



**CONSULTATION PAPER ISSUED BY THE
INFO-COMMUNICATIONS DEVELOPMENT AUTHORITY OF SINGAPORE**

ALLOCATION OF 3G SPECTRUM IN THE 1900/2100 MHz FREQUENCY BAND

29 March 2010

PART I: INTRODUCTION

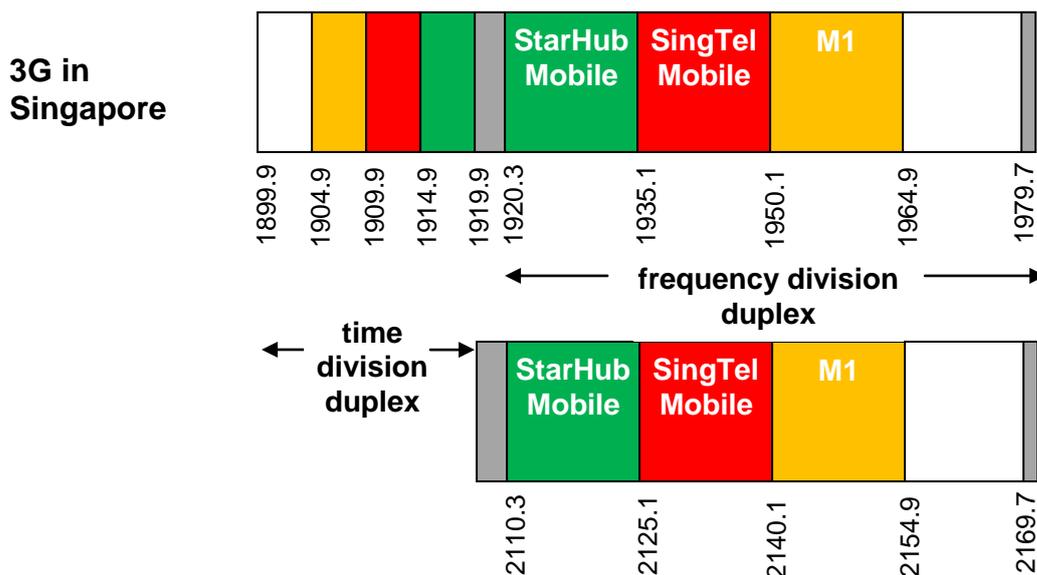
PART II: MEETING THE DEMAND FOR 3G SERVICES

PART III: PROPOSED SPECTRUM ALLOCATION FRAMEWORK

PART IV: INVITATION TO COMMENT

PART I: INTRODUCTION

1 In March 2001, IDA put up for auction 4 lots of radio-frequency spectrum in the 1900/2100 MHz band (“3G Band”) for the provision of 3rd Generation Mobile Services (“3G services”) in Singapore. Each lot consisted of a 2 x 15 MHz paired band and a 5 MHz unpaired band. As IDA received only three initial offers for the spectrum lots, no auction was conducted and three of the lots were eventually awarded to SingTel Mobile Pte Ltd (“STM”) and MobileOne Ltd (“M1”) and StarHub Mobile Pte Ltd (“SHM”) at the reserve price of S\$100 million, via the 3G Spectrum Rights. The 3G Spectrum Rights will expire on 31 December 2021. The fourth lot of spectrum in the 3G Band was not assigned. The current assignment of spectrum in the 3G Band is shown below.



2 It has been close to 9 years since the 3G Spectrum Rights were awarded. Since then, there has been significant development in the market for 3G services. Recently, there have been requests from the industry for IDA to release the fourth spectrum lot in the 3G Band to support the growth in 3G services, in particular mobile broadband services. IDA would like to seek views from the industry and public on IDA’s proposed approach to make available the remaining spectrum in the 3G Band, taking into account current and future needs for Singapore’s spectrum resources to promote innovation in, and growth of a vibrant infocomm industry in Singapore.

PART II: MEETING THE DEMAND FOR 3G SERVICES

3 International and market trends suggest that the 3G Band will be predominantly used for the deployment of mobile communication systems based on the 3G standard for the provision of 3G services, including mobile broadband. The growth of the 3G market is likely to be the main demand driver for spectrum in the 3G Band. Based on IDA’s statistics, between September 2008 and September 2009, 3G subscriptions grew by over 25% while High-Speed Packet Access (“HSPA”) subscriptions grew by 240%. IDA believes that demand for 3G services will continue to grow steadily as

more consumers upgrade from 2G to 3G services and take up mobile broadband services. IDA also expects mobile broadband data traffic to increase substantially, as smartphones become more pervasive and applications become more data and bandwidth intensive. To meet this growing consumption, the incumbent mobile operators will need to increase the capacity of their 3G networks. On the other hand, IDA cannot foreclose the possibility that the growing demand for 3G services may also present a viable business case for another operator to enter into the 3G market in Singapore.

4 To meet mobile operators' increased demand for frequency spectrum so as to enhance their 3G system, and also to open the door for a fourth 3G operator, IDA would like to make available the remaining spectrum in the 3G Band. IDA understands that 2 x 5 MHz of spectrum is sufficient to enable the existing 3G mobile operators to deploy an additional radio carrier at their base stations. IDA is also of the view that a new entrant is likely to need at least 2 x 15 MHz of spectrum to compete with the existing 3G operators. Based on these considerations, IDA is proposing to make available the remaining 2 x 15 MHz of paired spectrum (1964.9-1979.7 MHz/2154.9-2169.7 MHz) in three lots of roughly equal size (see Table 1 below for the frequency range of the 3 lots). Similar to existing 3G Spectrum Rights, the spectrum must be used for the operation of 3G mobile communication systems for the provision of 3G services.

5 IDA understands that there is less commercial interest for the unpaired spectrum in the 3G Band. To facilitate the development of technologies which would spur the commercial use of the spectrum eventually, IDA intends to set aside the remaining 5 MHz of unpaired spectrum for experimental, temporary and trial use. Nonetheless, should there be industry demand for the unpaired spectrum, IDA is open to making it available for allocation together with the 2 x 15 MHz paired spectrum.

Question 1

IDA invites views and comments on whether IDA should make available the remaining 2 x 15 MHz of paired spectrum in the 3G Band in three separate lots.

Question 2

IDA invites views and comments on the technologies that are developed for use for the unpaired spectrum. IDA also invites views on the demand for the unpaired spectrum. In particular, do you agree with IDA's assessment to reserve the unpaired spectrum for experimental, temporary and trial use to facilitate innovation?

PART III: PROPOSED SPECTRUM ALLOCATION FRAMEWORK

6 IDA believes that the market-based approach of allocating spectrum is a fair and efficient method to allocate a scarce and finite resource, by allowing the market to value the spectrum. Given the growing 3G market, IDA is of the view that conducting an auction to allocate the three 2 x 5 MHz lots will ensure that the spectrum resource is allocated in the most efficient and transparent manner.

7 IDA proposes the following parameters for the auction:

- a. **Duration of spectrum right.** IDA proposes to assign the spectrum for a period of **11 ½ years, starting on 1 July 2010 and ending 31 December 2021**, so that the new spectrum rights will expire together with the existing 3G spectrum rights.
- b. **Spectrum lots.** The 3 lots to be auctioned are shown in Table 1. IDA proposes to auction the lots as specific lots, rather than generic lots, so that operators can indicate which specific lot they want to bid for. As for the guard bands, IDA proposes to allow the operators to coordinate amongst themselves, post spectrum allocation, to agree on the necessary guard bands. If the operators are unable to reach an agreement, IDA will determine the guard band.

Table 1: Available lots

Lot	Lower Band (MHz)	Upper Band (MHz)
A	1964.9-1969.9	2154.9-2159.9
B	1969.9-1974.9	2159.9-2164.9
C	1974.9-1979.7	2164.9-2169.7

- c. **Maximum number of lot per bidder.** Similar to the approach taken for the Wireless Broadband Access (“WBA”) auction, IDA proposes to limit incumbent operators to a **maximum of 2 lots** of spectrum. This is to prevent unnecessary spectrum hoarding as well as the concentration of spectrum in the 3G Band to any one operator. The cap will not apply to new entrants. In addition, IDA will not permit any spectrum trade in the 3 lots of 2 x 5 MHz spectrum for a period of 1 year from the effective date of grant. Thereafter, spectrum trading may be permitted, subject to IDA’s approval.
- d. **Type of auction.** Given that the auction will involve a small number of specific lots, IDA is considering adopting the **combinatorial auction format** (also known as package bidding) based on a one-time sealed bid submission if the number of potential bidders is small. Under this type of auction, bidders will make a one-time submission consisting of multiple, exclusive bids, one for each combination of lots that they are eligible to acquire. This means that bidders can submit bids for both individual lots as well as packages of lots based on the value that they place on the spectrum, and vary the amounts they bid to reflect any synergies. IDA will then determine the combination of bids across bidders that maximises total value of the spectrum. The lots are then assigned to the bidders, based on this “winning combination”. The combinatorial auction format allows a new entrant to minimise its aggregation risk (i.e. the risk that a new entrant will get stranded with one lot without getting the other lots it needs to set up its network).

As an illustration of how this auction would work, Bidder 1 is interested in obtaining all three lots A, B and C or none at all and he puts in a bid of \$60m for lots A, B and C only; Bidder 2 is only interested in lot A and he submits a bid of \$25m for lot A; Bidder 3 is interested in obtaining lots B and C together and puts in a bid of \$40m for lots B and C. Based on the above bids, IDA will assign lot A to Bidder 2 at \$25m, and lots B and C to Bidder 3 at \$40m as this is the combination of bids which generate the highest spectrum value of \$65m.

The one-time sealed bid format is easy for bidders to understand and simple to implement which would in turn allow the allocation to be completed promptly. IDA however recognises that the one-time sealed bid format may not be the best approach when there is larger number of bidders. We are therefore prepared to consider the iterative auction format where bidders are able to raise their bids iteratively until demand equals supply, if there are strong interests for the 3G spectrum.

- e. **Reserve Price and Fees.** IDA proposes to set the reserve price at S\$20 million per spectrum lot, which is inclusive of goods and services tax. This reserve price takes into consideration the valuation of the existing 3G spectrum rights paid for by the incumbent operators, and the duration of the spectrum right. It also takes into account the fact that, unlike the 2G spectrum auction, IDA will not be imposing annual spectrum fees or annual licence fees for the provision of 3G services over the 3G Band, to be consistent with the approach adopted for the 3G spectrum rights auction conducted in 2001.
- f. **Rollout and use obligations.** To ensure that the scarce spectrum resource is used efficiently, successful bidders will be required to rollout nationwide 3G systems and services within 2 years from the date of grant. IDA is of the view that a 2-year rollout timeframe for a new entrant is reasonable given that 3G is a mature technology today. Existing 3G operators who successfully bid for the additional spectrum would have already met the obligation for rollout, but would have to ensure that the spectrum successfully bid for is put to use and not hoarded.

8 If a new entrant successfully obtains the 3G spectrum, it would have to apply for a Facilities-based Operator licence to operate 3G mobile communication systems for the provision of 3G services and comply with the relevant licensing and regulatory requirements.

Question 3

IDA invites views and comments on the proposed auction parameters including the auction format. Do you agree with IDA's proposal to adopt the combinatorial auction format based on a one-time sealed bid submission if the number of potential bidders is small?

Question 4

IDA also invites views and comments on whether any guard band should be provided between the 3 lots of 2 x 5 MHz spectrum and the amount needed to manage potential interference.

PART IV: INVITATION TO COMMENT

9 IDA would like to seek the views and comments from the industry and members of the public on whether IDA should make available three 2 x 5 MHz lots of spectrum in the 3G Band, and on the proposed allocation framework if the spectrum is to be allocated. This will allow IDA to have a better understanding of the issues and the different needs and requirements of various interested parties.

10 All views and comments should be submitted in writing and in both hard and soft copies (Microsoft Word Format), and should reach IDA by **12 noon, 26 April 2010**. Respondents are required to include their personal or company particulars, correspondence address, contact number and email address in their submissions. IDA will make all or parts of any submissions made in response to this consultation paper public and disclose the identity of the source. Any part of the submission which is considered commercially sensitive must be clearly marked and placed as an annex to the comments raised. IDA will take this into account in its review. All comments should be addressed to:

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AND

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