UWB Worldwide Regulations

Application Note
APR001

1 Introduction

A summary of the Worldwide Telecommunications Regulations governing the use of UWB.

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1.1 Overview

The landscape of worldwide telecommunications standards is varied and complex and has been evolving for over 100 years. Standards are addressed at a number of different levels. At a national level, almost all nations have their own telecommunications standards authority. At the next level, various geographic or political groupings of countries have standards bodies while at international level standards authorities exist also.

Industry associations also promote particular standards relevant to their members that operate within the established regulatory framework. Industry associations are, in many cases, the driving force behind effecting changes in communications regulations.

Generally speaking, agreed standards at regional level flow downwards to national level.

In the case of the European Union, the European Conference of Postal & Telecommunications Administrations (CEPT) is responsible for establishing the regulatory framework for telecommunications. Most of the work behind these regulations is carried out by the Electronic Communications Committee (ECC) of CEPT which publishes reports and decisions. These decisions are then enacted as directives to member states by the European Commission, making them mandatory for all member states.

In the USA, the Federal Communications Commission together with the National Telecommunications & Information Administration set the communications regulations. While these are national organizations, because the US is such a large producer and user of communications systems, regulations produced by the FCC have considerable influence on standards worldwide. FCC part 15 has been widely established for many years.

1.2 This document

1.2.1 About

This document is one of four application notes on ultra-wideband (UWB) certification process. Where APR002 [1] focuses on the process in the USA (FCC), APR003 [2] in Europe (ETSI), and APR004 [3] that focuses on the process in Japan.

1.2.2 Overview

This document sets out the current situation regarding the use of UWB in all the principal geographies in the world. In some areas the situation is very clear and fixed, at least for now, while in others it is evolving rapidly.

Information in this document has also been contributed to ETSI Technical Report ETSI TR 103 181-3, which is available from http://www.etsi.org

1.2.3 Structure

This document is structured into sections as follows: -

Section No	Section Title	Description
1	Introduction	This section
2	UWB Worldwide regulations summary	Presents a summary and status of the regulatory situation per region in tabular form
3	Status of UWB regulations, and regulatory bodies including contact details	The current known status of UWB regulations per region.
4	References	Lists the references used in this document
5	Document History	Details the history of this document

1.3 Ultra-Wideband

1.3.1 Introduction

While the theory behind UWB is not new – essentially the earliest spark gap transmitters were ultra-wideband in nature – it is only relatively recently we have seen a move towards greater adoption of the technology. Regulation has followed as a result.

Greater adoption is as a result of two important attributes of UWB – the prospect of very high data rate communications (because of the wide bandwidth and the relationship between max data rate and bandwidth established by Shannon) and the ability of UWB to allow very accurate time of flight measurements.

The very high data rate path has been followed aggressively by several companies under the IEEE802.15.3a working group (which failed to ratify a standard) and the subsequent ECMA standards, (ECMA 368, 369, 381), the move towards Wireless USB and the drive towards cable replacement in the home and office. Originally, this was the path that has driven UWB regulations.

The ability of UWB to accurately measure time of flight and thereby provide very accurate location estimation has been implemented by numerous companies using both proprietary systems and ones based on standards such as FiRa and CCC. This ability is now driving an explosion in demand for UWB. The IEEE802.15.4a standard in 2007 for the first time incorporated a UWB PHY into a Personal Area Network standard and allowed for power efficient, high data rate communications together with accurate location estimation. In 2019, the IEEE 802.15.4z standard added further secure ranging capabilities, which are leading to an unprecedented uptake of UWB in consumer products. IEEE 802.15.4ab will facilitate performance enhancement in terms of increased throughput and lower latency as well as opening new use case possibilities, with sensing human presence and environment mapping. This rapid evolution has added increasing pressure on regulatory authorities to allow the use of UWB in their respective geographies.

1.3.2 Generally perceived issues and mitigating approaches

The general concern with UWB has been that because the signal occupies such a wide bandwidth (500 MHz to 1300 MHz as defined in the IEEE802.15.4-2011 UWB standard) there is the potential to interfere with a variety of other telecommunication services occupying the same electromagnetic spectrum.

In many respects this is unfounded given the power levels that are permitted for UWB transmission (extremely low compared to the potential victim services) however there are some services with which interference is possible. There are several mitigation strategies that regulators have adopted:

1. Restrict the use of UWB to a particular frequency bands / channels and in particular shift the use of UWB away from currently occupied areas of the spectrum.

2. Permit the use of UWB but restrict the permitted transmit power – this approach has been adopted by pretty much every jurisdiction that has allowed UWB.

   Generally, the power emission limits are defined in terms of equivalent isotropically radiated power (EIRP) which is defined as the product of the power supplied to an antenna and its gain in a given direction relative to a genuinely isotropic antenna.

   The transmit power limits vary considerably from region to region, but almost all share one characteristic which is that the maximum permitted transmit power density is -41.3 dBm/MHz. This number has its roots in part 15 of the FCC standard; it is the maximum limit for unintended radiation from a non-UWB electronic system – so essentially UWB transmission has been limited to the level of background noise.

3. Permit the use of UWB but insist that systems use mitigating approaches to limit the possibility / effect of interference with other systems. Two main approaches have been adopted in various jurisdictions:

- Low Duty Cycle (LDC) in which UWB equipment must limit the relative time for which it is transmitting.

- Detect & Avoid (DAA) in which UWB systems listen for other UWB transmissions before they themselves transmit.

1.3.3 General trends in UWB regulations for Communications Devices

By examining the UWB regulations currently in force in various jurisdictions it's possible to draw some conclusions about where the regulatory regime is likely to end up:

- The general trend is towards license-exemption on a no-interference / no-protection basis. Various regulatory bodies have reached this point already; others have adopted a more cautious approach and have not yet reached this point.

- The 6.0 to 8.5 GHz band seems to be emerging as the band with least restrictions for UWB communications.

- Interference mitigation techniques including LDC & DAA are specified on a national or regional basis to remove the requirement for lower emission limits in the 3.1 – 4.8 GHz band (and in the 8.5 GHz to 9.0 GHz band in some cases).

2 UWB Worldwide Regulations Summary

2.1 Introduction

This section presents a summary of the global regulatory situation relating to UWB. Each jurisdiction in the world is considered, and the current situation is presented in tabular form. This section 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).

Colors are used to give a visual indication of the status with the following meanings:

Table 1 Color 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 regulations that most typically apply (usually FCC or ETSI) are listed

Where regulations do exist, they are dealt with in more detail in separate sections of this document.

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

2.2 Europe, Middle East & Africa (EMEA)

2.2.1 Europe

A short overview is given in table 3, for more details please check section 3.4.

Table 3 Europe regulations

	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)
1	Albania	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
2	Andorra	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
3	Austria	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
4	Belarus	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 9,0	Y	-41,3
5	Belgium	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
6	Bosnia & Herzegovina	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
7	Bulgaria	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
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
9	Croatia	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note))	Y	-41,3
10	Cyprus	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
11	Czech Republic	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
12	Denmark	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
13	Estonia	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
14	Finland	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
15	France	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
16	Germany	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
17	Gibraltar	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
18	Greece	Y	ECC Rec 70-03 / ECC	3,1 - 4,8 (see note)	Y	-41,3

			Decision 06(04) / ETSI EN 302 065	6,0 - 8,5 8,5 - 9,0 (see note)		
19	Hungary	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
20	Iceland	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
21	Ireland	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
22	Italy	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
23	Latvia	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
24	Lithuania	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
25	Luxembourg	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
26	Macedonia	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
27	Malta	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
28	Moldova	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
29	Monaco	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
30	Montenegro	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
31	Netherlands	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
32	Norway	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
33	Poland	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
34	Portugal	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065]	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
35	Romania	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
36	Russia	Y	Has implemented ECC Rec 70-03 but with local modifications	6,0 - 8,1	Y	-47
			Addendum No. 16 the GRFC decision May 7, 2007, No. 07-20-03-001	8,625 - 9,15		-45
			Addendum to the GRFC decision from December 15, 2009 # 5/9/02-05-02	9,15 - 10,6		(in 9,15 to 10,6 freq range)
37	San Marino	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
38	Serbia	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302	3,1 - 4,8 (see note) 6,0 - 8,5	Y	-41,3

			065	8,5 - 9,0 (see note)		
39	Slovakia	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
40	Slovenia	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
41	Spain	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
42	Sweden	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note))	Y	-41,3
43	Switzerland	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
44	Turkey	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
45	United Kingdom	Y	ECC Rec 70-03 / ECC Decision 06(04) / ETSI EN 302 065	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
46	Ukraine	N	ECC Rec 70-03 under consideration but not yet adopted	TBC		
NOTE: Mitigation techniques required.						

2.2.2 Middle East

Table 4: UWB Regulations Middle East

	Country	Do specific UWB regs exist?	What is the regulatory regime?	What frequency range is permitted?	Do these regs permit outdoor use?	EIRP (dBm / MHz)
47	Bahrain	Y	Resolution No. 8 of 2017 Regarding Regulation of Type Approval for Short Range Devices	3,4 - 4,8	Y	-50
49	Iran	Y	CRA-DEC 9018	6,0 - 8,5	Y	-41,3
49	Iraq	N	TBC	TBC		
50	Israel	N	Generally, will approve ETSI compliant equipment where compatible with national band plan. Confusion exists over the approval status of UWB equipment. There are rumours that the low band is being allocated for UWB trials.	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
51	Jordan	Y	Instructions for Obtaining Specific Approval for Telecommunication Devices and Terminals and Telecommunication Terminal Devices Decision No. (7046)	3,1-10,6	Y	-41,3
52	Kuwait	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
53	Lebanon	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
54	Oman	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
55	Qatar	Y	Class license for short range devices	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
56	Saudi Arabia	Y	CITC RI085	6,0 - 8,5	Y	-41,3
57	Syria	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
58	UAE	Y	Ultra-Wide Band and Short Range Devices V4.0	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3

59	Yemen	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
NOTE: Mitigation techniques required.						

2.2.3 Africa

Table 5: UWB Regulations Africa

	Country	Do specific UWB regs exist?	What is the regulatory regime?	What frequency range is permitted?	Do these regs permit outdoor use?	EIRP (dBm / MHz)
60	Algeria	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
61	Angola	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
62	Benin	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
63	Burkina Faso	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
64	Cameroon	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
65	Cape Verde	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
66	Central African Republic	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
67	Chad	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
68	Democratic Republic of the Congo	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
69	Djibouti	N	TBC	TBC		
70	Egypt	N	TBC	TBC		
71	Ethiopia	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
72	Gabon	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
73	Gambia	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
74	Ghana	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
75	Guinea-	N	Generally, will approve either		Y	-41,3

	Bissau		ETSI or FCC compliant equipment			
76	Ivory Coast	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
77	Kenya	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
78	Lesotho	N	Generally, will approve equipment approved for use in South Africa	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
79	Liberia	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
80	Libya	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
81	Madagascar	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
82	Malawi	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
83	Mali	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
84	Mauritius	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
85	Morocco	N	TBC	TBC		
86	Mozambique	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
87	Namibia	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
88	Niger	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
89	Nigeria	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
90	Rwanda	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
91	Senegal	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
92	Sierra Leone	N	Generally, will approve either ETSI or FCC compliant equipment	3,1 - 9,0	Y	-41,3
93	Somalia	N	TBC	TBC		
94	South Africa	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
95	Sudan	N	TBC	TBC		
96	Swaziland	N	Generally, will approve either ETSI or FCC compliant		Y	-41,3

			equipment			
97	Tanzania	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
98	Togo	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
99	Tunisia	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
100	Uganda	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
101	Zambia	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
102	Zimbabwe	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
NOTE: Mitigation techniques required.						

2.3 Asia Pacific (APAC)

Table 6 Regulations APAC

#	Country	Do specific UWB regs exist?	What is the regulatory regime?	What frequency range is permitted (GHz)?	Do these regs permit outdoor use?	EIRP (dBm / MHz)
103	Afghanistan	N	TBC	TBC		
104	Armenia	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
105	Australia	Y	Radio Communications (Low Interference Potential Devices) Class Licence 2015 as modified August 2019	3,1 – 4,8 6,0 – 9,0	Y	-41,3
106	Azerbaijan	N	TBC	TBC		
107	Bangladesh	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
108	Brunei	Y	Telecommunications Notification 2018	3,1 - 4,8 (see note) 6,0 - 9,0	Y	-41,3
109	Cambodia	N	TBC	TBC		
110	China	Y	MIIT Wireless File 354 (2008)	6.0 - 9.0	Y	-41
111	Cook Islands	N	TBC	TBC		
112	Fiji	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
113	French Polynesia	Y	Follows France	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
114	Georgia	Y	Short range device requirements	3,1 - 4,8 6,0 -9,0	Y	-41.3
115	Guam	Y	Territory of the USA	3,1 - 10,6	Y	-41,3
116	Hong Kong	Y	HKCA 1080	4,2 - 4,8 6,0 - 8,5	Y	-41,3
117	India	Y	GSR 1046 (E)	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41.3
118	Japan	Y	ARIB STD-T91 Ver. 4.0 2022	3,4 - 4,8 (see note) 7,25 - 10,25	Y	-41,3
119	Kazakhstan	N	Generally, will approve ETSI compliant equipment where compatible with national band plan	3,1 - 9,0	Y	-41,3
120	Korea, North	N	TBC	TBC		
121	Korea, South	Y	Korean Communications Commission K125B	3,735 - 4,8 (see note) 7,2 - 10,2	Y	-41,3

122	Kyrgyzstan	N	TBC	TBC		
123	Laos	N	TBC	TBC		
124	Macau	Y	Despacho do Chefe do Executivo n.º 44/2019	4,2 - 4,8 6,0 - 8,5		-41,3
125	Malaysia	Y	Class assignment No. 1 of 2020	6,0 - 8,5	Y	-41,3
126	Myanmar	N	Generally, will approve either ETSI or FCC compliant equipment where compatible with national band plan		Y	-41,3
127	Nepal	N	TBC	TBC		
128	New Caledonia	Y	Telecoms matters overseen by government of France	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
129	New Zealand	Y	Radiocommunications Regulations (General User Radio Licence for Ultra-Wide Band Devices) Notice 2017	3,1 – 4,8 (see note) 6.0 - 8.5	Y	-41,3
130	Pakistan	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
131	Papua New Guinea	Y	Low interference potential devices 2016	3,4 - 4,8 (see note) 6,0 - 8,5	Y	-41,3
132	Philippines	Y	MC 06-08-2018	6,0 - 8,5	Y	-41,3
133	Reunion	Y	Telecoms matters overseen by government of France	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
134	Samoa (Independent State of)	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
135	Singapore	Y	IDA TS UWB Issue 1, October 2016	3,4 - 4,8 (see note) 6,0 - 8,5	Y	-41,3
136	Sri Lanka	Y	Spectrum Allocation for Short Range Devices on Shared Basis	6,0 - 8,5		(200 mW)
137	Thailand	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
138	Turkmenistan	N	TBC	TBC		
139	Uzbekistan	N	TBC	TBC		
140	Vietnam	Y	Circular 46/2016/TT-BTTTT from MIC Vietnam	6,0 – 8,5	N	-41,3
NOTE: Mitigation techniques required.						

2.3.1 North America

Table 7: UWB Regulations North America

#	Country	Do specific UWB regs exist?	What is the regulatory regime?	What frequency range is permitted (GHz)?	Do these regs permit outdoor use?	EIRP (dBm / MHz)
141	Antigua & Barbuda	N	Generally, will approve FCC certified equipment	3,1 - 10,6	Y	-41,3
142	Aruba	N	Generally, will approve FCC certified equipment	3,1 - 10,6	Y	-41,3
143	Bahamas	N	Generally, will approve FCC certified equipment	3,1 - 10,6	Y	-41,3
144	Barbados	N	Generally, will approve FCC certified equipment	3,1 - 10,6	Y	-41,3
145	Bermuda	N	Generally, will approve FCC certified equipment	3,1 - 10,6	Y	-41,3
146	British Virgin Islands	N	Generally, will approve FCC certified equipment	3,1 - 10,6	Y	-41,3
147	Canada	Y	ISED RSS-220 specification	4,75 - 10,6	Y	-41,3
148	Cayman Islands	N	Generally, will approve either ETSI or FCC compliant equipment	ETSI Sec 3.4 FCC Sec 3.2	Y	-41,3
149	Costa Rica	N	Generally, will approve FCC certified equipment	3,1 - 10,6	Y	-41,3
150	Cuba	N	TBC	TBC		
151	Curacao	N	Generally, will approve FCC certified equipment	3,1 - 10,6	Y	-41,3
152	Dominica	N	Generally, will approve FCC certified equipment	3,1 - 10,6	Y	-41,3
153	Dominican Republic	N	Generally, will approve FCC certified equipment	3,1 - 10,6	Y	-41,3
154	El Salvador	N	Generally, will approve either ETSI or FCC compliant equipment	ETSI Sec 3.4 FCC Sec 3.2	Y	-41,3
155	Grenada	N	Generally, will approve either ETSI or FCC compliant equipment	ETSI Sec 3.4 FCC Sec 3.2	Y	-41,3
156	Guadeloupe	Y	Telecoms matters overseen by government of France	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
157	Guatemala	N	Generally, will approve either ETSI or FCC compliant equipment	ETSI Sec 3.4 FCC Sec 3.2	Y	-41,3
158	Haiti	N	Generally, will approve FCC certified equipment	3,1 - 10,6	Y	-41,3
159	Honduras	N	Generally, will approve FCC certified equipment	3,1 - 10,6	Y	-41,3

160	Martinique	Y	Telecoms matters overseen by government of France	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
161	Jamaica	N	Generally, will approve FCC certified equipment	3,1 - 10,6	Y	-41,3
162	Mexico	N	Generally, will approve FCC certified equipment	3,1 - 10,6	Y	-41,3
163	Nicaragua	N	Generally, will approve FCC certified equipment	3,1 - 10,6	Y	-41,3
164	Panama	Y	PNAF, Anexo 4	3,1 -10,6	Y	-41,3
165	St Kitts & Nevis	N	Generally, will approve either ETSI or FCC compliant equipment	ETSI Sec 3.4 FCC Sec 3.2	Y	-41,3
166	St Lucia	N	Generally, will approve either ETSI or FCC compliant equipment	ETSI Sec 3.4 FCC Sec 3.2	Y	-41,3
167	St Vincent & the Grenadines	N	Generally, will approve either ETSI or FCC compliant equipment	ETSI Sec 3.4 FCC Sec 3.2	Y	-41,3
168	Trinidad & Tobago	N	Generally, will approve FCC certified equipment	3,1 - 10,6	Y	-41,3
169	USA	Y	FCC CFR 47 Part 15	3,1 - 10,6	Y	-41,3
170	US Virgin islands	Y	Telecoms matters overseen by government of USA	3,1 - 10,6	Y	-41,3

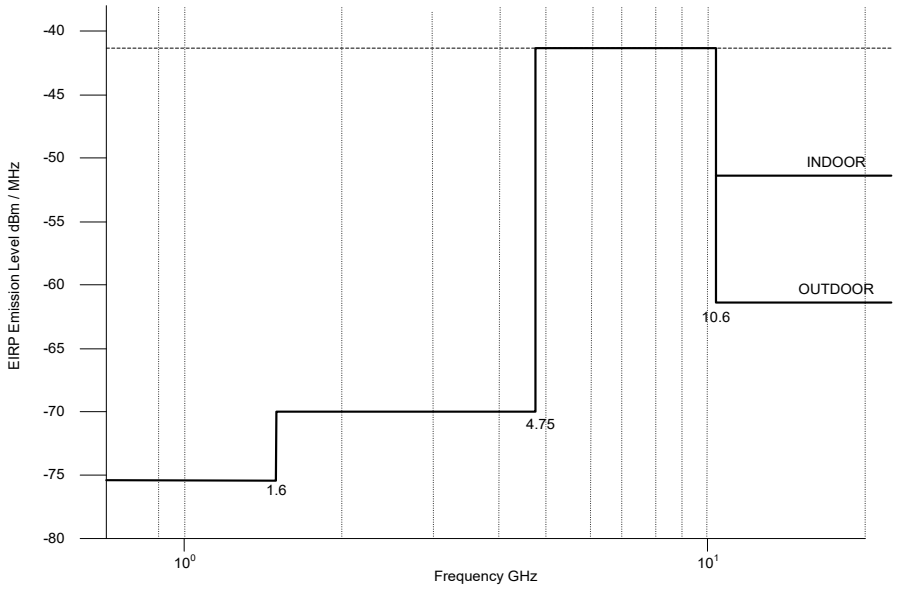
2.4 South America

Table 8: UWB Regulations South America

#	Country	Do specific UWB regs exist?	What is the regulatory regime?	What frequency range is permitted (GHz)?	Do these regs permit outdoor use?	EIRP (dBm / MHz)
171	Argentina	Y	ANEXO EXPCNC 13949/98 - ACTA 21	3,1 - 10,6		-35,3
172	Bolivia	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
173	Brazil	Y	Anatel Act No. 14448 of 4 December 2017	3,1 – 10,6	Y	-41,3
174	Chile	Y	Resolución 1985, Apendice 1	3,1 - 10,6	Y	-41,3
175	Colombia	Y	RESOLUCIÓN 181 DE 2019	3,7 -10,6	Y	-41,3
176	Ecuador	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
177	Falkland Islands	N	Generally, will approve ETSI compliant equipment	3,1 - 4,8 (see note) 6,0 - 8,5 8,5 - 9,0 (see note)	Y	-41,3
178	Guyana	N	Generally, will approve FCC compliant equipment	3,1 - 10,6	Y	-41,3
179	Paraguay	N	Generally, will approve FCC compliant equipment	3,1 - 10,6	Y	-41,3
180	Peru	N	Generally, will approve either ETSI or FCC compliant equipment		Y	-41,3
181	Uruguay	N	Generally, will approve FCC compliant equipment	3,1 - 10,6	Y	-41,3
182	Venezuela	Y	PROVIDENCIA ADMINISTRATIVA Nº 059 2013	6,0 -9,0		-41,3

3 Current status of UWB regulation, regulatory bodies and contact details

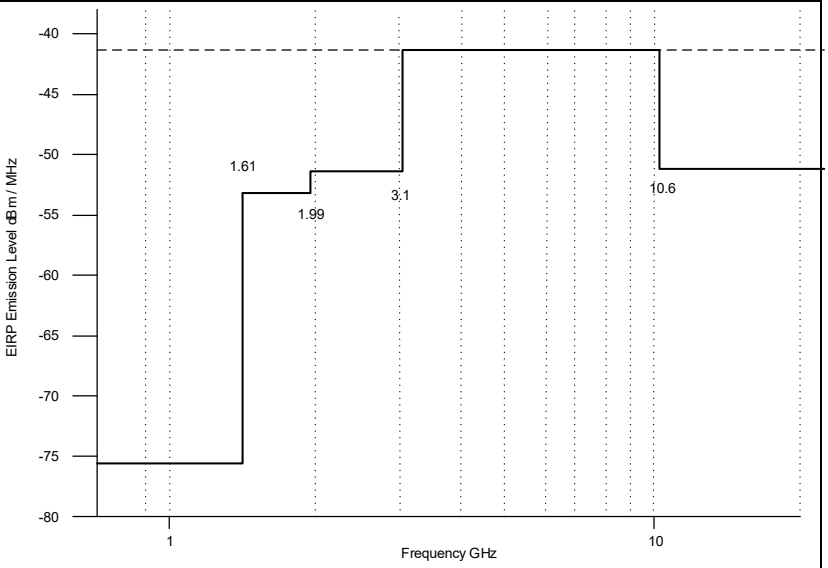
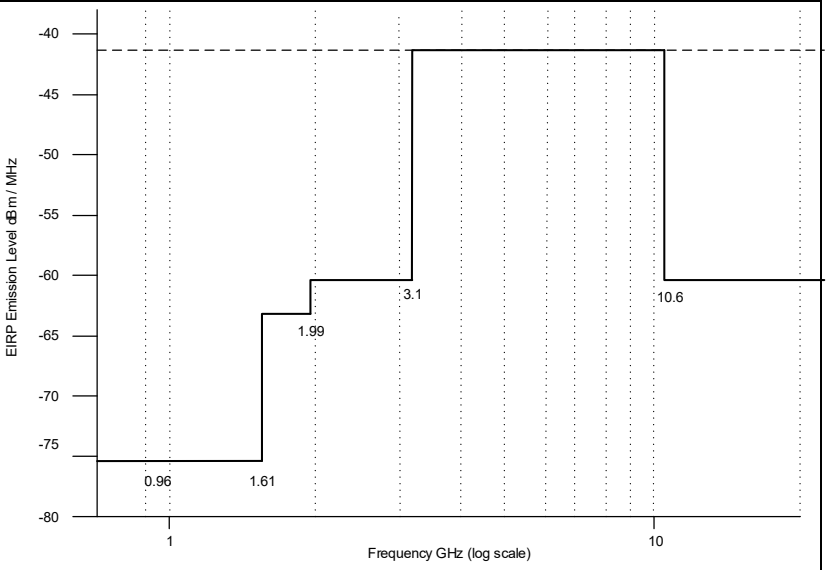
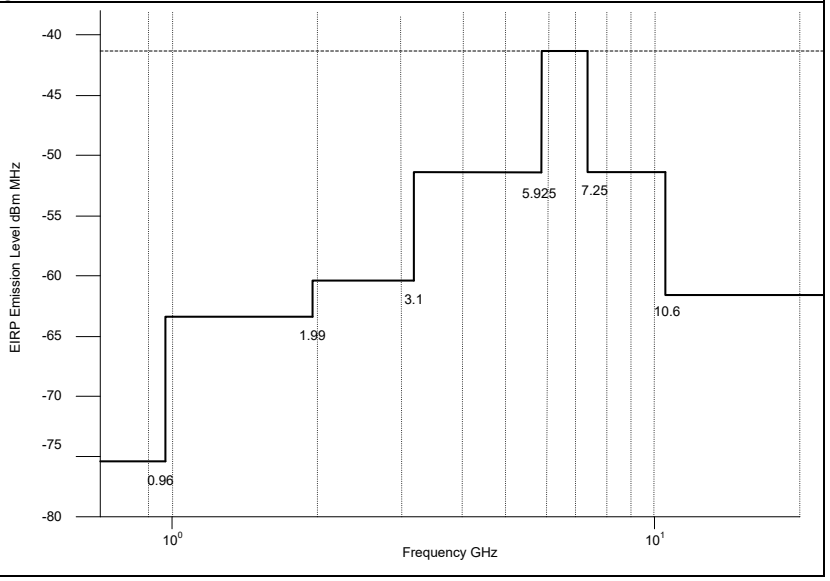
3.1 Canada

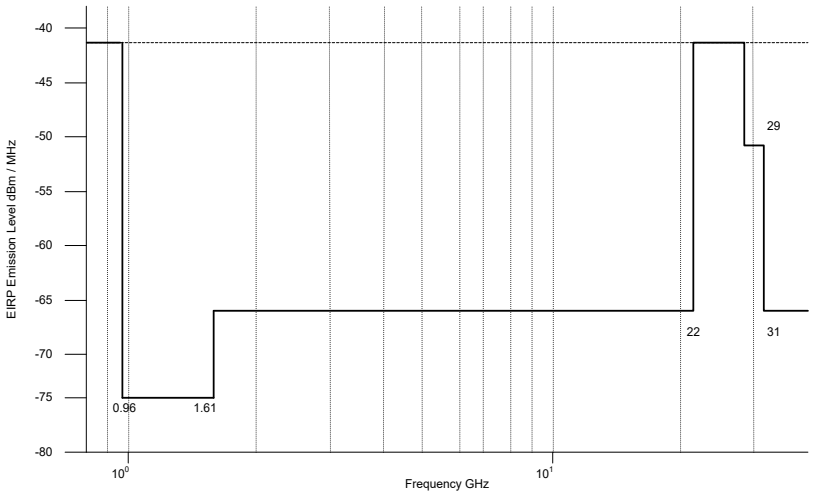
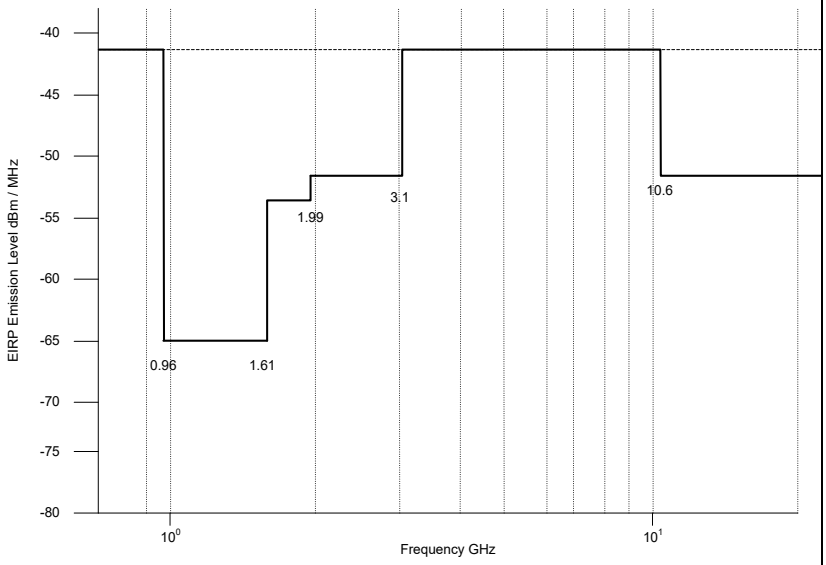
Item	Description
Regulatory Body	Innovation, Science and Economic Development (ISED)
Location	Ottawa, Canada
Postal Address	Service Canada Ottawa (Ontario) K1A 0J9 CANADA
Phone	+ 1 613 957 1954
Web	https://www.ised-isde.canada.ca/site/spectrum-management-telecommunications/en/devices-and-equipment/radio-equipment-standards/radio-standards-specifications-rss/rss-220-devices-using-ultra-wideband-uwb-technology
Do UWB regulations exist?	Yes
Specific regulations	RSS-220 — Devices Using Ultra-Wideband (UWB) Technology
Max Mean Emission Limits	 **Figure 1: Max mean emission limits under RSS 220**
Other relevant notes	Makes distinction between 3 classes of device: • Vehicular Radar • Radar Imaging • Communications Devices (both indoor and handheld)

3.2 USA

Note: The latest information in relation to FCC UWB regulations may be found here: https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-15/subpart-F

Item	Description
Regulatory Body	In the USA, spectrum jurisdiction is split between the Federal Communications Commission (FCC) and the National Telecommunications & Information Administration (NTIA) The FCC regulates private users and state and local governments and is an independent agency. The NTIA regulates Federal Government users and acts on behalf of the President. Frequency bands are either: - • Controlled by FCC • Controlled by NTIA • Shared and subject to mutual agreement UWB issues involved both agencies and needed mutual agreement. Certification and commercial product approval is handled by the FCC.
Location	Federal Communications Commission Washington; USA
Postal Address	Federal Communications Commission 445 12th Street SW Washington, DC 20554
Phone	+1 888 225 5322 (toll free)
Web	http://www.fcc.gov/
Do UWB regulations exist?	Yes
Specific regulations	Code of Federal Regulations (CFR) 47 Part 15 including among others: - • Section 15.517; technical requirements for indoor UWB systems. • Section 15.519; technical requirements for handheld UWB systems. • Section 15.521; technical requirements applicable to all UWB devices • Section 15.250; technical requirements for Wideband Devices (not specifically UWB devices but UWB devices can certify under this section).

Item	Description
Max mean Emission Limits – Indoor Systems	 **Figure 2: Max. mean emission limits for indoor communication systems under §15.517**
Max mean Emission Limits – Handheld Systems	 **Figure 3: Max. mean emission limits for handheld systems under §15.519**
Max mean Emission Limits – Wideband devices under §15.250	

Item	Description
	Figure 4: Max mean emission limits for wideband devices under §15.250
Max Mean Emission Limits – Vehicular radar systems Not of direct relevance to Qorvo products but included here for completeness	 Figure 5: Max mean emission limits for vehicular radar systems
Max Mean Emission Limits – Medical Imaging Systems Not of direct relevance to Qorvo products but included here for completeness	 **Figure 6: Max. mean emission limits for Medical Imaging Systems**
Notes	The USA was the first to introduce regulations that allowed Ultra-Wideband systems. Unlicensed use was first allowed in 2002. The regulations make a distinction between 3 different types of system: - • Communications Systems • Vehicular Radar Systems • Imaging Systems See Reference [1] for a detailed discussion of the FCC regulations and the FCC product approvals process.

3.3 South America

3.3.1 Argentina

Item	Description
Regulatory Body	Secretaria de Comunicaciones Comisión Nacional de Comunicaciones
Location	Comisión Nacional de Comunicaciones Buenos Aires Argentina
Postal Address	Perú 103 (C1067AAC), Buenos Aires, Argentina
Phone	+54 114 347 9242
Web	https://www.enacom.gob.ar/
Do UWB regulations exist?	Yes
Specific regulations	ANEXO EXPCNC 13949/98 - ACTA 21
Notes	FCC like regulations but with -35.3 dBm/MHz

3.3.2 Bolivia

Item	Description
Regulatory Body	Superintendencia de Telecomunicaciones de Bolivia
Location	Oficina Central La-Paz Bolivia
Postal Address	Oficina Central Calle 13 NÂº8260 – 8280 Calacoto Casilla Postal 6692 La-Paz Bolivia
Phone	+591 2 3120978 -3120587
Web	http://att.gob.bo/
Do UWB regulations exist?	No
Specific regulations	None
Notes	Generally will approve either ETSI or FCC compliant equipment

3.3.3 Brazil

Item	Description
Regulatory Body	Ministério das Comunicações Agência Nacional de Telecomunicações (ANATEL)
Location	Ministério das Comunicações Esplanada dos Ministérios, Bloco “R”, CEP 70044-900 Brazilia – DF
Postal Address	NA

Item	Description
Phone	NA
Web	http://www.anatel.gov.br
Do UWB regulations exist	YES
UWB Definition	Intentional emissions with fractional bandwidth greater than or equal to 20%, or a bandwidth measured between the points of 10 dB of the carrier wave peak, greater than or equal to 500 MHz, regardless of the fractional bandwidth.
Specific regulations	Ato nº 14448, de 04 de dezembro de 2017

3.3.4 Chile

Item	Description
Regulatory Body	Subsecretería de Telecomunicaciones
Location	Subsecretería de Telecomunicaciones Ministerio de Transportes y Telecomunicaciones Santiago de Chile, Chile
Postal Address	Subsecretería de Telecomunicaciones Ministerio de Transportes y Telecomunicaciones Amunátegui 139 – Clasificador 120 Correo 21 Santiago de Chile Chile
Phone	+506 220 60103
Web	http://www.subtel.cl
Do UWB regulations exist?	Yes
Specific regulations	Resolución 1985, Apendice 1
Notes	Essentially FCC rules

3.3.5 Colombia

Item	Description
Regulatory Body	Ministerio de Comunicaciones
Location	See below
Postal Address	Ministerio de Comunicaciones Edificio Murillo Toro Cra. 8a entre calles 12 y 13 Atención al Ciudadano
Phone	+506 800 206 1000
Web	http://www.mincomunicaciones.gov.co
Do UWB regulations exist?	Yes
Specific regulations	RESOLUCIÓN 181 DE 2019
Notes	Similar to FCC but from 3.7 GHz

3.3.6 Ecuador

Item	Description
Regulatory Body	Superintendence of Telecommunications of Ecuador
Location	Av. Diego de Almagro N31-95 entre Whymper y Alpallana. Edificio Senatel
Postal Address	NA
Phone	02 2 50 8535
Web	http://www.conatel.gov.ec
Do UWB regulations exist?	No
Specific regulations	None
Notes	Generally will approve either ETSI or FCC compliant equipment

3.3.7 Guyana

Item	Description
Regulatory Body	National Frequency Management Unit
Location	See below
Postal Address	68 Hadfield Street D'Urban Park, Georgetown, Guyana.
Phone	592 226 2233
Web	http://www.sdnp.org.gy/nfmu/index.htm
Do UWB regulations exist?	No
Specific regulations	None
Notes	Generally will approve FCC compliant equipment

3.3.8 Paraguay

Item	Description
Regulatory Body	Comisión Nacional de Telecomunicaciones
Location	See below
Postal Address	Comisión Nacional de Telecomunicaciones Yegros Nro. 437 y 25 de Mayo
Phone	440 020 R.A
Web	http://www.conatel.gov.py/licencias.htm
Do UWB regulations exist?	No
Specific regulations	None
Notes	Generally will approve FCC compliant equipment

3.3.9 Peru

Item	Description
Regulatory Body	Ministry of Transport and Communication
Location	Jr. Zorritos 1203 – Lima 1

Item	Description
Postal Address	NA
Phone	315 7800
Web	http://www.mtc.gob.pe/
Do UWB regulations exist?	No
Specific regulations	None
Notes	Generally will approve either ETSI or FCC compliant equipment

3.3.10 Uruguay

Item	Description
Regulatory Body	Unidad Reguladora de Servicios de Communicaciones (URSEC)
Location	Montevideo Uruguay
Postal Address	URSEC Uruguay 988 cp 11100 Montevideo
Phone	598 2 9028082
Web	www.ursec.gub.uy
Do UWB regulations exist?	No
Specific regulations	None
Notes	Generally will approve FCC compliant equipment

3.3.11 Venezuela

Item	Description
Regulatory Body	Comision Nacional de Telecomunicaciones República Bolivariana de Venezuela (CoNaTel)
Location	Ministerio de Infraestructura Comision Nacional de Telecomunicaciones República Bolivariana de Venezuela Caracas Venezuela
Postal Address	Planta Baja de la Torre MINFRA Av. Francisco de Miranda Chacao Caracas Venezuela
Phone	0212 201 59 40
Web	http://www.conatel.gov.ve
Do UWB regulations exist?	Yes
Specific regulations	PROVIDENCIA ADMINISTRATIVA Nº 059 2013
Notes	-41.3 dBm/MHz between 6,0 – 9,0 GHz

3.4 Europe

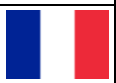
3.4.1 European Union

Note: The latest information in relation to the status of UWB regulations in individual European countries may be found using the European Communications Office (ECO) documentation database at this link: https://docdb.cept.org/ and European Communications Office Frequency Information System (EFIS) at this link: https://efis.cept.org/

Regulatory Authority: European Commission and CEPT/ECC
Standards Authority: ETSI

Regulatory Bodies – pan European		
CEPT		Nyropsgade 37, 4th floor 1602 Copenhagen Denmark
ETSI		650, Route des Lucioles 06921 Sophia-Antipolis Cedex France

Regulatory Bodies – National					
Country		EU Member State	CEPT Member	Regulatory Body	Web
Austria		Y	Y	Regulatory Authority for Telecommunications and Broadcasting Ministry of Transport, Innovation and Technology	www.rtr.at
Belgium		Y	Y	Belgian Institute for postal services and Telecommunications	www.ibpt.be
Bulgaria		Y	Y	Communications Regulation Commission	www.crc.bg
Croatia		Y	Y	Ministry of the Sea, Tourism, Transport and Development	www.mmtpr.hr
Cyprus		Y	Y	Department of Electronic Communications	www.mcw.gov.cy
Czech Republic		Y	Y	Czech Telecommunications Office	www.ctu.eu
Denmark		Y	Y	National IT and Telecom Agency	www.en.itst.dk
Estonia		Y	Y	Technical Surveillance Authority	www.tja.ee
Finland		Y	Y	Ministry of Transport & Communications	www.lvm.fi

Regulatory Bodies – National					
Country		EU Member State	CEPT Member	Regulatory Body	Web
France		Y	Y	ARCEP	www.arcep.fr/eng
Germany		Y	Y	Regulierungsbehoerde für Telekommunikation und Post	www.bundesnetzagentur.de
Greece		Y	Y	Hellenic Telecommunications and Post Commission	www.eett.gr
Hungary		Y	Y	Ministry of Transport, Communication and Water Management	www.meh.hu
Ireland		Y	Y	COMREG – Commission for Communication Regulation	www.comreg.ie
Italy		Y	Y	Communications Regulatory Authority	www.agcom.it
Latvia		Y	Y	Latvia Telecommunication State Inspector	www.vei.lv
Lithuania		Y	Y	Lithuanian Communications Regulatory Authority	www.radio.lt
Luxembourg		Y	Y	Institut Luxembourgeois de Régulation	www.ilr.public.lu
Malta		Y	Y	Malta Communications Authority	www.mca.org.mt
Netherlands		Y	Y	OPTA	www.opta.nl
Poland		Y	Y	Office of Electronic Communications	www.en.uke.gov.pl
Portugal		Y	Y	ANACOM	www.anacom.pt
Romania		Y	Y	National Regulatory Authority for Communications	www.ancom.org.ro
Slovakia		Y	Y	Telecommunications Office of the Slovak Republic	www.teleoff.gov.sk
Slovenia		Y	Y	AKOS – Agency for communications networks and services, republic of Slovenia	www.akos-rs.si/akos-ang
Spain		Y	Y	Comison del Mercado de las Telecommunicaciones	www.cnmc.es
Sweden		Y	Y	Swedish Post and Telecom Agency	www.pts.se

3.4.2 Applications

- Communications
- Locations Tracking
- Road and rail vehicles
- Ground probing radar
- On-board aircraft

3.4.3 Requirements

See Reference [2] for a detailed discussion of European regulations and the European product approvals process.

3.4.4 Other European Countries

3.4.4.1 Iceland

Item	Description
Regulatory Body	Póst- og fjarskiptastofnun
Location	As below
Postal Address	Suðurlandsbraut 4, 108 Reykjavík
Phone	+354 510 1500
Web	www.pfs.is
Do UWB regulations exist?	Yes
Specific regulations	Same as ECC regulations

3.4.4.2 Liechtenstein

Item	Description
Regulatory Body	Amt für Kommunikation (AK)
Location	Äulestrasse 51 9490 Vaduz
Postal Address	Äulestrasse 51 Postfach 684 9490 Vaduz
Phone	+423 236 64 88
Web	https://www.llv.li/inhalt/11109/amtsstellen/amt-fur-kommunikation
Do UWB regulations exist?	Yes
Specific regulations	Same as ECC regulations

3.4.4.3 Norway

Item	Description
Regulatory Body	Nasjonal kommunikasjonsmyndigheit (Nkom)
Location	Nygård 1, 4790 Lillesand
Postal Address	Postboks 93, 4791 Lillesand
Phone	+47 95 74 84 47
Web	www.nkom.no
Do UWB regulations exist?	Yes
Specific regulations	Same as ECC regulations

3.4.4.4 Russia

Item	Description
Regulatory Body	General Radio Frequency Centre (GRFC)
Location	As below
Postal Address	7, Tverskaya Street 125375 Moscow Russian Federation
Phone	+7 095 771 84 00
Web	http://www.gov.ru/
Do UWB regulations exist?	Yes
Specific regulations	Addendum to the GRFC decision from December 15, 2009 # 5/9/02-05-02 Addendum No. 16 the GRFC decision May 7, 2007 No. 07-20-03-001
Notes	1. Outdoor use is prohibited 2. Use on board aircraft during taxing, take-off or landing is prohibited. 3. Use is prohibited in freight terminals at airports.

3.4.4.5 Switzerland

Item	Description
Regulatory Body	Federal Office of Communication
Location	Federal Office of Communications Biel Switzerland
Postal Address	Federal Office of Communications Zukunftstrasse 44 P.O. Box 2501 Biel
Phone	+41 32 327 5511
Web	www.bakom.ch
Do UWB regulations exist?	Yes
Specific regulations	Same as ECC regulations

3.4.4.6 United Kingdom

Item	Description
Regulatory Body	Ofcom
Location	As below
Postal Address	Riverside House 2a Southwark Bridge Road London SE1 9HA
Phone	+44 20 7981 3000
Web	www.ofcom.org.uk
Do UWB regulations exist?	Yes
Specific regulations	Same as ECC regulations

3.5 Middle East

3.5.1 Bahrain

Item	Description
Regulatory Body	Telecommunications Regulatory Authority
Location	5th Floor, Building No. 852, Road No. 3618 Seef 436
Postal Address	Telecommunications Regulatory Authority PO Box 10353 Manama, Kingdom of Bahrain
Phone	+973 1752 0000
Web	http://www.tra.org.bh/
Do UWB regulations exist?	Yes
Specific regulations	Resolution No. 8 of 2017 Regarding Regulation of Type Approval for Short Range Devices
Notes	Limited to -50 dBm/MHz in 2,4 -4,8 GHz

3.5.2 Iran

Item	Description
Regulatory Body	Communications Regulatory Authority (CRA) of Iran
Location	NA
Postal Address	NA
Phone	NA
Web	http://www.cra.ir/
Do UWB regulations exist?	Yes
Specific regulations	CRA-DEC 9018
Notes	-41.3 dBm/MHz between 6,0 – 8,5 GHz

3.5.3 Iraq

Item	Description
Regulatory Body	The Iraqi National Communications and Media Commission (NCMC)
Location	NA
Postal Address	NA
Phone	NA
Web	NA
Do UWB regulations exist?	Yes
Specific regulations	None
Notes	Refers to EN 302 065

3.5.4 Israel

Item	Description
Regulatory Body	Ministry of Communications
Location	Tel Aviv, Israel
Postal Address	NA
Phone	+972 3 5198281
Web	http://www.moc.gov.il/
Do UWB regulations exist?	Yes
Specific regulations	None
Notes	EN test reports are required for approval. US-based (FCC/ISED) reports are not accepted.

3.5.5 Jordan

Item	Description
Regulatory Body	Telecommunications Regulatory Commission
Location	Amman, Jordan
Postal Address	The Telecommunications Regulatory Commission (TRC) Shmeisani Area / Abd Al-Hamid Sharaf Street, building no. (90). P.O.Box: 941794 Amman 11194 Jordan
Phone	+962 6 5501120
Web	http://www.trc.gov.jo/
Do UWB regulations exist?	Yes
Specific regulations	None
Notes	Aligning with European (ETSI/CE) standards

3.5.6 Lebanon

Item	Description
Regulatory Body	Telecommunications Regulatory Authority (TRA)
Location	Beirut, Lebanon
Postal Address	Beirut, Riad El Solh Str. MoT 3rd
Phone	+961 1 979 979
Web	http://www.mpt.gov.lb/ & https://www.tra.gov.lb/
Do UWB regulations exist?	Yes
Specific regulations	None
Notes	Refers to EN 302 065

3.5.7 Qatar

Item	Description
Regulatory Body	Communications Regulatory Authority
Location	Doha, Qatar
Postal Address	Al Nasr Tower B, Corniche PO Box 23404, Doha, Qatar
Phone	+974 4 935 922
Web	http://www.cra.gov.qa/en
Do UWB regulations exist?	Yes
Specific regulations	Class license for short range devices
Notes	Refers to EN 302 065

3.5.8 Saudi Arabia

Item	Description
Regulatory Body	The Communications and Information Technology Commission of Saudi Arabia (CITC)
Location	Communications and Information Technology Commission Riyadh Kingdom of Saudi Arabia
Postal Address	Communications and Information Technology Commission P.O. Box 75606 Riyadh 11588 K.S.A
Phone	+966 1 4618000
Web	http://www.citc.gov.sa
Do UWB regulations exist?	Yes
Specific regulations	CITC R1085.
Notes	Refers to EN 302 065

3.5.9 Syria

Item	Description
Regulatory Body	Ministry of Communications and Technology
Location	NA
Postal Address	NA
Phone	NA
Web	www.moct.gov.sy
Do UWB regulations exist?	No
Specific regulations	None
Notes	Generally, will approve ETSI certified equipment

3.5.10 UAE

Item	Description
Regulatory Body	Telecommunications Regulatory Authority
Location	Sheikh Zayed Street, Abu Dhabi, United Arab Emirates
Postal Address	P.O.Box: 26662 Abu Dhabi, United Arab Emirates
Phone	+971 2 626 9999
Web	http://www.tra.gov.ae/
Do UWB regulations exist?	Yes
Specific regulations	Ultra-Wide Band and Short-Range Devices V4.0
Notes	Refers to EN 302 065

3.5.11 Yemen

Item	Description
Regulatory Body	The Ministry of Telecommunications and Information Technology
Location	Sanaa, Yemen
Postal Address	NA
Phone	+967 1 331456
Web	www.mtit.gov.ye
Do UWB regulations exist?	No
Specific regulations	None
Notes	Generally, will approve ETSI certified equipment

3.6 Asia Pacific

3.6.1 Australia

Item	Description
Regulatory Body	Australian Communications and Media Authority (ACMA)
Location	Canberra, Melbourne & Sydney Central Offices
Postal Address	Canberra Central Office Purple Building, Benjamin Offices, Chan Street, PO Box 78
Phone	+61 2 6219 5555
Web	http://www.acma.gov.au
Do UWB regulations exist?	Yes
Specific regulations	Radio Communications (Low Interference Potential Devices) Class Licence 2015 as modified August 2019
Notes	For generic UWB transmitters: (a) The transmitter must comply with either: (i) ETSI Standard EN 302 500; or (ii) ETSI Standard EN 302 065. (b) The transmitter must not be operated on board any aircraft or from any fixed outdoor location. (c) The transmitter must not be operated in the 3425-3575 MHz band before 14 December 2015. (d) The transmitter must not be operated within a nominated distance of a specified Australian radio-astronomy site. (e) The transmitter must not be operated in the 8400–8500 MHz band within the nominated distance of a specified SRS earth station. For in-ground UWB transmitters: (a) The transmitter must comply with Part 2 of ETSI Standard EN 302 065. (b) The transmitter must not be operated within a nominated distance of a specified Australian radio-astronomy site For building material analysis transmitters: (a) The transmitter must comply with ETSI Standard EN 302 435. (b) The transmitter must be operated in a position such that emissions are directed into building material. (c) The transmitter must not be operated within a nominated distance of a specified Australian radio-astronomy site. (d) The transmitter must not be operated in the 8400–8500 MHz band within the nominated distance of a specified SRS earth station. **Restricted sites are listed at https://www.acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Class-licences/lipd-class-licence-spectrum-acma**

3.6.2 Brunei

Item	Description
Regulatory Body	The Authority for Info-communications Technology Industry of Brunei Darussalam (AITI)
Location	Block B14, Simpang 32-5, Kampung Anggerek Desa, Jalan Berakas BB3713, Brunei Darussalam.
Postal Address	Block B14, Simpang 32-5, Kampung Anggerek Desa, Jalan Berakas BB3713, Brunei Darussalam.
Phone	+ (673) 232 3232
Web	https://www.aiti.gov.bn/SitePages/Spectrum-Management.aspx
Do UWB regulations exist?	Yes
Specific regulations	Telecommunications Notification 2018
Notes	-41.3 dBm/MHz between 3,4-4,8 GHz (mitigation required between 3,4 – 4,2 GHz) and 6,0 – 9,0 GHz

3.6.3 China

Item	Description
Regulatory Body	Ministry of Industry and Information Technology (MIIT)
Location	Beijing China
Postal Address	No.80, Beilishi Road, Beijing, 100037, China
Phone	+660 122 37
Web	http://www.mii.gov.cn/
Do UWB regulations exist?	Yes
Specific regulations	MIIT wireless [2008] 354 file
Notes	China has approved the use of UWB for WiMedia applications. The approved bands are 3 and 7 through 11 of the appropriate ECMA standard (4.2 – 4.8 GHz and 6 – 9 GHz approximately). Many of the constraints on the use of UWB equipment are common to other jurisdictions: - • Not permitted on aircraft • Not permitted in an area of 1 km around listed radio astronomy observatories • UWB radio transmitting equipment must obtain an approval certificate from the Ministry of Industry and Information Technology of the People's Republic of China

3.6.4 Hong Kong

Item	Description
Regulatory Body	Office of the Telecommunications Authority (OFTA)
Location	OFTA Wan Chai Hong Kong
Postal Address	OFTA 29/F Wu Chung House 213 Queens Road East Wan Chai Hong Kong
Phone	+852 2961 6333
Web	http://www.ofta.gov.hk/
Do UWB regulations exist?	Yes
Specific regulations	HKCA 1080
Notes	-41.,3 dBm/MHz between 4,2-4,8 GHz and 6,0-8,5 GHz

3.6.5 India

Item	Description
Regulatory Body	Government of India Wireless Planning & Coordination Wing Ministry of Communications and Information Technology Department of Telecommunications
Location	New Delhi, India
Postal Address	Various – check website
Phone	Various – check website
Web	http://www.wpc.dot.gov.in/
Do UWB regulations exist?	Yes
Specific regulations	GSR 1046(E)
Notes	Refers to EN 302 065

3.6.6 Indonesia

Item	Description
Regulatory Body	Ministry of Communication and Informatics and the Directorate General of Post and Information Resources and Equipment (SDPPI)
Location	Jakarta, Indonesia
Postal Address	
Phone	
Web	https://www.dimulti.co.id/uwb-operation-and-regulatory-control-in-

Item	Description
	indonesia/
Do UWB regulations exist?	Yes
Notes	Indonesia's UWB regulations are governed by the new Short-Range Devices (SRD) Technical Standards, specifically Ministerial Decree Number 260 of 2024

3.6.7 Japan

Item	Description
Regulatory Body	Ministry of Internal Affairs and Communication
Location	NA
Postal Address	NA
Phone	NA
Web	http://www.tele.soumu.go.jp/e/index.htm
Do UWB regulations exist?	Yes
Specific regulations	ARIB STD-T91 v3.0 2019

3.6.8 Macau

Item	Description
Regulatory Body	Correios e Telecomunicações de Macau
Location	Edifício-Sede dos Correios de Macau, Largo do Senado, Macau Peninsula, Macau, China
Postal Address	Edifício-Sede dos Correios de Macau, Largo do Senado, Macau Peninsula, Macau, China
Phone	
Web	https://www.ctt.gov.mo/MacauPost/Default.aspx?lang=en-us
Do UWB regulations exist?	
Specific regulations	Despacho do Chefe do Executivo n.º 44/2019
Notes	-41.3 dBm/MHz between 4,2 – 4,8 GHz and 6,0 – 8,5 GHz

3.6.9 Malaysia

Item	Description
Regulatory Body	Malaysian Communications and Multimedia Commission
Location	See below
Postal Address	63000 Cyberjaya, Selangor Darul Ehsan, Malaysia
Phone	+603 8688 8000
Web	http://www.mcmc.gov.my
Do UWB regulations exist?	Yes
Specific regulations	Class assignment No. 1 of 2020
Notes	-41.3 dBm/MHz between 6,0 – 8,5 GHz

3.6.10 New Zealand

Item	Description
Regulatory Body	Commerce Commission of New Zealand (ComCom).
Location	44 The Terrace PO Box 2351 Wellington 6140 New Zealand
Postal Address	PO Box 2351 Wellington 6140 New Zealand
Phone	+64 4 924 3600
Web	http://www.rsm.govt.nz/index.html
Do UWB regulations exist?	Yes
Specific regulations	Radiocommunications Regulations (General User Radio Licence for Ultra Wide Band Devices) Notice 2017
Notes	-41.3 dBm/MHz between 6,0 -8,5 GHz (and 3,1 – 4,8 with mitigation)

3.6.11 Philippines

Item	Description
Regulatory Body	National Telecommunications Commission
Location	
Postal Address	
Phone	
Web	https://ntc.gov.ph/
Do UWB regulations exist?	Yes
Specific regulations	MC 06-08-2018
Notes	-41.3 dBm/MHz between 6,0 and 8,5 GHz

3.6.12 Singapore

Item	Description
Regulatory Body	Info-Communications Development Authority of Singapore (IDA)
Location	Spectrum & Number Management Info-Communications Development Authority of Singapore Singapore
Postal Address	Resource Management & Standards 10 Pasir Panjang Road #10-01 Mapletree Business City Singapore 117438
Phone	+ 65 322 1999
Web	http://www.ida.gov.sg
Do UWB regulations exist?	Yes
Specific regulations	IDA TS UWB Issue 1, October 2016
Notes	The Singapore regulations adopt much of the FCC and ECC rulings.

3.6.13 South Korea

Item	Description
Regulatory Body	RAPA - Korea Radio Promotion Association (www.rapa.or.kr and www.spectrum.or.kr)
Location	See below
Postal Address	47, Gwanmun-ro, Gwacheon-si, Gyeonggi-do, 13809, Rep. of Korea
Phone	+82 2 500 9000
Web	http://www.kcc.go.kr/
Do UWB regulations exist?	Yes
Specific regulations	Korean Communications Commission K125B

3.6.14 Vietnam

Item	Description
Regulatory Body	Regulatory is the Ministry of Information and Communications (MIC).
Location	
Email:	banbientap@mic.gov.vn;
Phone	8424.3.5563461
Web	http://english.mic.gov.vn/Pages/home.aspx
Do UWB regulations exist?	Yes
Specific regulations	UWB rules are part of the Circular No. 46/2016/TT-BTTTT dated 26 December 2016

References

Table 9: Table of References

Ref	Author	Title
[1]	Qorvo	APR002: UWB product certification process in USA
[2]	Qorvo	APR003: UWB product certification process in Europe
[3]	Qorvo	APR004: UWB product certification process in Japan

Document History

Table 10: Document History

Revision	Date	Description
1.0	31/10/15	Initial release
1.1	31/5/18	Updated with updated regulations
1.2	28/02/21	Updated version with new format and regulatory updates
1.3	17/05/24	Modification to footer
B	31/03/26	Re-formatting General updates Indonesia section added

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