regulations, the usual approach to such matters is described
What frequency range is permitted?	What range of frequencies is permitted to be used for UWB transmission at the mean EIRP under the applicable regulatory regime?	Given in GHz range of frequencies e.g. 6,0 - 8,5 GHz
Do these regulations permit outdoor use?	Does the applicable regulatory regime permit use of UWB outdoors?	Y = Yes, regulations permit use outdoors TBC = To be confirmed N = No, regulations do not permit use outdoors
e.i.r.p. (dBm / MHz)	What is the maximum value of mean power spectral density permitted under the applicable regulatory regime?	Where known this is given in dBm / MHz otherwise it is marked as TBC
Emission profile	What is the spectral emissions profile allowed under the applicable regulatory regime?	This column refers to later clause in the present document

4.2 Europe, Middle East and Africa

4.2.1 Europe

A short overview is given in table 3, for more details please check, clause 5 and ETSI TR 103 181-1 [i.18].

Table 3: Overview Europe

	Country	Do specific UWB regs exist?	What is the regulatory regime?	What frequency range is permitted (GHz)?	Do these regs permit outdoor use?	Max mean e.i.r.p. (dBm / MHz)	Emission Profile
1	Albania	Y	ECC Rec 70-03 [i.24] / ECC Decision 06(04) [i.25]/ ETSI EN 302 065 [i.20]	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3	ETSI clause 5
2	Andorra	N	Generally will approve equipment compliant to ETSI standards where compatible with national band plan				
3	Austria	Y	ECC Rec 70-03 [i.24] / ECC Decision 06(04) [i.25]/ ETSI EN 302 065 [i.20]	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3	ETSI clause 5
4	Belarus	N	Generally will approve equipment compliant to ETSI standards where compatible with national band plan				
5	Belgium	Y	ECC Rec 70-03 [i.24] / ECC Decision 06(04) [i.25]/ ETSI EN 302 065 [i.20]	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3	ETSI clause 5
6	Bosnia & Herzegovina	Y	ECC Rec 70-03 [i.24] / ECC Decision 06(04) [i.25]/ ETSI EN 302 065 [i.20]	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3	ETSI clause 5
7	Bulgaria	Y	ECC Rec 70-03 [i.24] / ECC Decision 06(04) [i.25]/ ETSI EN 302 065 [i.20]	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3	ETSI clause 5
8	Canary Islands	Y	Telecoms matters overseen by government of Spain	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3	ETSI clause 5
9	Croatia	Y	ECC Rec 70-03 [i.24] / ECC Decision 06(04) [i.25]/ ETSI EN 302 065 [i.20]	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3	ETSI clause 5
10	Cyprus	Y	ECC Rec 70-03 [i.24] / ECC Decision 06(04) [i.25]/ ETSI EN 302 065 [i.20]	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3	ETSI clause 5
11	Czech Republic	Y	ECC Rec 70-03 [i.24] / ECC Decision 06(04) [i.25]/ ETSI EN 302 065 [i.20]	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3	ETSI clause 5