CONSULTATION PAPER

PROPOSED REGULATORY FRAMEWORK FOR 60 GHz FREQUENCY BAND

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FOR 60 GHz FREQUENCY BAND

PART I: INTRODUCTION

1. Multi-gigabit wireless systems (MGWS) technology in the 60 GHz band is widely perceived by analysts and industry as an emerging area for products and services in both the consumer and business markets. There are two key applications for 60 GHz band to deliver MGWS services, namely the Wireless Personal Area Network (WPAN) and also for Fixed Wireless Services. Possible wireless applications include home/office networking, wireless backhaul and temporary wireless connections during events.

2. The unique propagation characteristics of the 60 GHz band is ideally suited for deployment of MGWS to provide short range wireless links (≤ 1km) with high data rate and high bandwidth. It offers a low cost, easy maintenance, highly secure and reliable alternative to other high capacity links at congested bands. Considering the above, there are significant benefits for Singapore to open the 60 GHz band for new mobile and wireless applications leading to even greater adoption and usage of ICT within Singapore.

PART II: ALLOCATION IN THE 60 GHz FREQUENCY BAND

3. At this juncture, the 60 GHz band (57 – 66 GHz) has not yet been released or allocated for use in Singapore. Since last year, however, IDA has received some feedback from the industry indicating interest to bring commercial equipment that operate in the 60 GHz into Singapore. There are 2 categories of commercial equipment that are identified as readily available in the market, low radiation equipment (≤40dBm EIRP) and high radiation equipment (>40dBm EIRP).

4. IDA noted from the CEPT ECC Report 113[1] which examined and provided conclusions on the compatibility studies between ITS (Intelligent Transport Systems) and Fixed Services at around 63 GHz: its conclusion for the need to implement mitigation techniques to significantly reduce the mutual interference possibilities with ITS.

Question 1: IDA invites views and comments on the compatibility report for ITS and Fixed Services to operate in the same frequency band, 63-64 GHz.

[1] http://www.erodocdb.dk/doks/doccategoryECC.aspx?doccatid=4 (May 2009)

5. In order to protect possible deployment of ITS in Singapore from unwanted emissions from fixed wireless services, IDA is proposing for high radiation fixed wireless services to operate only in the 57 – 63 GHz frequency band. In consideration to the above, IDA is proposing the following frequency allocation for the use of low radiation and high radiation equipment as shown in Figure 1. There will be a 100 MHz guard band (in red) at each end to safeguard operations of other services in the adjacent bands as shown in Figure 1.

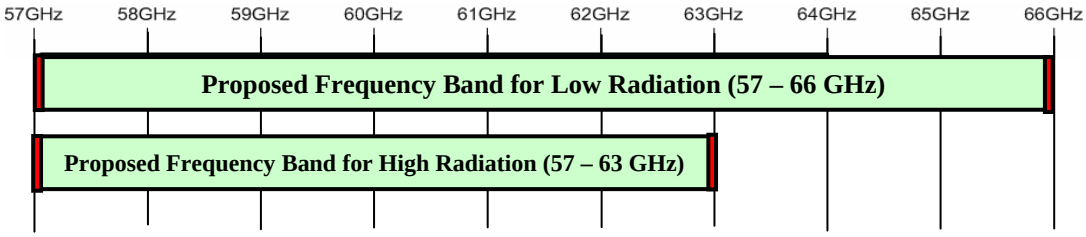

Figure 1: Proposed frequency allocations for low radiation and high radiation equipment in the 60 GHz band

Question 2: IDA invites views and comments on whether 63-66 GHz frequency band should be opened up for high power fixed wireless services.

Question 3: IDA invites views and comments on IDA's proposed frequency bands to be allocated for operations of both low radiation and high radiation equipment. IDA also invites views and comments on a 100 MHz guard band at each end of the band to safeguard operations of other services in the adjacent channels.

6. CEPT Recommendation ECC/REC/(09)01[1] provides a number of flexible options for high power point-to-point fixed wireless services in this band, including the option of not having specific channel plan or adopting a channel plan.

a. **Option (1) No specific channel plan**: In order to provide maximum flexibility for high power fixed wireless services applications, IDA is considering a 5.8 GHz block of spectrum with no mandatory channel arrangement and a 100 MHz guard band (in red) at each end to safeguard operation of other services in the adjacent bands.

b. **Option (2) Specific channel plan**: In order to ensure efficient spectrum usage for high power wireless services, IDA is considering a 5.8 GHz block of spectrum with a 50 MHz channel arrangement and a 100 MHz guard band (in red) at each end to safeguard operation of other services in the adjacent bands as shown in Figure 2.

[1] http://www.erodocdb.dk/doks/doccategoryECC.aspx?doccatid=2 (Jan 2009)

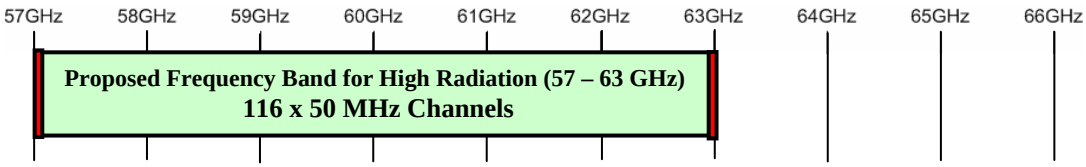

Figure 2: Proposed channel plan in the 60 GHz band

Question 4: IDA invites views and comments on the above two options for IDA to adopt for the channel plan.

7. IDA's preference is **Option (1) No specific channel plan,** which is able to provide maximum flexibility for high power fixed wireless services. Under this channel plan, high radiation equipment will be able to operate anywhere within the allocated band.

Question 5: IDA invites views and comments on IDA's preferred channel plan (Option 1).

PART III: TECHNICAL CONDITIONS AND REGULATORY APPROACH

8. Many countries[2] have already made allocations in the 60GHz band for multi-gigabit wireless applications, but with disparate technical requirements and permitted power level. In consideration of the various frameworks and to achieve international harmonisation for 60 GHz, IDA is proposing that the use of multi-gigabit wireless technology in the 60 GHz band may be provided within the technical parameters and frequency bands as follows:

Applications	Authorised Frequency Band	RF Output Power (EIRP)	Key Requirements
MGWS WPAN/WLAN	57 – 66 GHz	Not to exceed 25dBm (0.3W)	Maximum mean e.i.r.p density is limited to -2 dBm/MHz
		Not to exceed 40dBm (10W)	Maximum mean e.i.r.p density is limited to 13 dBm/MHz
Non-specified SRDs	61.0 - 61.5 GHz	Not to exceed 20dBm (100 mW)	For industrial, scientific and medical (ISM) applications as defined in ITU Radio Regulations.

[2] Countries which have allocated the 60 GHz band include U.S., Australia, Japan, South Korea etc.

Applications	Authorised Frequency Band	RF Output Power (EIRP)	Key Requirements
POINT-TO-POINT FIXED WIRELESS SYSTEMS INCLUDING FIXED LAN EXTENSION (FLANE) APPLICATIONS	57 – 63 GHz	Not to exceed 55dBm (316.2W)	Equipment is not allowed on aircraft or satellites. Maximum transmit output power density is limited to -10dBm/MHz

Table 1: Proposed frequency allocations and regulatory framework

Question 6: IDA invites views and comments on IDA's proposed technical framework on RF output power and key requirements for the deployment of multi-gigabit wireless technology in the 60 GHZ band.

Question 7: IDA invites views and comments on whether there should be a limit cap on the RF output power for high radiated power Fixed Services and whether there are potential health concerns for high radiation equipment.

9. Operations of low radiation equipment (≤40dBm EIRP) are unlikely to cause interference to other users within the same band and licence exemption for this band will promote the usage of multi-gigabit wireless applications in the 60 GHz band. As such, IDA intends to exempt from licensing low-radiated power devices operating in the 60GHz band subject to the technical framework for use of radio-communication equipments in the 60GHz band that IDA may issue.

Question 8: IDA invites views and comments on IDA's proposal to exempt low-radiated power devices (≤40dBm EIRP*) from licensing.*

10. CEPT ECC Report 113 and 114[3] have examined MGWS coexistence issues including FLANE applications. MGWS applications would be deployed predominantly outdoors and would require significant separation distances or sufficient antenna discrimination to avoid interference into radio links of same systems as well as between different systems. IDA notes that Singapore is a densely populated environment, as such, for high radiation equipment (> 40dBm EIRP), there is a need for IDA to retain greater control over such equipment operating in the band in order to mitigate possible radio interference.

[3] http://www.erodocdb.dk/Docs/doc98/Official/Pdf/ECCRep114.pdf (May 2009)

11. IDA's preference is to adopt a full licence approach for high radiation equipment (> 40dBm EIRP) operating in the 60GHz band which would enable IDA to retain greater control over such equipment operating in the band in view of the potential for interference. This approach is similar to IDA's current practice with regard to traditional fixed point to point links.

Question 9: IDA invites views and comments on IDA's preference for a full licensing approach for high radiation equipment (> 40dBm EIRP) operating in this band.

12. There are a few reports[4] that discussed safety aspects of the operations of **60 GHz** wireless systems. The report by SiBEAM cites that there are no commercial wireless systems operating in that band may radiate more than 1 mW/cm2, nor may it transmit more than 500 mW of peak power at any given time. That is ***ten times lower*** than the lowest level studied in the medical experiments, and even that level produced no observable effects. These reports conclude that the use of such equipment is within safety limits. In addition, IDA will work closely with the National Environment Agency (NEA) to ensure RF radiation from high radiation equipment are within safety limits.

Question 10: IDA invites views and comments on the safety aspects of operation of 60 GHz wireless systems and what guidelines must be established to protect individual users.

PART IV: INVITATION TO COMMENT

13. IDA invites the industry to comment on the matters stated in the above paragraphs and any other related issues not covered in this consultation document but which are considered to be relevant to the formulation of 60 GHz band regulatory framework. Following the end of the consultation period, IDA targets to announce the 60 GHz band regulatory framework by the second quarter of 2010.

[4] http://www.continental-wireless-solutions.com/Products/Wireless/PMP/TeraBeam/Performance60_Ghz.pdf (Oct 2002) and http://www.sibeam.com/whtpapers/60GHz_Safety_5_07.pdf (May 2007)

14. IDA reserves the right to make public all or parts of any written submissions made in response to this consultation, and to disclose the identity of the respondent. Any part of the submission which the respondent considers is commercially sensitive must be clearly marked and placed as a separate annex to the comments raised. IDA will take this into consideration when disclosing the information submitted.

15. All views and comments should be submitted in writing and in both hard and soft copies (Microsoft Word format) and shall reach IDA by **12 noon, 31 March 2010**. Respondents are required to include their personal/company particulars as well as their correspondence address in their submission. Views and comments should be addressed to:

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