Ericsson's responses to iDA's second consultation on the proposed framework for the allocation of spectrum for IMT and IMT-Advanced services

SECOND CONSULTATION ON PROPOSED FRAMEWORK FOR THE ALLOCATION OF SPECTRUM FOR INTERNATIONAL MOBILE TELECOMMUNICATIONS ("IMT") AND IMT-ADVANCED SERVICES AND FOR THE ENHANCEMENT OF COMPETITION IN THE MOBILE MARKET

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2 Ericsson's responses to iDA's second consultation on the proposed framework for the allocation of spectrum for IMT and IMT-Advanced services and for the enhancement of competition in the mobile market

Ericsson welcomes the opportunity to provide responses and comments to iDA's initiative on the proposed framework for the allocation of spectrum for IMT and IMT-Advanced services and for the enhancement of competition in the mobile market consultation paper.

Ericsson supports and appreciates that the bands 700 MHz, 900 MHz, 2.3 GHz and 2.5 GHz are available to the mobile industry, as well as the possible bands 800 MHz, 1.4 GHz and 3.5 GHz. Ericsson is also inviting iDA to consider the bands 600 MHz, 4400 – 4500 MHz and 4800 – 4990 MHz for future allocation as this would secure the evolution of mobile broadband services further into the future. All these bands would support valuable public mobile broadband communication services and applications for consumers in Singapore. Ericsson has taken the approach of providing comments with a view on the operational and technical opportunities as well as the socio-economic aspects based on our experiences.

As a global provider of public mobile telecommunication solutions, Ericsson understands and promotes the benefits of international spectrum harmonisation. International spectrum harmonisation brings economies of scale in network equipment and terminal devices, thereby reducing the end user costs and providing for affordable services and applications to all. In addition, it enables international roaming and handover capabilities, which contribute to a common market in the region and easy border coordination. The current successes of GSM/EDGE, WCDMA/HSPA and LTE are results of a common global view on the allocation of spectrum to International Mobile Telecommunications (IMT), defined and standardised by International Telecommunication Union (ITU) and Third Generation Partner Project (3GPP).

Ericsson believes that the IMT family of standards will remain the relevant technologies for mass market public mobile broadband usage in the foreseeable future. The vast ecosystem of these technologies is being developed under an open international standardisation scheme together with the harmonised spectrum. It is providing economies of scale which have proven to be the best drivers to deliver increased user values.

3 Ericsson's Responses

3.1 Question 1

IDA would like to seek views and comments on the proposed allocation of the 700 MHz band together with other suitable bands for mobile services in the next spectrum allocation exercise; and the mechanism to allow the delay of the commencement date of the 700 MHz spectrum right, and correspondingly, the expiry date as well as the spectrum right payment due date, in the event of a delay in the ASO.

Ericsson's Response:

Ericsson agrees with the proposed allocation of the full 700 MHz band (i.e. 2 x 45 MHz in accordance with the APT arrangement and the 3GPP specified band 28) for mobile broadband services and also agrees with the important aspect of the early availability of this band to provide services for consumers in Singapore.

However, Ericsson proposes that regional coordination activities for this band should take place as soon as possible to ensure a harmonised coexistence with the neighbouring countries, with the aim of allowing for the early introduction of services supported by the properties of this band.

In addition, Ericsson is of the view that iDA could consider to free up more spectrum in the bands 900 MHz (band 8), 850 MHz (band 5, excluding the EGSM band), 2.3 GHz (band 40) and 2.5 GHz (band 7) for mobile broadband services since there is already a large ecosystem for LTE user devices in these bands.

In particular, Ericsson understands that the band 900 MHz (band 8) is of exceptional and immediate importance for the development of mobile broadband services in Singapore. The particular circumstances in Singapore, with its predominant urban structure, promotes the need to improve deep indoor coverage in populated areas, which is provided through the particular radio wave propagation properties in this band. Ericsson wishes to invite IDA to consider making available 2 x 35 MHz in the band 900 MHz (including the EGSM band) for mobile broadband services instead of reserving the band 880 - 885 MHz / 925 – 930 MHz.

For 2.3 GHz (band 40), Ericsson understands that only the upper 50 MHz (i.e. 2350 MHz to 2400 MHz) is currently not available to Singapore operators for priority access and wishes to invite iDA to extend the allocation of this band to beyond the planned 30 MHz (i.e. 2300 MHz – 2330 MHz), preferably 40 MHz or more.

For 2.5 GHz (band 7), iDA could consider freeing up a block of 2 x 10 MHz (FDD), which is currently unassigned, for allocation as appropriate. Please refer to our responses to Question 5 (b) for the details.

Ericsson wishes to further express the view that the band 600 MHz provides a possible future extension for services, including the support for on-demand audio-visual content delivery, as a complement to the current linear broadcasting TV services in this band. A possible solution for Singapore would be to initially deliver supplemental downlink (SDL) based services as a way to prevent interference to TV receivers by avoiding having transmitting devices in the home environment. This approach is also supported by the fact that the viewing behaviour is changing towards on-demand viewing. In an extended future when the linear TV broadcasting would be further limited, uplink could also be considered in the band 600 MHz to allow for better communications from mobile devices.

Other bands suitable for mobile broadband of particular interest to Singapore which could provide for higher bandwidths and high peak data rates in the densely populated urban structures are the bands 2700 – 2900 MHz (S-band) and 3600 – 3800 MHz (C-band). As the band 2700 – 2900 MHz is largely underused and to improve spectrum efficiency for the use of this band, there are discussions in the international arena to at least use part of this band for mobile broadband services and a solution under consideration is to use SDL for easy coexistence with possible incumbent services. The band 3600 – 3800 MHz has already been decided for use and designated for mobile broadband services, and the additional 200 MHz in this band together with the band 3400 – 3600 MHz would indeed be satisfying many of the communication needs and demands for higher peak data rates by consumers.

Ericsson is also inviting iDA to consider the bands 4400 – 4500 MHz and 4800 – 4990 MHz for mobile broadband as this would secure the evolution of the mobile broadband services further into the future.

Ericsson wishes to refrain from commenting on any of the license aspects.

3.2 Question 2

IDA would like to seek views and comments on:
a) The proposed 800 MHz band plan based on the 3GPP band 26, or a combination of 3GPP band 27 and band 5 (excluding the EGSM band), including views on the possible phased approach and timeline to migrate existing users of the band; and
b) The impact to existing users (i.e., Trunked radio and SRD) of the 800 MHz band plan based on the 3GPP band 26, or a combination of 3GPP band 27 and band 5 (excluding the EGSM band).

Ericsson's Response:

Ericsson is of the view that:

(a) Taking appropriate account of the current usage, the band 800 MHz could be considered for re-farming to be used for mobile broadband services, including Broadband Public Protection and Disaster Relief (BB-PPDR) services, subject to national circumstances. This band represents excellent coverage properties, especially for deep indoor penetration, as well as being suitable with regard to the radio frequency wavelength properties allowing for appropriate antenna system arrangements in comparison with, for example, frequencies around 400 MHz.

With the current large ecosystem for LTE user devices in band 5, iDA could possibly make available this band for allocation. As such, Ericsson is of the view that a suitable frequency design in Singapore could be based on the 3GPP band 27 and band 5 (excluding the EGSM band) arrangements.

A phased approach could be taken to develop a band plan towards 3GPP band 27 and band 5. This would facilitate an efficient use of spectrum and assist in the planning of using the 3GPP band 27 in combination with band 5 for a combined commercial and BB-PPDR solution that is currently under discussion in several APT countries. It should also be noted that the band 806-824/851-869 MHz is highlighted as a PPDR band in ITU reports and recommendations, and can potentially be harmonised throughout APT countries.

The following is Ericsson's proposal for both short and long term implementations:

Short term

- Trunked Radio between 807 to 814 MHz Uplink paired with 852 to 859 MHz Downlink
- Mobile Broadband (BB-PPDR) between 814 to 824 MHz Uplink paired with 859 to 869 MHz Downlink (2 x 5 MHz within this block)
- Mobile Broadband between 824 to 834 MHz Uplink paired with 869 to 879 MHz Downlink

Long term

- Mobile Broadband (BB-PPDR) between 807 to 824 MHz Uplink paired with 852 to 869 MHz Downlink
- Mobile Broadband between 824 to 834 MHz Uplink paired with 869 to 879 MHz Downlink

(b) Please refer to Ericsson's proposed phased approach in (a), taking into account the need to ensure that the requirements of existing users in this range are met and that existing users are given a reasonable migration time frame upon IDA's decision to re-farm the band.

3.3 Question 3

IDA would like to seek views and comments on the allocation of the short-term spectrum rights for the EGSM band, including the approach to extend the short-term spectrum right.

Ericsson's Response:

Ericsson is of the view that the EGSM band should be allocated for mobile broadband services.

Ericsson wishes to refrain from commenting on the issue of spectrum rights.

3.4 Question 4

IDA would like to seek views and comments on:
a) The proposed re-allocation of the L-band for wireless broadband in Singapore in the longer term; and
b) The allocation of the L-band for trial, temporary use and/or commercial services in the interim period.

Ericsson's Response:

(a) Ericsson agrees that a re-allocation of the L-band for mobile broadband in Singapore would be the preferred solution. Ericsson understands that supplemental downlink (SDL) could be used in accordance with the harmonised and specified 3GPP bands to increase the downlink capacity of the networks in Singapore. In doing so, networks would be providing a significant improvement to the end-user experience. According to the Ericsson Mobility Report[1], it is estimated that mobile video is expected to account for around 60 percent of all mobile data

[1] Ericsson Mobility Report, June 2015: http://www.ericsson.com/res/docs/2015/ericsson-mobility-report-june-2015.pdf

traffic by the year 2020. Therefore continuous improvement in the delivery of audio-visual services is regarded to be of particular importance.

(b) Ericsson is of the understanding that this band could be coordinated with the neighbouring countries without any delay and without any foreseeable difficulties as the band is currently allocated for high RF power Digital Audio Broadcasting (DAB) in Singapore. Therefore a re-allocation for mobile broadband usage through a SDL access scheme would indeed represent a relaxed coexistence situation between neighbouring countries.

3.5 Question 5

IDA would like to seek views and comments on:
a) The proposed approach for local operators to coordinate with neighbouring countries' operators to address potential co-channel interference in the use of the 2.5 GHz band;
b) The use of the proposed 5 MHz guard band in the 2.5 GHz band to prevent interference between TDD and FDD systems operating in adjacent bands, versus the imposition of suitable mitigation measures to prevent interference; and
c) The possible adoption and/or suitable restriction levels for Block Edge Mask, synchronisation of TDD networks and any other suitable mitigation measures to prevent co-channel or adjacent channel interference between different TDD systems or between TDD and FDD systems.

Ericsson's Response:

(a) Ericsson understands that coordination arrangements need to be carried out with all involved countries so as not to compromise the opportunities available to Singapore. Coexistence requires coordination with the neighbouring countries along the whole border when a predicted, measured or agreed field strength at the border exceeds certain levels that represent the formalised agreement. For optimised usage and as seen among other countries, a more spectrum efficient use could be achieved if service providers on the opposite sides of an international border are allowed and willing to coordinate their network designs accordingly. This would speed up the operations process as the networks evolve on both sides.

The following are some of the possible technical and operational coordination aspects at the border areas to be considered:

- Technical RF optimisation options should be applied on both sides
- Antenna arrangements
- Interleaving of the frequency use along and close to the border areas

For unpaired co-channel operations, there would indeed be a need to optimise the RF planning at border areas and coordination options including RF power, antenna system alignment and re-alignment as well as possible synchronisation of the operations on the two sides of the border. Another option is to establish significant separation distances while taking into account the need for coverage, capacity, quality and an uninterrupted level of service. The regulator could render assistance to the MNOs as appropriate.

(b) Ericsson is convinced that there is a need for guard bands or restricted channels between the FDD and TDD arrangements of the harmonised and specified 3PP bands 7 and 38 due to adjacent uplink and downlink circumstances. This would be for the reason of interference avoidance to maintain quality and uninterrupted services for consumers, particularly for “live” streaming and other real-time voice and video applications.

From an economical and technical point of view, blocks of 5 MHz are regarded as the minimum feasible guard bands, or so called restricted channels, to mitigate the interference between systems operating on adjacent channels of band 7 (FDD) and channels of band 38 (TDD). The 5 MHz guard bands would safeguard the TDD operations in the band 2575 – 2615 MHz as well as for the FDD operations in the band 2500 – 2570 MHz paired with 2620 – 2690 MHz, by reducing the interference between operations to an acceptable level. Notably, even with such 5 MHz guard bands in place, special measures for coexistence may still be required between the paired and unpaired operations.

Ericsson would like to invite iDA to consider setting aside 5 MHz guard bands at both ends of band 38 (TDD), specifically the blocks 2570 – 2575 MHz and 2615 – 2620 MHz, resulting in a remaining band of 40 MHz (20 + 20 MHz) being available for allocations. With this arrangement, iDA could also consider freeing up a block of 2 x 10 MHz in band 7 (FDD), which is currently unassigned, for allocation as appropriate.

(c) Ericsson understands and agrees with iDA’s approach on the mitigation measures to prevent co-channel or adjacent channel interference between different TDD systems and the need for synchronisation through establishing inter-operator agreements covering synchronisation components such as common reference clock, compatible frame structures and alignment of Uplink (UL) / Downlink (DL) ratio. However, other solutions to mitigate interference should not be excluded from considerations, such as the use of guard band between TDD operations subject to the needs of service providers in respect of their different business cases.

3.6 Question 6

IDA welcomes views and comments on the proposed allocation of the spectrum bands in the next allocation exercise, including on the proposed uses and spectrum right durations of the spectrum bands, the proposed 'Clock Plus' auction format, as well as the appropriate spectrum caps and regulatory obligations to ensure the optimal use of the spectrum.

Ericsson's Response:

Ericsson wishes to invite iDA to review the amount of spectrum intended to be made available so as to ensure the needs of both consumers and MNOs could be met. One of the possibilities which iDA could look into is to free up more spectrum for allocation as suggested in our responses to the other questions.

3.7 Question 7

IDA would like to seek views and comments on the proposed facilitation framework for the new MNO, including on the set-aside spectrum, the reserve price for the set-aside spectrum, the auction format, and the regulatory obligations on the new MNO.

Ericsson's Response:

Ericsson has no comment to this question.

3.8 Question 8

IDA would like to seek views and comments on the proposed negotiation principles to facilitate wholesale access negotiations between "thick" MVNOs and MNOs.

Ericsson's Response:

Ericsson has no comment to this question.