

September 2020

doc.: IEEE 802.15-20-0241-00-0dep

Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: [**Expecting Update of UWB Outdoor Use Radio Regulation in Japan**]

Date Submitted: [135 September 2020]

Source: [Ryuji Kohno^{1,2,3}] [1;Yokohama National University, 2;Centre for Wireless Communications(CWC), University of Oulu, 3;University of Oulu Research Institute Japan CWC-Nippon]
Address [1; 79-5 Tokiwadai, Hodogaya-ku, Yokohama, Japan 240-8501

2; Linnanmaa, P.O. Box 4500, FIN-90570 Oulu, Finland FI-90014

3; Yokohama Mitsui Bldg. 15F, 1-1-2 Takashima, Nishi-ku, Yokohama, Japan 220-0011]

Voice:[1; +81-45-339-4115, 2:+358-8-553-2849], FAX: [+81-45-338-1157],

Email:[1: kohno@ynu.ac.jp, 2: Ryuji.Kohno@oulu.fi, 3: ryuji.kohno@cwc-nippon.co.jp] Re: []

Re: []

Abstract: [This document introduces expecting change of radio regulation for outdoor use of Ultra Wide Band (UWB) radio in Japan. In January 2021. This is not an official document of Japanese radio authority MIC but the translated part of documents by Ryuji Kohno.]

Purpose: [information]

Notice: This document has been prepared to assist the IEEE P802.15. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.

Release: The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15.

Expecting Update of UWB Outdoor Use Radio Regulation in Japan

Ryuji Kohno

**Professor, Graduate School of Engineering Science, Yokohama National University, Japan
Director, Center for Future Medical Infrastructure Based on Advanced ICT, Japan**

Background:**Introduction**

- Japanese radio regulation authority MIC (Ministry of Internal Affairs and Communications) has investigated technical requirement for ultra wide band (UWB) radio use according to UWB research, development, and business after it established regulatory requirement for communication uses for 3.4-4.8GHz, 7.25-10.25GHz in 2006, and collision avoidance radar uses for 22-29GHz in 2013. While UWB communication and sensing systems have been restricted indoor in Japan, the rest of world have been developing them to a lot of outdoor uses.

Major Change in May 2019:

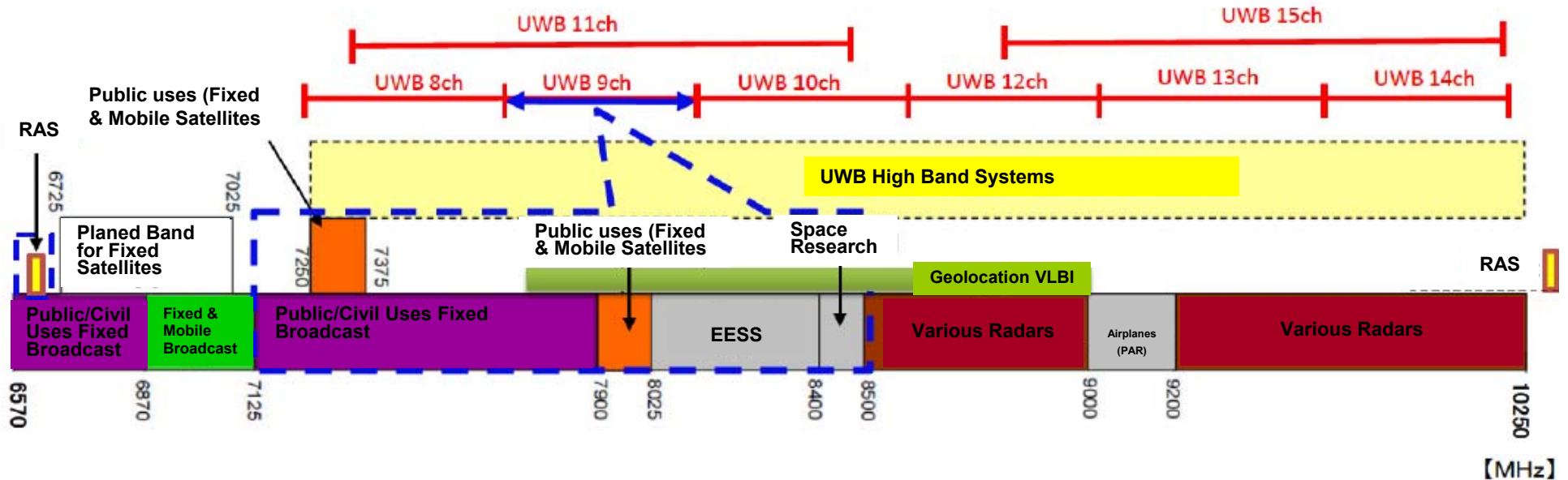
- (1) Bandwidth, Occupied, and Impermissible Emission Available Outdoor; Channel 9 of IEEE802.15.4aTM with central frequency 7987.2GHz and bandwidth 499.2MHz out of high band 7.25-10.25GHz has been considered available outdoor.
- (2) EIRP(Equivalent Isotropically Radiated Power); Japanese regulatory requirement for UWB radio has been regulated by emission power, antenna gain as well as EIRP. For the sake of international compatibility, Japanese regulation for UWB radio uses could be regulated by EIRP.

Expecting Change in January 2021:

- (1) Although Ch 9 in 7.587-8.4GHz was allowed for outdoor use in May 2019, MIC has started investigation to allow wider band 7.25-9.00 GHz corresponding Channel 8,9,10 and 11 while it is expected to allow it for outdoor use in January 2021.
- (2) Technical task group has been investigating coexisting constraint of expected usecases such as smart key, body sensor, smart parking, logistics etc. with licenced primary systems.

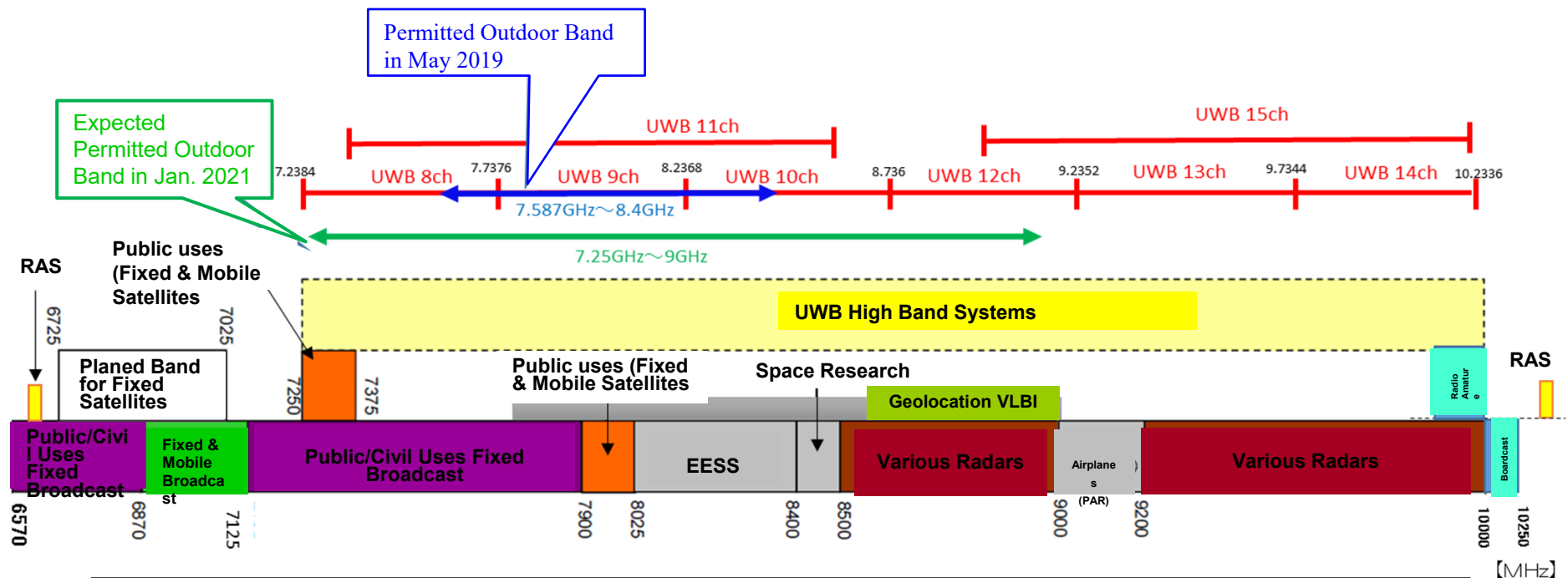
Radio Uses in the Frequency Band 6.57-10.25GHz (May 2019)

- **Red lines** indicate channels defined by **IEEE802.15.4a**.
- Available band is 7.587-8.4GHz. **Blue dotted line** systems should be protected for coexistence such as fixed micro wave communication, satellite, radio astronomy and VLBI etc.



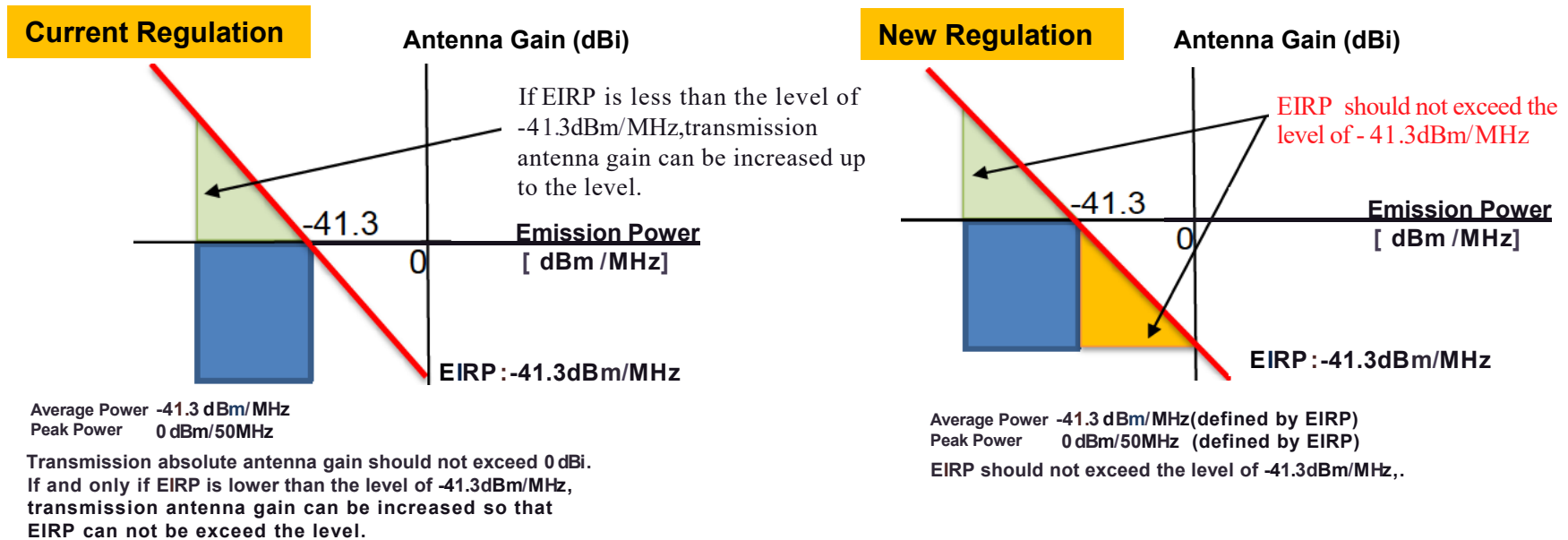
Radio Outdoor Uses in the Frequency Band 7.25-9.00GHz (January 2021)

- Red lines indicate channels defined by IEEE802.15.4a.
- Although Ch 9 in 7.587-8.4GHz Blue line was allowed for outdoor use in May 2019, MIC has started investigation to allow wider band 7.25-9.00 GHz Green line and it is expected to allow it for outdoor use in January 2021



Update of Emission Power Regulation in case of Low Gain Antenna

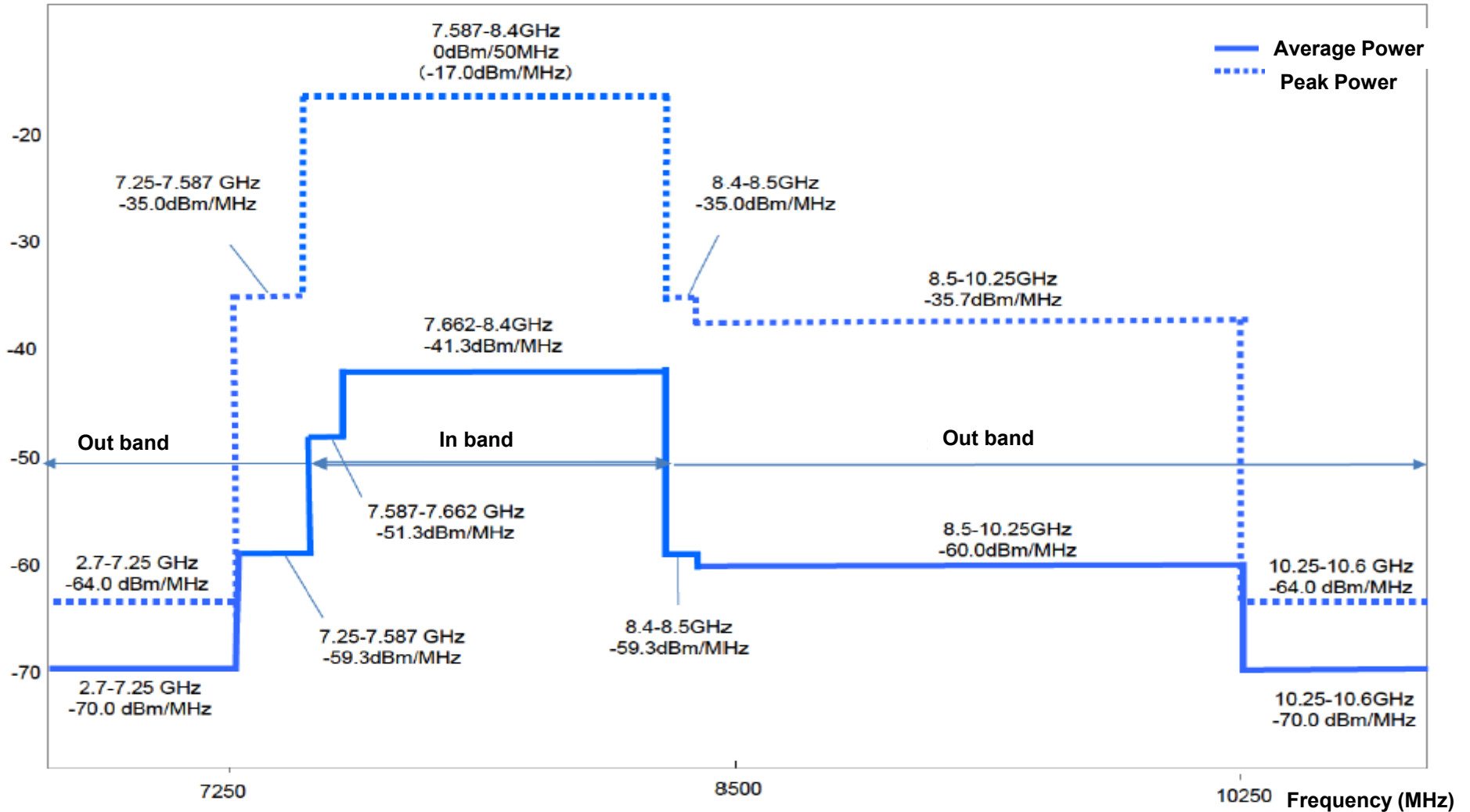
- Recently demand of small wireless terminals including UWB terminals drastically. A small terminal cannot perform desired covering range because antenna gain of small terminals is used not to be sufficient.
- Corresponding to the demand, it is permitted that under the range of the regulated Equivalent Isotropically Radiated Power (EIRP), antenna gain can be increased according to attenuation amount of emission power. Increase of emission power can be replaced with attenuation of transmitted antenna gain.



- In current regulation, it is permitted that under the limit of the regulated EIRP, antenna gain can be increased according to attenuation amount of emission power.
- In new regulation, it is permitted that under the range of the regulated EIRP increase of emission power is allowed in case that antenna gain is small to reach the regulated EIRP

Updated UWB PSD Mask for Outdoor Uses in Japan

Power(dBm/MHz)



Remark

- In May 2019, regulation for UWB radio outdoor use was allowed only for CH9 but MIC has been investigating more reasonable extension to other channels.
- In January 2021, regulation for UWB radio outdoor use is expected to be allowed for CH7,8,9,10, and 11 wider band 7.25-9.00GHz.
- These slides are translated from MICT documents by Ryuji Kohno, so it means these are not official MIC documents.
- IG-DEP has been investigating dependable MAC and PHY in which UWB is mostly assumed to be PHY specification. For amendment of IEEE802.15.6-2012 BAN of which three PHY specifications with common MAC, i.e. hybrid MAC protocol of contention base and contention free have been defined.
- IG-DEP aims to update BAN MAC and UWB PHY of IEEE802.15.6 dependable even in channels with various interference and in various usecases.