Ericsson's Comments to iDA's Proposed Regulatory Framework for TV White Space Operations

Proposed Regulatory Framework for TV White Space Operations in the VHF/UHF Bands

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1 Distribution and contact details

1.1 Receiver

Ms Aileen Chia
Deputy Director General (Telecoms and Post)
Infocomm Development Authority of Singapore
10 Pasir Panjang Road
#10-01 Mapletree Business City
Singapore 117438
Fax: (65) 6211 2116

1.2 Contact Details

Chew Kok-Wee
Senior Manager
Government and Industry Relations
Ericsson Telecommunications Pte Ltd
1 Changi Business Park Central 1
One @ Changi City #06-101
Singapore 486036
Tel: (65) 6704 5768
Fax: (65) 259 0168
Email: kok-wee.chew@ericsson.com
www.ericsson.com

2 Ericsson's Comments to iDA's Proposed Regulatory Framework for TV White Space Operations in the VHF/UHF Bands

Ericsson welcomes the opportunity to provide comments to iDA's initiative on the Proposed Regulatory Framework for TV White Space Operations Consultation Paper. Ericsson has taken the approach of providing comments with a view on the operational, technical and socio-economic aspects based on our experiences.

In this response, Ericsson is focusing on both licensed and license-exempt aspects of secondary usage of the TV UHF spectrum. Notably, the TV UHF spectrum range is, from a mobile industry point of view, regarded as being "beach-front" spectrum. The radio frequency spectrum is a limited natural resource that should be used efficiently in the best interest of society.

In our view, license-exempt secondary usage is not representing efficient spectrum usage, especially for these relatively low frequencies with excellent extended propagation characteristics, where interference issues would be a challenge for license-exempt secondary use. These low frequencies would be more efficiently used by licensed and coordinated mobile network operations. In particular, work is on-going in the USA with regard to the TV UHF spectrum where about 120 MHz is considered for a licensed and dedicated mobile use.

With regard to the proposed framework for "white spaces" use in the TV UHF bands, Ericsson is convinced that there are other more suitable options providing enhanced values to use this range of spectrum in a more efficient manner.

In summary, there is a need to develop a suitable frequency arrangement which should be globally or regionally harmonised for mobile use under a licensed regime on national level. It should be noted that a regulatory practice for TV White Spaces may neither provide a viable business case nor for optimal use in the 600 MHz band (470 – 694/698 MHz). It is recommended that the 600 MHz band be identified as an IMT band and be included in the ITU Radio Regulations at the WRC-15. Alternatively, an Authorized Shared Access (ASA) or License Shared Access (LSA) regulatory regime concept may present one favourable option, especially in the higher frequency bands above the TV "beach-front" spectrum. Another alternative option is to use a "downlink only" solution in the 600 MHz band with a coordinated and licensed mobile underlay network that would be able to provide LTE Broadcast amongst other applications in a spectrum efficient way and can be aggregated with another downlink and uplink license in higher frequencies.

3 Ericsson's Comments

3.1 Question 1

IDA invites views on adopting a licence-exempt approach for WSDs in Singapore, subject to the devices meeting the conditions set by IDA.

Ericsson's Comments:

Ericsson is of the view that "TVWS technology" with associated specific regulatory practices, as referred to in the consultation, is not the most efficient and optimised way to use this spectrum. On the contrary, there are viable innovative alternatives that would provide more efficient spectrum utilisation and outstanding end-user experience.

iDA is invited to consider carefully the future use of this highly valuable spectrum for more advanced innovative mobile internet and media-based mass-market high quality services. Ericsson studies have not been able to confirm that the use of specific regulatory practices designed for "cognitive radio devices" and/or TV "white spaces" would improve the overall economic or spectrum efficiency.

License-exempt deployments of Wi-Fi are indeed successfully addressing indoor WLAN on higher frequency bands in controlled environments. Outdoor deployments of standalone Wi-Fi systems have shown poor performance when in loaded condition due to less control of interference. If license-exempt technologies such as Wi-Fi were to be deployed on a lower frequency band outdoors, interference would be more severe due to the propagation characteristics and performance would be worse.

Alternatively, an Authorized Shared Access (ASA) or License Shared Access (LSA) approach could be considered. However, a regulatory regime for the ASA/LSA concept may present a more favourable option in other bands. ASA/LSA concept is regarded to be better suited in higher bands where legacy use is limited or infrequent.

Another option is to use the TV white spaces for a "downlink only" mobile network in which the limitations on transmit power due to the susceptibility of TV receivers could be mitigated for a secondary fully licensed usage, aggregated with an uplink/downlink paired license on another frequency band. These mobile devices would then not be transmitting on adjacent frequencies to TV receivers and this mobile "downlink only" solution could be coordinated and licensed in the available white spaces supporting e.g. LTE-Broadcast or any other downlink application.

With regard to the TV UHF spectrum, Ericsson is of the view is that the band 600 MHz (470 – 694/698 MHz) should be used for advanced mobile broadband services under licensed conditions. The excellent propagation characteristics of this spectrum could be used for advanced mobile services and applications. Currently, work is on-going in the USA under the auspices of their National Broadband Plan (NBP) where approximately 120 MHz in TV UHF band is considered for mobile use, applying a reversed auction procedure. It is also our view that a harmonised frequency arrangement should be sought on a global or regional level, and a possible "Identification for IMT" for this band in the ITU Radio Regulations at WRC-15 is preferred.

3.2 Question 2

IDA invites views on designating a restricted number of TVWS channels to support the deployment of services that require certainty of spectrum access.

Ericsson's Comments:

iDA is invited to re-consider the spectrum designated for TVWS use in order to avoid suboptimal use of this highly valuable spectrum in the TV UHF band. A key consideration is to understand the viability and economy involved with regard to "cognitive radio", TV "white spaces" and WSD systems.

Please also refer to our response to Question 1.

3.3 Question 3

In the event where IDA designates channels to support such services, IDA invites views on the appropriate regulatory approach in designating and managing these TVWS channels and the regulatory framework for the operations of prioritised WSDs.

Ericsson's Comments:

Ericsson would recommend iDA to consider other alternatives while evaluating new regulatory approaches such as ASA/LSA approaches and a mobile downlink only solution.

3.4 Question 4

IDA invites views on allowing operation of WSDs in the 694 MHz – 806 MHz band until IDA allocates these frequencies for IMT deployment.

Ericsson's Comments:

Ericsson is of the view that this band falls into the APT700 band plan which has already gained significant traction within the APAC region as well as in Latin America. In particular, Singapore, Brunei, Indonesia and Malaysia have recently agreed to harmonise the use of this band.

Ericsson would strongly recommend that this band be dedicated for mobile use under a licensed regime and should not be allocated for WSD operation even before IMT deployment.

In the event that any services are deployed in the designated APT700 band prior to licensing, it should be encumbent on service providers to provide adequate notice to users of the temporary nature of service.
This notice would need to consider the potential for early access to be facilitated by incoming licence holders, which may significantly impact any WSD operation business case.

3.5 Question 5

IDA invites views on adopting a database approach as the mandated method to access white space spectrum.

Ericsson's Comments:

From a technical and operational point of view, a geo-location database could be used for radio-communication based systems, including TV "white spaces" systems. Any regulatory practice considered for implementation should be neutral and not related to a particular technology, providing equal opportunities to technologies and systems.

It is important to apply strict regulatory conditions on the use of geo-location database with the aim to avoid interference between legacy services and other users of the same band.

3.6 Question 6

IDA invites views on the proposed general requirements for the database query and registration.

Ericsson's Comments:

Please refer to our response to Question 5.

Any regulatory practice considered for implementation should be neutral and not related to a particular technology, providing equal opportunities to technologies and systems.

3.7 Question 7

IDA invites views on the three situations in which a WSD must query the database. In particular, IDA invites views on defining 50m as the maximum distance that WSDs are allowed to move from its original location, without contacting the geolocation database.

Ericsson's Comments:

A key characteristic of mobile communications is the rapid and significant variation in the propagation conditions. Frequency-selective fading generating rapid and random variations of the propagation attenuation, together with shadow fading, will affect the wanted signal path as well as the unwanted signal path. There would be profound impact on the instantaneous interference situation in sharing circumstances.

With regard to time validity, from the perspective of mobile communications, the instantaneous RF power control is an essential property with a purpose to serve the appropriate wanted signal path. It also serves the purpose of controlling the interference affecting other users. High peak data rates at high RF power need to be balanced in relation to the acceptable level of interference, as other devices may not be able to successfully transmit data. Therefore, devices in mobile broadband networks are updating the applied RF power a significant amount of times every second to adjust to the wanted and unwanted circumstances.

The movement from an original location of 50 m indicates a rather limited use-case (such as fixed broadband of a specific technology). The more common mobile use case involves using devices such as laptops, tablets and smartphones. This use case suggests a specific regulatory condition, which may not be particularly neutral in coexistence circumstances, where several different technologies and systems would be used.

As such, Ericsson does not support this proposition.

3.8 Question 8

IDA invites views on the output power transmission of WSDs as shown in Table 2.

Ericsson's Comments:

It is our understanding that these suggested RF power levels are too high for devices used in home environments and if operated on adjacent channels to a TV receiver. It is suggested that more studies are required within the industry and the standardisation bodies to evaluate an optimal output power transmission.

3.9 Question 9

IDA invites views on allowing the Fixed Devices to have tuneable output power that is capped at a maximum of 4Watts EIRP.

Ericsson's Comments:

Please refer to our response to Question 8.

3.10 Question 10

IDA invites views on the requirement of a Unique WSD Identifier and for this identifier to be based on standards developed by recognised standards organisations.

Ericsson's Comments:

Ericsson has no comments to this question.

3.11 Question 11

IDA invites views on the proposed maximum transmission level of 100mW EIRP for WSDs operating in channels adjacent to a local broadcast channel.

Ericsson's Comments:

Please refer to our response to Question 8.

3.12 Question 12

IDA invites views on the proposed OOB emission limit of -56.8dBm, which will be imposed on WSDs operating in channels that are directly adjacent to a local broadcast service.

Ericsson's Comments:

Please refer to our response to Question 8.

3.13 Question 13

IDA invites views on defining the OOB emission limits for WSD to WSD operations.

Ericsson's Comments:

Please refer to our response to Question 8.

It should be noted that uncoordinated devices will interfere with each other in terms of OOB emission and co-channel situations, which limit the performance and spectrum efficiency. A network controlled system would deliver significantly better performance and spectrum efficiency; an example being a LTE system.

3.14 Question 14

IDA invites views on the proposed approach to manage coexistence between a WSD and the other secondary services within the TVWS channels.

Ericsson's Comments:

Actual path loss will often differ significantly from theoretical path loss calculations based on propagation models and distance; e.g. moving from an indoor to an outdoor situation could make a difference of 20 – 40 dB which is significantly more than the suggested range for adjusting the RF power down from 4 W to 100 mW. A large safety-margin would, in addition, be needed to ensure an acceptable level of interference to other secondary services, especially on the TV UHF band with excellent propagation. However, a large safety margin also implies a less efficient use of spectrum.

Please also refer to our response to Question 7.

3.15 Question 15

IDA invites views on the proposed propagation model and parameters used to determine the maximum transmission power level of a WSD.

Ericsson's Comments:

Please refer to our response to Question 8.

3.16 Question 16

IDA invites views on its proposal for the protection of licence-exempt and licensed wireless microphones. IDA also invites views and comments on the optimal number of safe harbour channels required to ensure that licence-exempt wireless microphones can continue to be used once WSDs are deployed.

Ericsson's Comments:

Ericsson has no comments to this question.

3.17 Question 17

IDA invites views on the need to develop a registration process for users of licence-exempt wireless microphones that require additional channels beyond the safe harbour channels.

Ericsson's Comments:

Ericsson has no comments to this question.

3.18 Question 18

IDA invites views on whether the proposed demarcation zone approach is sufficient in terms of managing cross border interference issue and if there are any other factors IDA should consider.

Ericsson's Comments:

Ericsson has no comments to this question.

3.19 Question 19

IDA invites views on the aggregate interference effect of WSD and whether any adjustment in terms of technical requirement is needed.

Ericsson's Comments:

As the un-coordinated devices (used under license-exempt / unlicensed regime) operate in the same geographical area on co-channels, the interference will build up accordingly and limit performance and spectrum efficiency. This is certainly the experience from un-coordinated Wi-Fi use, which is regarded to be representative for other un-coordinated systems.

Please also refer to our response to Question 8.

3.20 Question 20

IDA invites views on using GPS as the method to determine location accuracy, and on whether 50m is a sufficient location accuracy requirement for the operation of WSDs.

Ericsson's Comments:

Ericsson has no comments to this question.

3.21 Question 21

IDA invites views on allowing the manual input and internal storage of geographic coordinates for indoor Fixed Devices.

Ericsson's Comments:

Ericsson has no comments to this question.

3.22 Question 22

IDA invites views on the requirement of an approval process for the installer of indoor Fixed Devices and the necessary conditions for approval.

Ericsson's Comments:

Ericsson has no comments to this question.

3.23 Question 23

IDA invites views on the possible types of TVWS network topologies and use case scenarios.

Ericsson's Comments:

It is important that a national regulation regime would be truly technology neutral; allowing for the possibility of all technologies.

Ericsson is considering different topologies, such as underlay mobile "downlink only" complementing systems or licensed shared ASA/LSA systems (as described earlier) that could be neutral and be using a geo-location database that could be integrated in dissimilar way in relation to the suggested arrangement in this consultation paper. In our view, these systems would provide topologies which are better satisfying end-user requirements, and would enable much more efficient use of this TV UHF highly valuable spectrum.

3.24 Question 24

IDA invites views on the payment of fees for the use of database services.

Ericsson's Comments:

Ericsson has no comments to this question.

3.25 Question 25

IDA invites views on both approaches in managing the database (i.e. industry-managed or government-managed database).

Ericsson's Comments:

Ericsson has no comments to this question.

3.26 Question 26

To better gauge the level of interest from the industry, IDA invites companies that are interested in developing and managing the database for Singapore to register its interest with us and share the following details:
i) Funding for database development and management (i.e. self-funded, cost recovery, etc)
ii) Business models considered when providing database services
iii) Possible fees involved for TVWS users

Ericsson's Comments:

Noted.

3.27 Question 27

IDA invites views on the proposed preliminary conditions for the operation and administration of the databases

Ericsson's Comments:

Ericsson understands that freedom for the industry stakeholders should be awarded, as a geo-location database may be implemented in different ways subject to topologies and business cases.

The following points should be noted:

- a database could be "open" or "integrated" in a radio-communication system
- consistency by close coordination is a well-recognized approach
- hosted and operated in accordance with national laws, regulations and condition is certainly necessary

3.28 Question 28

IDA invites views on the proposed approach and communications protocols between the following:
i) WSD and IDA website containing the list of authorised database administrators
ii) WSD and the database

Ericsson's Comments:

Ericsson has no comments to this question.

3.29 Question 29

IDA invites views on the proposed frequency of update for Time A validity and Time B validity.

Ericsson's Comments:

Ericsson has no comments to this question.

3.30 Question 30

IDA invites views on requiring the adjustment of the value for Time A validity and Time B validity, and for this to be within the range of 6 to 24 hours.

Ericsson's Comments:

Ericsson has no comments to this question.

3.31 Question 31

IDA invites views on the benefits and costs of a requirement for WSD to report its operational parameters to the database.

Ericsson's Comments:

Ericsson is of the view that this is a technology specific requirement. Therefore it might not be an appropriate regulatory requirement.

3.32 Question 32

IDA invites views on the benefits of including within the TVWS regulations a requirement for WSD to register its contact parameters to the database.

Ericsson’s Comments:

Please refer to our responses to Question 31.