

IDA Public Consultation on Wireless Broadband

To

**Mr Andrew Haire
Senior Director (Policy and Competition Development)**



**Prepared By
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Overview

nexG Systems Pte Ltd is a Singapore based company, with a global focus on wireless broadband services. We see the market exploding, and are keen to be a part of this.

nex-G provides integrated 4G cellular technology solutions that allow seamless fixed/mobile access for voice, multimedia and data networks. Based on WIMAX 802.16 2004 initiatives and standards, nex-G designs, manufactures and deploys innovative wireless solutions using a high-throughput network architecture that is fully redundant – ideal for tier-1 telecom carriers and service providers, as well as for large enterprises. nex-G's expertise lies in developing and maintaining wireless broadband infrastructure that provides a strong business case for service providers

Questions

IDA welcomes views and comments on the potential of and benefits arising from the deployment of wireless broadband technologies, the likely services/applications to be deployed and the potential demand from businesses and consumers

3. 2.3 GHz AND 2.5 GHz SPECTRUM

3.1 IDA will be making the 2.3 GHz and 2.5 GHz spectrum available for deployment of wireless broadband technologies. It is noted that several other countries like the United States, South Korea and Malaysia have identified these bands for the provision of wireless broadband services.

nex-G Response

nexG has plans to support 2.3 Ghz and 2.5 Ghz bands support a multitude of IP based services include IP/VOIP/Video.

3.2 IDA will be making available the spectrum for both Frequency Division Duplex (“FDD”) and Time Division Duplex (“TDD”) wireless broadband technologies, in line with its technology neutral stance. However, coexistence issues between wireless broadband systems (FDD & TDD) need to be considered and addressed, namely:

(a) For systems deployed in the same geographical area in adjacent frequency blocks; and Infocomm Development Authority of Singapore

(b) For systems deployed across geographic boundaries in the same frequency blocks.

nex-G Response

NexG equipment supports both FDD and TDD in its products. The solution deployed is based on detailed planning of the network to minimize interference and allow large scale reuse of the spectrum.

3.3 IDA has studied the technical specifications of various wireless broadband technologies. IDA notes that different wireless broadband technologies adopt different channeling arrangements. IDA is also aware that, in the US, the Federal Communications Commission (“FCC”) is currently in the process of re-planning the 2.5-2.69 GHz band in the US. One of the suggestions to FCC, submitted jointly by the Wireless Communications Association, the National ITFS Association and the Catholic Television Network (“CTN”) was to replace the existing 6 MHz channels in the US 2.5 GHz band with a combination of 5.5 MHz channels for wireless broadband systems and 6 MHz channels for high-power broadcast systems. To accommodate a wider range of wireless broadband technologies and systems, IDA is considering adopting a 5 MHz, 5.5 MHz or 6 MHz channeling plan for the 2.3 GHz and 2.5 GHz bands.

nex-G Response

While short-term this allocation is good, our feeling that in a broadband wireless solution of the future, logs of bandwidth is important. Our equipment can operate easily a 5Mhz channels, but 10Mhz channels allow for double thru-put, and would be more acceptable long-term. The standard document specifies for 802.16-2004 channel sizes of up to 20 Mhz, and 10 Mhz can be used in our first-generation gear.

3.4 Based on IDA’s technical assessment and discussions with industry players and vendors, we assessed that operators would typically require about 5-15 MHz of spectrum for rollout to parts of Singapore, and up to about 30 MHz of spectrum for nationwide rollout, depending on the transmission systems used, either a TDD or FDD system.

nex-G Response

We feel that 30Mhz is very constrained the amount and quality of service that can be offered. To get enough channels to do good RF planning, we would end up reducing the size of the channel below 5Mhz. Since 30 Mhz of spectrum will only provide 6 channels, and will limit total thruput in the base station to 150Megabits max. (In equipment that can support 800 Megabits). Also this will increase the interference.

Questions

IDA welcomes views and comments on the allocation of the 2.3 GHz and 2.5 GHz bands for wireless broadband technologies and the harmonization of spectrum at the border areas.

What are the coexistence issues that need to be considered with regards to the deployment of systems (FDD & TDD) in the same geographical area in adjacent frequency blocks, and the deployment of systems across geographic boundaries in the same frequency blocks? What are the technical assessment and methodology to be used for the deployment and coordination of systems, including separation distances, power spectral flux density limits, out-of-band-emission limits, frequency guard bands etc, to ensure coexistence of system operations? What are the mitigation techniques that could be employed in case of co-channel interference between systems operating in adjacent geographical areas?

nex-G Response

NexG biggest concern is that several of these matters are addressed by the 802.16-2004 standard. And the standard and the related framework should be closely coordinated. As an equipment vendor we tend to take a global view, and the standard is the driving point. Out-of-band-emissions, frequency guard bands are specifically addressed in the standard. Also ad-hoc usage of unregulated spectrum has a separate working group in the standard. It would be good if IDA or a representative of IDA participated in the standards process. In addition it may be wise to consider an informal gathering of 802.16 related companies and Singapore regulators to make sure that Singapore interests are properly reflected in the standard. In our participation in the standard we find Korea and Korean companies are spending great effort to influence the standard of 802.16(revd/e), and it may be wise to organize a semi-formal group in Singapore to push the technology.

Does the 5 MHz, 5.5 MHz or 6 MHz channeling plan for the 2.3 GHz band and the 2.5 GHz band meet industry requirements? What is the appropriate duplex separation (Transmit/Receive) for the FDD wireless broadband technologies in the 2.3 GHz and 2.5 GHz bands respectively? What is the minimum, as well as optimal amount of spectrum Infocomm Development Authority of Singapore required by an operator for specific geographical deployment or nationwide deployment?

nex-G Response

This is driven base the “quality” and robustness, and performance. If you stick to 5Mhz channels, then 80Mhz is reasonable, and 120Mhz would be superb. Our stations can support up to 16000 associated users, so if the amount of spectrum given is important. Also any service will need to compete with existing ADSL and cable modems. Thus each user will need a min. of 512Kbits per second. And the market is moving to always on connections. Thus spectrum is king. I would prefer to see 10Mhz channels oh, so we can offer 50Mbit sectors. This would use larger selection of spectrum.

Please provide supporting reasons for each comment and proposal made.

4. MARKET BASED ALLOCATION APPROACH

4.1 IDA is likely to adopt a market-based approach to allocate spectrum, via auction. IDA believes that the auction approach, is a fair and transparent way of allowing the market to value the spectrum, as opposed to administrative allocation which is subjective.

Key Characteristics

4.2 The framework previously adopted by IDA for the allocation of spectrum for 2G and Local Multipoint Distribution Systems (“LMDS”)² contained the following key characteristics:

(a) The spectrum lots on auction were set out as generic lots and operators would bid on the quantity of lots they require, but not on the exact frequency bands. At the end of each round, the auctioneer would announce the aggregate number of lots being bid for, but not the specific quantity of lots for each bidder. The auction would close when the spectrum lots demanded equals the supply.

(b) The reserve price of each spectrum lot was set based at cost recovery levels for administering the spectrum for the base (first) year. The annual recurrent Facilities-Based Operator (“FBO”) licence fees were kept separate from the price of the spectrum lots.

(c) The duration of spectrum rights was set at 7 years. For the base year, the winning operators pay the final bid price plus the FBO licence fees. For each subsequent year, the operators would pay the final bid price plus a 2.5% annual escalation factor, on top of the annual recurrent FBO licence fees. Spectrum trading for the provision of the same service would be allowed subject to IDA’s approval.

(d) Eligible operators³ were required to submit an Initial Offer (“IO”) – the

quantity of lots they wish to bid for at the reserve price, plus a Banker's

2 LMDS is a broadband wireless point-to-multipoint communication system that provides digital two-way voice, data, Internet and video services. It can also be used for backhaul or as leased circuits. LMDS systems use a cellularlike network architecture similar to mobile networks, however, bandwidth is delivered from base stations to buildings, not moving subscribers.

3 For the LMDS auction, interested operators were required to submit an application and IDA assessed the eligibility of the operators based on factors like financial and technical capability, public interest, etc.

Guarantee equal to the reserve price of their IO. If the total number of IOs was less than the supply of spectrum lots on offer, the auction would not proceed and IDA would grant the spectrum lots at the reserve price.

4.3 We recognise that the detailed auction design is, however, far more complex because it will have to factor in different gaming considerations and technology considerations unique to WBA. However, IDA's preliminary assessment is that these key characteristics should be retained for allocating the WBA spectrum for the following reasons:

(a) Reserve price – it is reasonable for IDA to set the reserve price at levels sufficient to at least recover the cost of administering the spectrum. It is also neater to keep the spectrum auction price separate from FBO licence fees and it reduces the volatility of the auction.

(b) Duration of spectrum rights – we believe that a spectrum right duration of 7 years is sufficient to provide business certainty for successful WBA providers.

(c) Submission of IOs – the purpose of an IO is to ensure that only serious players interested in acquiring the spectrum would enter the auction.

4.4 WBA technologies can be deployed on a regional basis or on a nationwide scale, depending on each operator's business plans. Imposing island-wide roll out obligation could potentially deter interested players from entering the market. However, to ensure that consumers are able to enjoy WBA services within a reasonable timeframe, and to prevent companies from bidding for spectrum trading purposes with no intention to provide WBA services, IDA intends to subject successful bidders to a service launch obligation of within 2 years from obtaining the spectrum from IDA. Successful bidders will have full commercial flexibility to deploy the infrastructure necessary to serve either on a regional or nationwide scale. However they will need to launch WBA services within 2 years of obtaining the spectrum from IDA. IDA reserves the right to impose a financial penalty (subject to a maximum of \$1 million) on operators who fail to meet the service obligation, and subsequently, suspend the licence and spectrum rights if IDA determines that the operator will not be rolling out wireless broadband services within a reasonable timeframe after the 2-year mark.

Questions

IDA welcomes views and comments on the key features and service obligation to be applied for auctioning the spectrum for the deployment of wireless broadband technologies. If the key features are not appropriate, please provide supporting reasons why they are not.

Generic Spectrum Lot Size and Maximum Cap

4.5 Based on IDA's technical assessment of the various WBA technologies, we believe that there are no technical advantages for using the spectrum at different frequencies within a specific band⁴. Hence, the spectrum frequencies can be grouped into generic lots for allocation through auction. It is not necessary for potential WBA operators to bid for blocks with specific spectrum frequencies. Successful bidders will be assigned the specific spectrum frequencies based on the number of lots they have successfully bid for, taking into consideration the need to ensure sufficient duplex separation necessary for successful bidders using FDD systems. The generic lots are likely to be of 5 MHz, 5.5 MHz or 6 MHz size in the 2.3 GHz and 2.5 GHz bands. With generic lot sizes, IDA may hold two separate but concurrent auctions for the 2.3 GHz and 2.5 GHz bands.

4.6 To prevent unnecessary spectrum 'hoarding' during the auction, IDA intends to place a cap on the maximum amount of spectrum each bidder may bid for, which should be no higher than the optimum amount of spectrum required for nationwide deployment.

Questions

IDA welcomes views and comments on whether spectrum should be auctioned in generic lots or in blocks with specified frequencies; the appropriateness of the lot sizes; and the maximum amount of spectrum to be set.

nex-G Response

NexG would recommend that some spectrum in one band would be allocated as unlicensed. As a example 5.8Ghz in many countries is open. This allows commercial non-carrier customers to deploy campus networks and building networks using the same technology used by carriers. NexG currently has MNC that are interested in our technology for such deployments.

5. DEPLOYMENT OF WIRELESS BROADBAND TECHNOLOGIES IN 3G SPECTRUM BAND

5.1 The International Telecommunication Union ("ITU") has identified the 1.9 GHz and 2.1 GHz frequency bands for the deployment of 3rd-Generation ("3G") technologies. 3G technologies are classified under the International Mobile Telecommunication-2000 ("IMT-2000") family of 3G standards endorsed by the

ITU. Worldwide, several countries like Hong Kong, United Kingdom and other European countries, have auctioned out the 1.9 GHz and 2.1 GHz bands for 3G services since 2000. In Singapore, IDA auctioned the 1.9 GHz and 2.1 GHz bands in 2001 for the deployment of 3G services. Three mobile operators, SingTel Mobile, StarHub Mobile and MobileOne, were awarded the spectrum rights to the 1.9 GHz and 2.1 GHz bands for 3G services.

4 For example, in the 2.3 GHz spectrum band, there are no technical advantages in using the frequency band at 2.3-

2.31 GHz as compared to 2.31-2.32 GHz (and vice versa).

5.2 The three 3G operators are required to rollout 3G systems and services by 31 December 2004, as part of their 3G licence obligations. IDA is considering permitting the 3G operators to deploy wireless broadband technologies that do not belong to the IMT-2000 family of standards in their 3G spectrum, upon them fulfilling their 3G Licence roll-out obligation to complete the nationwide rollout of the 3G systems and services by 31 December 2004. This will give the 3G operators additional flexibility in using their 3G spectrum, and allow the deployment of wireless broadband technologies that operate in the 1.9 GHz and 2.1 GHz bands. IDA notes that this is in line with practices in other countries like Australia and the United States which allow the deployment of any fixed or mobile wireless technologies not limited to those associated with IMT-2000 family of standards, in the 1.9 GHz and 2.1 GHz bands.

Questions

IDA welcomes views and comments on the deployment of wireless broadband technologies in the 3G spectrum bands. Are there any technical considerations that the IDA should consider? Please provide detailed supporting reasons for each comment and proposal made.

6. ELIGIBILITY OF EXISTING 3G AND BROADBAND INFRASTRUCTURE PROVIDERS

6.1 Existing DSL and cable modem broadband infrastructure providers (with islandwide reach) and 3G providers such as the SingTel Group, StarHub Group and MobileOne, could be interested in acquiring spectrum in the 2.3 GHz and 2.5 GHz band and use wireless broadband technologies to complement their existing infrastructure to deliver services to end-users. IDA intends to allow existing DSL and cable modem broadband infrastructure providers (with island-wide operations) and 3G providers to bid for the spectrum, but intends to limit the amount of spectrum they can bid. This amount will be determined based on the minimum spectrum technically necessary for specific geographical deployment in Singapore. This takes into consideration the flexibility IDA intends to provide for existing 3G operators to deploy wireless broadband technologies within their 3G spectrum.

6.2 Due to the legal commitment made in the 3G auction, IDA will ensure that the WBA technologies deployed in the 2.3 GHz and 2.5 GHz bands do not belong to the complete IMT-2000 family of standards for deployment before 1 January 2006.

IDA welcomes views and comments on the eligibility of existing 3G and broadband infrastructure providers for the 2.3 GHz and 2.5 GHz spectrum, and the limit on the spectrum amount for which they could bid.

7. INTERCONNECTION AND ACCESS

7.1 To ensure fair and equitable open access to any content or service providers, IDA would require wireless broadband operators to interconnect their wireless broadband networks to the networks of any other service provider licensed by IDA. End-users should be able to choose, use and access the services of any content/service provider in a transparent and seamless manner. To ensure that consumers enjoy a minimum standard of service in wireless broadband access, wireless broadband operators may be required to comply with the minimum Quality of Service (“QoS”) standards issued by IDA from time to time. Today, existing DSL and broadband service providers’ are required to comply with a set of minimum QoS standards (see Annex 1).

Questions

IDA welcomes views and comments on whether there are issues that may pose problems to achieving transparent and seamless interconnection and open access. IDA further seeks comments on the type and level of QoS standards that will be appropriate and whether the existing set of QoS standards for broadband service providers are applicable for service delivery using wireless broadband networks. Please provide supporting reasons for each comment and proposal made.

8 MARKET TRIAL LICENCE FRAMEWORK

8.1 IDA currently has a 3-month trial framework for any party that wishes to conduct trials on any telecommunication services, systems and/or network for purposes of equipment testing, research and development or to assess the potential of certain technology, service or product. Trial operators under this framework are not allowed to charge their trial participants for the use of the trial services.

8.2 To help companies and licensees to better test the commercial viability of innovative technologies, including wireless broadband technologies, IDA intends to create a market trial framework to allow commercial charging of trial services. This Market Trial Licence scheme will be opened to new entrants as well as existing operators. This framework is designed with a view to support IDA’s policy objective of promoting Singapore as a hub and test-bed for deployment of new technologies and to ensure fairness to market entrants that took the business risks and applied for full-fledge FBO and Services-Based Operator (“SBO”) licence for service provision. Therefore, the Market Trial Licence is set for a period of 6 months, with a maximum extension of 6 months, at a fee of S\$2,500 per 6-month period. IDA believes that a 6-month trial period is sufficient considering that companies can set up their trial network to do technical trials under the existing technical trial framework before applying for the commercial trial licence to do commercial trials. A brief overview of this licence is set out in Annex 2.

Questions

IDA welcomes views and comments on the Market Trial Licence framework and the specific features set out in Annex 2. Is the Market Trial Licence framework conducive in helping market participants test the commercial viability of innovative service? Are there additional issues that IDA should consider? Please provide detailed supporting reasons for each comment and proposal made.

nex-G Response

NexG would like to work out a Trial/Testing Licence to facilitate the constant improvement of our equipment. The Trial framework is fine for operators, but since we need to routinely test on a limited basis, we would hope that a framework can be established for this.

9 INVITATION FOR COMMENTS

9.1 IDA would like to seek the views and comments from the industry and members of the public on the issues and proposals raised in this consultation. This will allow IDA to have a better understanding of the issues and the different needs and requirements of the different interested parties. The questions are listed again below:

(a) View and comments on the potential of and benefits arising from the deployment of wireless broadband technologies, the likely services/applications to be deployed and the potential demand from businesses and consumers.

(b) Views and comments on the allocation of the 2.3 GHz and 2.5 GHz bands for wireless broadband technologies and the harmonization of spectrum at the border areas. What are the coexistence issues that need to be considered with regards to the deployment of systems (FDD & TDD) in the same geographical area in adjacent frequency blocks, and the deployment of systems across geographic boundaries in the same frequency blocks? What are the technical assessment and methodology to be used for the deployment and coordination of systems, including separation distances, power spectral flux density limits, out-of-band-emission limits, frequency guard bands etc, to ensure coexistence of system operations? What are the mitigation techniques that could be employed in case of co-channel interference between systems operating in adjacent geographical areas?

Does the 5 MHz, 5.5 MHz or 6 MHz channeling plan for the 2.3 GHz band

and the 2.5 GHz band meet industry requirements? What is the appropriate duplex separation (Transmit/Receive) for the FDD wireless broadband technologies in the 2.3 GHz and 2.5 GHz bands respectively? What is the minimum, as well as optimal amount of spectrum required by an operator for specific geographical deployment or nationwide deployment? Please provide supporting reasons for each comment and proposal made.

(c) Views and comments on the key features and service obligation to be applied for auctioning the spectrum for the deployment of wireless broadband technologies. If the key features are not appropriate, please provide supporting reasons why they are not.

(d) Views and comments on whether spectrum should be auctioned in generic lots or in blocks with specified frequencies; the appropriateness of the lot sizes; and the maximum amount of spectrum to be set.

(e) Views and comments on the deployment of wireless broadband technologies in the 3G spectrum bands. Are there any technical considerations that IDA should consider? Please provide detailed supporting reasons for each comment and proposal made.

(f) Views and comments on the eligibility of existing 3G and broadband infrastructure providers for the 2.3 GHz and 2.5 GHz spectrum, and the limit on the spectrum amount for which they could bid.

(g) Views and comments on whether there are issues that may pose problems to achieving transparent and seamless interconnection and open access. IDA further seeks comments on the type and level of QoS standards that will be appropriate and whether the existing set of QoS standards for broadband service providers are applicable for service delivery using wireless broadband networks. Please provide supporting reasons for each comment and proposal made.

(h) Views and comments on the Market Trial Licence framework and the specific features set out in Annex 2. Is the market trial licence framework conducive in helping market participants test the commercial viability of innovative service? Are there additional issues that IDA should consider? Please provide detailed supporting reasons for each comment and proposal made.

9.2 Respondents are also invited to comment on any other issues not covered in this consultation document but which are considered to be relevant in the deployment of wireless broadband technologies.

nex-G Response

The US is currently looking at releasing spectrum in the UHF television band. This could release spectrum below 900Mhz to use in BWA. The propagation for these frequency are very good, NexG would prefer IDA track this closely. Also if part of any release frequency is also unlicensed, then this would significantly add to the usage in carrier as well as commercial enterprises.

9.3 IDA will consider inputs submitted and make its policy decisions thereafter. IDA will target to announce the spectrum allocation framework for the 2.3 GHz and 2.5 GHz bands, the market trial licence framework, and the policy decision on the deployment of wireless broadband technologies in the 3G spectrum bands by third quarter 2004.

9.4 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 pm, 30 April 2004. Respondents are required to include their personal/company particulars as well as the correspondence address in their submissions to this Consultation Paper.

Comments and views should be addressed to:

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AND

Please submit your soft copies via email to:
loh_oon_sien@ida.gov.sg

9.5 IDA reserves the right to make public all or parts of any written submissions made in response to this Consultation Paper and to disclose the identity of the source. Any part of the submission, which is considered by respondents to be commercially confidential, should be clearly marked and placed as an annex. IDA will take this into account regarding disclosure of the information submitted.
Infocomm Development Authority of Singapore

nex-G Response

For any additional information or clarification please contact:

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