DECISION ISSUED BY THE
INFO-COMMUNICATIONS DEVELOPMENT AUTHORITY OF SINGAPORE

DEPLOYMENT OF FOURTH GENERATION ("4G") AND INTERNATIONAL MOBILE TELECOMMUNICATION ("IMT")-ADVANCED SYSTEMS AND SERVICES USING EXISTING 3G SPECTRUM RIGHTS

12 DECEMBER 2014

PART I: INTRODUCTION

PART II: SUMMARY OF RESPONSES AND IDA'S DECISION

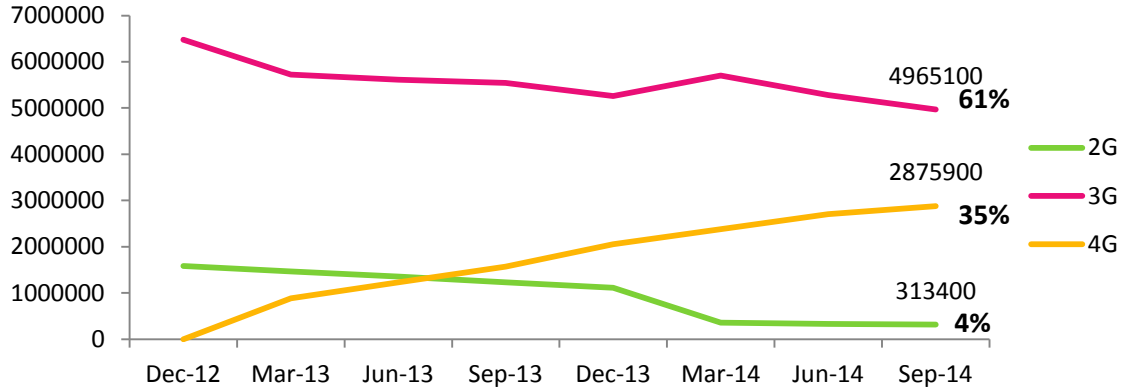
PART I: INTRODUCTION

1. With the exponential increase in mobile data traffic, coupled with the trends to re-farm certain spectrum bands for more advanced services globally[1], IDA has been closely monitoring such developments and adopted a case-by-case approach towards allowing the provisioning of new generation mobile services over the existing assigned radio frequency spectrum.

2. As a regulator, IDA seeks to be technology neutral to the extent possible and allows licensees to assess the technologies and adopt those that best suit their needs. Nonetheless, where radio frequency assignment is concerned, IDA is careful to ensure that scarce spectrum resources, especially those that have already been harmonised worldwide for the provision of certain telecommunication services, are used in an optimal and efficient manner for the provision of telecommunication services. For instance, IDA will seek to ensure that radio spectrum that has been harmonised worldwide for the deployment of advanced 4G technologies (e.g., LTE-Advance) to deliver high-speed mobile broadband services, will be used by Mobile Network Operators ("**MNOs**") for similar deployment in Singapore. As technologies evolve, IDA may also allow MNOs to re-use the same assigned radio frequency spectrum for the provision of telecommunication services based on newer generation technologies. For example, IDA had previously allowed the provision of 3G services using the traditional 2G spectrum (900 MHz/ 1800 MHz bands).

3. While 3G subscribers continue to account for the majority of mobile subscriptions, IDA notes that 4G subscriptions have been steadily increasing with corresponding declines in 2G and 3G subscriptions. As of June 2014, 4G subscriptions constitute 32% of today's total mobile subscription base of 8.3M.

Graph 1: 2G, 3G, 4G Share



[1] The European Commission has mandated EU members to liberalise their 3G spectrum for 4G deployment (Telecoms.com), while UK's OFCOM has published a proposal to liberalise all mobile licences in the 900 MHz, 1800 MHz and 2.1 GHz bands to allow the deployment of 4G services (OFCOM, 2013).

4. On 22 April 2014, IDA issued a public consultation on “Proposed Allocation of Spectrum for IMT and IMT-Advanced Services and Options to Enhance Mobile Competition” (“**Public Consultation**”). Specifically on the 1.9 GHz/2.1 GHz bands (“**3G bands**”), IDA sought views on allowing the deployment of 4G and IMT-Advanced systems and services in the 3G bands prior to the expiry of the 3G Spectrum Rights. Comments from the following six respondents were received:

a) Ericsson Telecommunications Pte Ltd
b) Liberty Wireless Pte.Ltd.
c) MyRepublic Limited
d) SingTel Mobile Singapore Pte Ltd
e) StarHub Mobile Pte Ltd
f) Qualcomm Incorporated

5. IDA would like to thank the respondents for their inputs. IDA has reviewed the comments received, and this document sets out IDA’s decision on the proposal to allow the deployment of 4G and IMT-Advanced systems and services in the 3G bands, prior to the expiry of the 3G Spectrum Rights.

PART II: SUMMARY OF RESPONSES AND IDA'S DECISION

Summary of responses

6. In the Public Consultation, IDA proposed to allow the use of existing 3G Spectrum Rights for the deployment of 4G and IMT-Advanced systems and services in addition to 3G services, prior to the expiry of the 3G Spectrum Rights in 2021(the "**Proposal**").

7. All respondents agreed with IDA's Proposal and generally supported that spectrum usage should be technology neutral to allow the deployment of more spectrally efficient technologies. One respondent further recommended not to convert all existing 3G licences to be technology neutral or to 3G/4G licences automatically, and suggested to establish a procedure for MNOs to apply for such licence conversion.

Policy rationale

8. With exponential growth in data traffic[2] and consumers' demand for data rich applications such as HD video streaming, 4G technology will be more efficient compared to 3G technology in the use of scarce spectrum resources, to meet consumers' demand and bringing about better user experience. Maintaining status quo, i.e., keeping spectrum bands assigned for 3G services for the provision of the same services, may impede the development of advanced mobile services for consumers. Today, MNOs have already deployed LTE based technologies in the 1800 MHz and 2.5 GHz bands[3] and have reported adoption rates of 4G services that surpassed those when 3G was first introduced. While IDA's 4G spectrum auction framework[4] has reallocated spectrum to cater to this growing demand, over time, 3G Spectrum Right holders may want to re-farm part of their 3G Spectrum Rights, to supplement the spectrum resources available for 4G services. Restricting the use of 3G spectrum solely for 3G services until 2021 will thus not allow the MNOs to respond efficiently to the shifts in user preferences and business trends before 2021. This will not be in the interests of end users in Singapore.

9. On the other hand, allowing the deployment of 4G and IMT-Advanced systems and services using the 3G bands will be consistent with IDA's policy objective of promoting the development of innovative services for the benefit of end users. In fact, since existing MNOs have already deployed LTE systems and

[2] http://www.ida.gov.sg/Infocomm-Landscape/Facts-and-Figures/Telecommunications#9

[3] M1, SingTel Mobile and StarHub Mobile initiated their commercial LTE services in June 2011, December 2011 and September 2012 respectively.

[4] "Framework for the Re-allocation of Spectrum for 4G Telecommunication Systems and Services", issued 16 January 2013

services, allowing the deployment of 4G and IMT-Advanced systems and services on the 3G bands will provide the industry with greater certainty on the efficient use of spectrum resources going forward and invest in spectrally more efficient technology.

10. Allowing the deployment of 4G and IMT-Advanced systems and services using the 3G bands is unlikely to tilt the playing field in favour of the existing 3G Spectrum Rights holders, as IDA has already allowed the deployment of LTE by existing spectrum right holders in the 1800 MHz and 2.5GHz band in IDA's interim decision on the Spectrum Framework for 4G Mobile Communication Systems in Singapore ("**4G interim decision**").

11. In view of IDA's policy stance and the feedback received during public consultation, IDA hereby sets out the framework to allow the deployment of 4G and IMT-Advanced systems and services using the 3G bands, i.e., 1904.9 MHz – 1920 MHz and 1920MHz – 1979.7 MHz paired with 2110.3 MHz – 2169.7 MHz.

Framework for the deployment of 4G and IMT-Advanced systems and services using 3G bands

12. Subject to the following conditions, IDA will allow an existing 3G Spectrum Right holder to deploy 4G and IMT-Advanced systems and services under its 3G Spectrum Right:

a) A 3G Spectrum Right holder intending to deploy 4G and IMT-Advanced systems and services using the 3G bands is required to seek IDA's approval for the specific radio frequencies that it proposes to use under its 3G Spectrum Right for purposes of such deployment before deploying systems and services consistent with the definition of 4G in IDA's decision on Framework for the Reallocation of Spectrum for 4G Telecommunication Systems and Services ("**4G Decision**"). In IDA's 4G Decision, IDA defined 4G as "a cellular mobile communications system capable of evolving to achieve the targeted peak data rates of 100 Mbits/s for high mobility and 1 Gbit/s for low mobility as defined by ITU-IMT-Advanced; meeting at the minimum the standards and specifications of either LTE (i.e. 3GPP Release 8), or WiMax (i.e. IEEE 802.16-2009) or standards/specifications recognised as ITU-IMT-Advanced by the ITU.";

b) The 3G Spectrum Right holder must ensure that there is no degradation of existing services, such as the Quality of Service standards for existing 3G services, when it implements 4G and IMT-Advanced systems and services over the 3G bands as assigned under its 3G Spectrum Right;

c) A 3G Spectrum Right holder in deploying the 4G and IMT-Advanced systems and services is required to take measures to prevent interference[5] to any IDA authorised networks. The Spectrum Right holder is required to ensure that its 4G and IMT-Advanced deployments are co-ordinated with the authorised networks at the border areas of neighbouring jurisdictions. In Singapore, IDA notes that existing MNOs are deploying 4G systems and services using LTE-based technology. IDA further notes that deployment of WiMax-based technology may have higher risk of causing interference to existing LTE and 3G systems and services. Therefore, any operator intending to deploy WiMax-based technology in the 3G bands is required to demonstrate to IDA the measures it would take to mitigate any such interference issues when seeking IDA's prior approval to deploying such systems and services; and

d) IDA reserves the right to, from time to time, impose quality of service requirements on the 4G and IMT-Advanced systems and services deployed in the 3G bands as well as any other measures required to protect consumer interests.

13. For the avoidance of doubt, MNOs wishing to deploy 4G or IMT-Advanced systems and services using the 3G Spectrum Rights will provide such services under the MNOs' Facilities-Based Operations ("**FBO**") licences (i.e. the non-3G FBO licences), with applicable licence fees[6].

14. Upon approval, the MNOs' FBO licences and 3G Spectrum Rights will be amended to include the approved systems and services.

15. While IDA allows the deployment of 4G and IMT-Advanced systems and services in the abovementioned spectrum bands as a policy, MNOs are advised to take into consideration any consumer transition issues that may arise upon the subsequent expiry of the 3G Spectrum Rights, and how they may be addressed.

[5] This may include operator-to-operator coordination, allocating sufficient frequency separation and/or adjusting network parameters.

[6] The licence fees for the new services will be calculated based on the FBO licence fee framework.

16. IDA's decision does not guarantee any form of preference to existing holders of spectrum rights in any future allocation exercise for spectrum rights for 4G and IMT-Advanced systems and services in any spectrum band. IDA's decision to allow 4G and IMT-Advanced systems and services to be deployed within the 3G bands at this juncture should in no way be construed as binding or restricting IDA's flexibility to determine the relevant terms and conditions for the re-allocation of the 3G bands for any other systems or services in future. IDA will take into account its policy objectives, spectrum availability, spectrum rights conditions, market and technology trends, global developments and other relevant factors in determining any re-allocation framework.

17. This decision takes immediate effect.

18. IDA is assessing the responses to the rest of the Public Consultation, and is targeting to release its decision in early 2015.