



Ericsson's Comments to iDA's Proposed Framework for 4G Spectrum

PROPOSED FRAMEWORK FOR THE REALLOCATION OF SPECTRUM FOR FOURTH GENERATION ("4G") TELECOMMUNICATION SYSTEMS AND SERVICES

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2 Ericsson's Comments to the 4G Public Consultation Paper: SPECTRUM FRAMEWORK FOR FOURTH GENERATION (4G) MOBILE COMMUNICATION SYSTEMS IN SINGAPORE

Ericsson welcomes the opportunity to provide comments to iDA's initiative on the PROPOSED FRAMEWORK FOR THE REALLOCATION OF SPECTRUM FOR FOURTH GENERATION ("4G") TELECOMMUNICATION SYSTEMS AND SERVICES consultation paper. Ericsson supports and appreciates the release of the bands 1800 MHz, 2.3 GHz and 2.5 GHz which can 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 provide 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 world view on the allocation of spectrum to International Mobile Telecommunications (IMT), defined and standardized by International Telecommunication Union (ITU) as well as technical specifications developed within the framework of the international Third Generation Partner Project (3GPP).

Ericsson believes that the IMT family of standards including GSM/EDGE, WCDMA/HSPA and the LTE technologies, as well as the future LTE-Advanced (IMT-Advanced) technology, will remain the relevant technologies for mass market public mobile broadband usage. There are already more than 6 billion subscriptions currently served by the ecosystem based on IMT standards. This vast ecosystem is being developed under an open international standardization scheme together with the harmonised spectrum. It is providing economies of scale which have proven to be the best drivers to deliver user values.

LTE offers new and enhanced opportunities to operators wanting to use both paired and unpaired spectrum in an integrated service offering to their consumers. The LTE architecture allows for such integration due to the fact that the same frame structure is used for both access schemes. Therefore LTE is particularly well suited for usage in the bands 1800 MHz, 2.3 GHz and 2.5 GHz, which consist of both paired and unpaired spectrum arrangements as specified in Annex A of the consultation paper.

2.1 Ericsson's Comments

2.1.1 Question 1

IDA seeks views on the proposed allocation of the 1800 MHz, 2.3 GHz and 2.5 GHz spectrum bands.

Ericsson's Comments:

Ericsson largely agrees with the approach of the proposed allocation of the bands 1800 MHz, 2.3 GHz and 2.5 GHz. However, Ericsson is of the view that the usage of mobile broadband communications should be considered for use in the whole of the bands 1800 MHz, 2.3 GHz and 2.5 GHz due to the considerable current and future demands by consumers. Consumers are always demanding for more advanced and richer Internet and multimedia based services and applications.

The ever increasing use of Internet services, especially the downloading and uploading as well as streaming of multimedia content, media transfer, media sharing, web casting and telecommuting tools, is generating significant demands for mobile broadband. To satisfy these demands, mobile broadband service providers are evolving toward high-capacity access technologies. There are already more than 1 billion mobile broadband subscriptions on global basis using the IMT technologies, which underpins the need for the whole of the spectrum bands to be allocated. With the estimation that there will be more than 4.7 billion mobile broadband subscriptions by year 2016 on a global scale, this is also suggesting the scale of the future needs in Singapore.

2.1.2 Question 2

IDA seeks views on the amount of spectrum to be made available for allocation in the 1800 MHz, 2.3 GHz and 2.5 GHz bands.

Ericsson's Comments:

ITU has reported that countries may be expected to have a need to make available spectrum for terrestrial public mobile communications use in amounts of 1280 – 1720 MHz, subject to national circumstances. Ericsson understands that Singapore is one of the more advanced countries in terms of the level of development. Therefore, Singapore is expected to be in the need of making available a total amount of the order of 1700 MHz in the next few years to come for advanced mobile broadband services and applications. This suggests that the whole of all the bands 1800 MHz, 2.3 GHz and 2.5 MHz needs to be made available. With regard to the aspect of future needs, iDA might find it more appropriate to consider other bands for future needs, while taking full advantage of the spectrum bands 1800 MHz, 2.3 GHz and 2.5 GHz in the near term perspective.

For the future, iDA could consider the bands 700 MHz, 1.4 GHz and 3.5 GHz. The band 700 MHz refers to the new digital dividend band 703 – 803 MHz. Ericsson is of the view that there is a need to make available the frequency band 700 MHz for mobile broadband services and applications in 2014 timeframe. Ericsson understands that the band is of exceptional importance for the development of mobile broadband services in Singapore. The particular circumstances in Singapore promote the need to improve the deep indoor coverage in populated areas, which is provided through the particular radio wave propagation properties in this band.

The market demand for mobile broadband services and applications is without doubt growing in Singapore, and mobile service providers have already started deployments. Ericsson is of the view that there is an increasing demand for capacity and coverage that needs to be satisfied by making available more spectrum to meet the longer term needs of consumers, and therefore would propose that iDA maximise the allocation of available spectrum to service providers by allocating the whole of all the bands. This would make available the necessary spectrum for allocation to mobile broadband services and applications to satisfy consumer demands.

2.1.3

Question 3

IDA seeks views on the benefits of an earlier start date for the full-band sharing arrangement, and what an appropriate start date might be.
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Ericsson's Comments:

Ericsson agrees with IDA's approach to an earlier start date for the full-band sharing arrangement, with the following notable benefits:

- Enables operators to plan and rollout a nation-wide LTE system in a cost-effective way
- Possibility to position LTE as a premium service, maximising the full potential of LTE technology
- End users subscribing to LTE services will be able to enjoy the same experience within Singapore

Ericsson is of the view that the full-band sharing arrangement should start upon the award of the spectrum in order for the relevant operators to have ample time for cross border coordination.

2.1.4**Question 4**

IDA seeks views on the proposed block size per spectrum lot, the number of spectrum lots, and the arrangement of the spectrum lots to be made available for reallocation.

Ericsson's Comments:

Ericsson understands that it is important to allow service providers to be able to use large enough and contiguous channel blocks, preferably up to 20 MHz from the start of the use of the bands 1800 MHz, 2.3 GHz and 2.5 GHz. LTE is the most recent and innovative mobile broadband technology in commercial operation and will work at its optimum performance with 20 MHz channel blocks, with the possibility of increasing the bandwidth when LTE-Advanced is to be introduced in the market.

As such, a bandwidth of at least 10 MHz is suggested for LTE to provide for the expected consumer experience. In view of this, it is suggested that iDA consider allocating the bandwidth in blocks of minimum 10 MHz, 15 MHz or 20 MHz. The 20 MHz channel block will guarantee the consumers in Singapore the access to the most advanced services and applications.

The use of channel blocks of 20 MHz will allow peak data rates of about 100 Mbps using current available devices and is expected to be able to deliver more than 300 Mbps in a few years time using higher order MIMO antenna systems.

2.1.5**Question 5**

IDA seeks views on its proposal for operators to co-ordinate the use of different services and not to set aside guard bands at the frequency boundaries between FDD and TDD technologies in the 2.5 GHz band.

Ericsson's Comments:

Ericsson is convinced that there is a need for guard bands or restricted channels for quality and uninterrupted services and applications, particularly "live" streaming and other real-time voice and video services.

From an economical and technical point of view, the 5 MHz channel blocks 2570 – 2575 MHz and 2615 – 2620 MHz are regarded as the minimum feasible guard bands or restricted channels. This is to safeguard the operations in the TDD operations in the band 2575 – 2615 MHz as well as for the 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 guard bands in place, special measures for coexistence may still be required between the paired and unpaired operations.

For an acceptable level of quality for mobile broadband consumers, a guard band of 5 MHz is a minimum requirement in our view, which will still have both a technical and an economical impact in terms of site coordination and additional filtering. The experiences from Europe suggest that a guard band provides better clarity for the bidders for the spectrum, over a restricted channel approach.

2.1.6**Question 6**

IDA seeks views on its proposed definition of 4G technologies and the proposal to assess on a case-by-case basis alternative technologies to be deployed in the 4G spectrum bands.

Ericsson's Comments:

Ericsson agrees with iDA's definition of 4G as well as the proposal to assess on a case-by-case basis alternative technologies to be deployed in the 4G spectrum bands.

However, Ericsson understands that it will not be necessary to distinguish between the current HSPA, LTE and future LTE-Advanced technologies by regulatory means, as these are largely designed to be perceived as seamless technical evolutions in transitional steps of releases by 3GPP over the years.

2.1.7**Question 7**

IDA seeks views on its proposal that successful bidders of 4G spectrum should meet nationwide 4G systems and service coverage requirements by the dates specified.

Ericsson's Comments:

Ericsson has no strong opinion regarding the timeframe for deployment which will depend on each operator's readiness.

2.1.8**Question 8**

IDA would like to seek the industry's views on the proposed auction parameters for the 4G spectrum rights.

Ericsson's Comments:

Ericsson understands that reliable and efficient public mobile broadband services are of utmost importance to consumers in Singapore. As such, any licensing and auctioning practice should secure the appropriate availability of spectrum in lots that are suitable for the winning service providers to be able to provide the most

advanced services and applications at the highest quality while also securing the access to the right amount of spectrum subject to traffic evolution and demands.

Ericsson is of the view that the demands for mobile broadband services and applications in Singapore suggest that the whole sub-bands 2 x 70 MHz of the FDD arrangement in the band 2.5 GHz should be made available to all interested parties. The band 2575 – 2615 MHz should be considered for licensing in one lot to secure the quality of service. To ensure the highest quality, the sub-bands 2570 – 2575 MHz and 2615 – 2620 MHz should be reserved as guard bands.

In addition, Ericsson suggests that iDA consider taking into account the fact that operators will need to plan for future evolutions where there will be a need for more and contiguous spectrum. Notably, one technical opportunity to satisfy the increasing market demands in the future, while considering the use of LTE and LTE-Advanced, is the opportunity to use aggregation of carriers and channel blocks. Therefore the most favourable arrangement would be to make available spectrum lots in channel blocks of 20 MHz whenever possible.

In doing so, this would ensure fair competition among all interested stakeholders to acquire the spectrum lots, as deem viable to businesses, while taking into consideration the technical, economic, competitive, societal and regulatory aspects that concern the market and consumers in Singapore.

2.1.9**Question 9**

IDA would like to solicit interest from potential new entrants in the market. In addition, IDA seeks views on the proposed spectrum set-aside and nationwide 4G systems and service coverage obligations for the new entrant. Interested parties may submit their comments on the “new entrant” rules in a confidential annex if required.

IDA would also like to seek the industry's views on whether the reserve price for the spectrum set aside for a new entrant should differ from the spectrum to be auctioned to non-new entrants.

Ericsson's Comments:

Please refer to our response to Question 8. Ericsson has no further comments.

2.1.10**Question 10**

IDA invites views and comments on the adoption of the ECC/REC/(11)05 Recommendation for cross border coordination in the 2.5 GHz band in Singapore.

Ericsson's Comments:

Ericsson understands that the CEPT band plan would be providing for the necessary guide towards global harmonisation of broadband services and applications, and the resulting benefits of economies of scale in infrastructure and terminal devices for this band. Control of interference and successful coexistence of different technologies and services are best achieved by reference to standards produced by the appropriate internationally recognised standards bodies and Recommendations and Decisions of CEPT/ECC and ITU. Such approach, while allowing for a number of standards, would still be satisfying the technology-neutral approach.

This approach could also ensure that the band is used in a harmonised manner on both sides of geographic boundaries, and different systems are standardised and carefully assessed against each other from a co-existence point of view.

2.1.11**Question 11**

IDA invites views and comments on the practical measures for the deployment of 4G base stations at the border areas for the harmonised co-existence with the BSS in Indonesia.

Ericsson's Comments:

International border coordination is a crucial issue for the success of mobile broadband services and applications in Singapore. The mixture of radio-communication services in the different bands makes border coordination very complex. Thus, correct and timely coordination procedures would safeguard the use of spectrum in border areas, while considering the technical issues involved. Coordination decisions must be taken with all involved countries so as not to compromise the options available to Singapore. Co-existence requires coordination with the neighbouring countries along the whole border where a predicted, measured or agreed field strength at the border exceeds certain levels.

One aspect, while considering the involved bands, is the two overarching types of border coordination on the two sides of the international border:

1. Co-existence between paired operations with same duplex direction
2. Co-existence between unpaired and uncoordinated operations

The following are the technical and operational coordination aspects in border areas to be considered:

- Technical RF optimisation options should be applied on both sides
- Service providers should coordinate without direct involvement of regulators

- Border sites could alternatively consider a downshift e.g. from 20 MHz to 10 MHz, in the event where RF optimisation and coordination options are explored and exhausted

With regard to the deployment parameters for co-existence with the BSS system in Indonesia, this is dependent on the technical implementation of the BSS system which will serve as input to the coordination activities among the relevant parties.

For unpaired operations, there will be a need to optimise the RF planning in border areas and coordination options include RF power and antenna system alignment and re-alignment as well as 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.

2.1.12

Question 12

IDA invites views and comments on the possible practical measures that the operators would implement to allow coexistence of mobile services and radar services in the adjacent band.

IDA also invites views and comments on the required mitigation parameters indicated in the ECC Report 174 and the regulatory limit proposed by IDA for the co-existence between mobile services in 2.5 GHz with S-band radars.

Ericsson's Comments:

The ECC Report 174 from CEPT refers to a number of possible mitigation techniques, and several corresponding results of these mitigation techniques. The most suitable solutions depend largely on the different circumstances in each country, or the area of relevance in countries. For example, the type of radar system in use will have a significant impact on the co-existence conditions.

An essential resolution is the use of RF filters, which need to be used on both radars and mobile systems together, possibly together with the other mitigation techniques addressed in the Report. The best results are provided when using several mitigation techniques together. An important aspect is to allocate radars several tens of MHz above the frequency 2700 MHz so as to provide an additional guard band between the mobile broadband use and possible radar use. With these methods in place, the geographical separation distance between radars and mobile broadband use would be manageable. Ericsson has been deeply involved in the development of the ECC Report 174 to fully understand the most efficient use of the needed and suitable mitigation techniques.

Notably, this band may be one of the potential candidate bands for IMT in the next World Radio-communication Conference i.e. ITU WRC-15. Therefore, the longer-term coexistence aspect with S-band radars may no longer be an issue in the future when these radars could possibly be phased out.

2.1.13**Question 13**

IDA would like to seek the industry's views on whether IDA should: (1) allow the 2G service providers to individually decide on when to shut down their 2G networks; or (2) intervene or assist to facilitate in any aspect of a possible winding down of 2G services in Singapore in order to manage the efficient use of spectrum. Such intervention could include the possibility of IDA centrally managing the 2G spectrum made available, e.g., by specifying spectrum, to be used by the 2G service providers on a shared basis for a shared 2G network.

Ericsson's Comments:

Ericsson is not in a position to offer a view neither from a commercial nor a regulatory point of view. However, Ericsson understands that it might be appropriate to allow the 2G service providers to individually decide on when to shut down their 2G networks from an operational point, considering that 2G networks are still being widely used from a global perspective.

From an operational and technical point of view, the current spectrum could be used either for 2G, 3G or LTE technology depending on market demands, which might be subject to some coordination aspects among the service providers.

Service providers should also be allowed to re-farm their existing 2G spectrum (e.g. 900 MHz) to be used for either 3G or LTE technology. With the development of 3G mobile telephony networks in the band of 900 MHz, less base stations are required compared to the use of higher frequencies and access quality in indoor areas is improved.

The reduction in deployment cost of the network leads to the release of monetary flows for the creation and provision of services according to consumer demands. Hence, the availability and performance of mobile broadband services are reinforced.