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WP 5, D11 – Spectrum study and standardization status

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Abstract:

This report contains an overview of the worldwide 60GHz spectrum regulation, and an update of the different 60GHz standardization initiatives status.

Keyword list:

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1. Spectrum regulation study

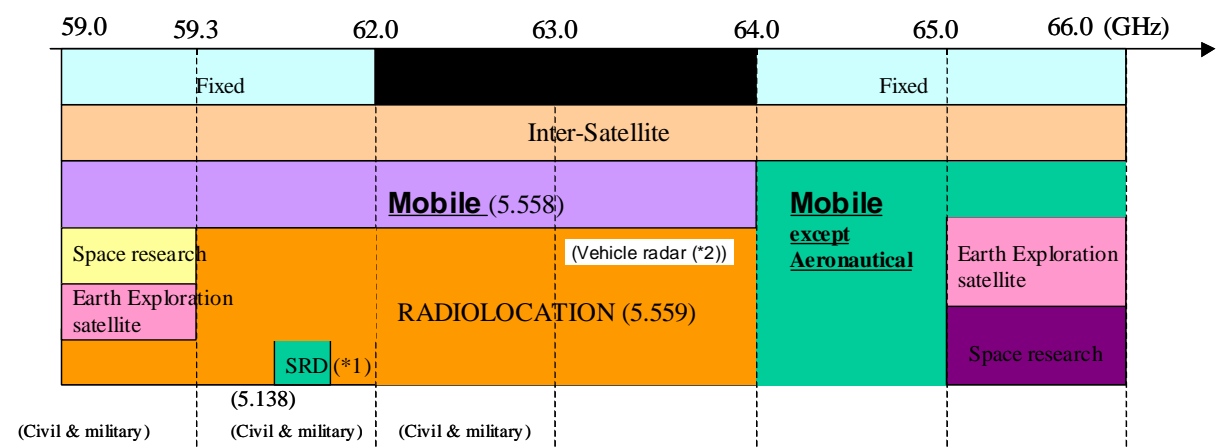
1.1 Europe

In Europe, spectrum regulation is managed by CEPT. CEPT maintains the European Frequency Allocation Table, which is available at <http://www.ero.dk>. All member countries also implement their national frequency allocation table based on the CEPT one. The national frequency allocation tables are available either at <http://www.efis.dk/search/general> or on each national regulation organism web site.

An excerpt of the European Spectrum Allocation Table from 59GHz to 66GHz is provided below (taken from [2]).

European Spectrum Allocation (59.3- 66.0GHz) by 2008

(Source : European Frequency Allocation Table issued by CEPT)



Foot notes

5.138 : This frequency band is designated for ISM applications. The use of this frequency band shall be subject to special authorisation by the administration concerned, in agreement with other administrations whose radiocommunication services might be affected. In applying this provisions shall have due regard to the latest relevant ITU-R recommendations.

5.558 : Stations in the aeronautical mobile service may be operated subject to not causing harmful interference to the inter-satellite service.

5.559 : Airbone radars in the radiolocation service may be operated subject to not causing harmful interference to the inter-satellite service.

(*1) : Non specific short range device. See ERC recommendation 70-03 for (May, 2003)

(*2) : Road Transport Traffic Telematics (RTTT). See ECC/DEC/(02)01

Figure 1: European spectrum regulation for 60GHz

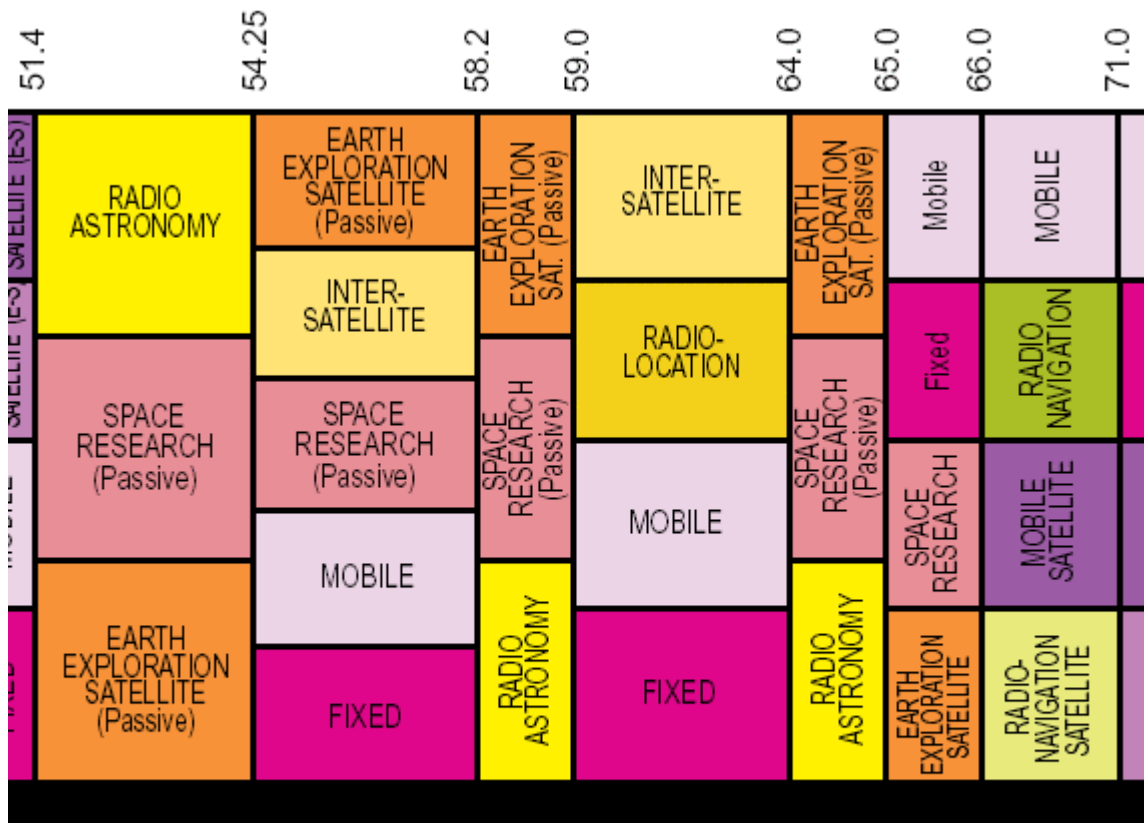
This table shows that the 59-64GHz band is available for mobile applications. The allocation of this band to mobile services is a follow up of the recommendation T/R 22-03 [4], where it is stipulated that:

- “the high-frequency re-use achievable in the oxygen-absorption band reduces the requirement for sophisticated frequency planning techniques and offers the possibility of a pan-European deregulated telecommunications environment for various low-power, low cost, short-range applications.”
- "a number of new or existing systems could operate successfully in the range of 54-66GHz, thus relieving congestion and reducing the demand for spectrum in lower frequency bands"

To our knowledge, and after investigations at ANFR (Agence Nationale des Fréquences: french agency for frequency regulation), it seems that there are no limitations on output powers and antenna gains yet. Standardization issues are likely to push spectrum authorities to define such limitations when needed.

1.2 USA

In US, the spectrum regulation is ensured by the NTIA/OSM (National Telecommunications and Information Administration / Office of Spectrum Management: <http://www.ntia.doc.gov/osmhome/osmhome.html>). This organism delivers a US frequency allocation chart that is available online. An excerpt of this chart around 60GHz is represented below:



ISM - 61.25 ± .250 GHz
 59-64 GHz IS DESIGNATED FOR UNLICENSED DEVICES

Figure 2: US spectrum regulation for 60GHz

As in Europe, the 59-64GHz band is available for unlicensed mobile services, but to our knowledge, there are no specifications yet for its use.

1.3 Japan

In Japan, spectrum regulation is ensured by ARIB (<http://www.arib.or.jp/english/>) in relation with Japanese Ministry of Public Management, Home affairs, Posts and Telecommunications. Since 60GHz normalization started early, namely at the very beginning of wireless LANs standardizations, spectrum regulation in the 60GHz band is also much more defined than in other regions of the world.

Japanese regulation for 60GHz bands was completed in 2000 and is summarized in [3], from which the following figure and tables are extracted. As shown on the figure below, the 59-66GHz band is unlicensed

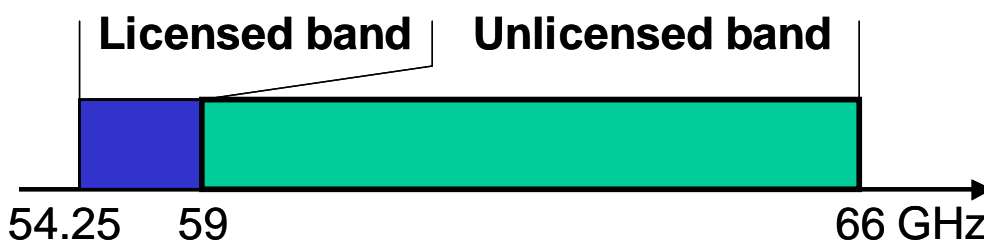


Figure 3: Japanese spectrum regulation for 60GHz

Contrary to other regions, there are specifications defined for the unlicensed band as well as for the licensed band:

Unlicensed band	
RF frequency	59-66 GHz
Maximum output power	10 mW
Maximum antenna gain	47 dBi
Frequency stability	within +/-500 ppm
Maximum Bandwidth	2.5 GHz
Spurious radiation strength	100 μ W or less
Other items	Basically not specified

Table 1: Specifications for the unlicensed band in Japan

Licensed band	
RF frequency	54.25-59 GHz
Maximum output power	100 mW
Maximum antenna gain	20 dBi
Frequency stability	within +/-200 ppm
Spurious radiation strength	50 μ W or less

Table 2: Specifications for the licensed band in Japan

2. Worldwide standardization status

As shown in the previous section, the 59-64GHz represents a big opportunity for developing standards on WLANs or WPANs. The actual standardization status is the following:

- Japan: Japan had already anticipated that fact at the very beginning of WLANs standardization and 60GHz is already a hot standardization topic with the ARIB MMAC Ultra High Speed WLAN (UHSWAN).
- US: IEEE 802.15.3 has recently created a millimeter waves interest group in order to standardize WPANs at 60GHz. Motorola made a presentation of Broadway concepts to this committee at the last meeting (Albuquerque, November 2003) [5].
- Europe: one of the goal of BroadWay is to contribute to the creation the 60GHz branch of the WLAN standardization in Europe. The uncertainties of the HIPERLAN/2 success is clearly a penalty for the moment in order to consider new avenues for higher data rates but nevertheless, a white paper contribution [6] has been presented this year to ETSI BRAN in order to consider 60GHz for next generation of WLANs. Formal contact has also been established with former partners of COMMinDor (THALES, IEMN de Lille, Thomson Multimedia France, INSA-LCST, CEA-LETI, FTR&D) that have also been working on developing 60GHz OFDM WLANs. Note that the consortium is quite complementary to the one of BroadWay. The goal was thus to join forces on the standardization level and issue a common contribution in order together more weight. As a result from this cooperation a presentation has been made to the 34th ETSI BRAN meeting. Very positive feedback has been received and ETSI is favorable to open a work item. In order to open this work item at least 4 companies (ETSI members) need to support its creation. Since Motorola, FTR&D, Intracom, IMST, TNO are favorable, this is enough for pursuing along that path.

3. Conclusion

As detailed in section 1, the 59-64GHz band is allocated to unlicensed mobile services worldwide, which represents a very interesting opportunity for designing WLANs or WPANs. While 60GHz has been considered in Japanese WLAN standards for several years, 60GHz standardization investigations are only emerging in US and Europe, and the Broadway project has a great role to play in these new processes.

4. References

- [1] ERC Report 25, "The European Table of Frequency Allocations and Utilizations Covering the Frequency Range 9kHz to 275GHz", Lisboa 2002 revised Dublin 2003.
- [2] Kei Obara, "Millimeter wave frequency allocation in Europe", doc IEEE802.15.3/0360r0, Sept. 2003.
- [3] Kiyoshi Hamagushi, "Japanese regulation for 60GHz band", doc IEEE802.15.3/0351r1, Sept. 2003.
- [4] CEPT Recommendation T/R 22-03, "Provisional recommended use of the frequency range 54.25-66GHz by terrestrial fixed and mobile systems", Athens, 1990.
- [5] Dave Silk, "A mmW WPAN concept", contribution to IEEE802.15.3 mmW IG, Albuquerque, November 2003.
- [6] Motorola, France-Telecom, "Evolution of WLAN/WPAN towards higher frequencies and higher throughput: from 5 to 60GHz?", ETSI BRAN34d018 document, October 2003.