

SINGTEL RESPONSE TO CONSULTATION PAPER

ALLOCATION OF THE 10.5 GHZ BAND (MAY 2008)

1. INTRODUCTION

- 1.1 Singapore Telecommunications Limited, Singapore Telecom Mobile Pte Ltd and Singapore Telecom Paging Pte Ltd (collectively referred to as **SingTel**) refer to the Info-communications Development Authority of Singapore (**IDA**) consultation paper dated 22 May 2008 on the proposed allocation of spectrum in the 10.5 GHz frequency band (**Consultation Paper**).
- 1.2 SingTel is licensed to provide telecommunications services in Singapore. SingTel has a comprehensive portfolio of services that includes voice and data services over fixed and wireless platforms. As a leading provider of telecommunications services including satellite uplink/ downlink services, microwave services, mobile services over 2G and 3G, high speed data access through GPRS and HSDPA, as well wireless services on our WiFi platforms, SingTel has a strong interest in the proposed allocation of spectrum in the 10.5 GHz frequency band in Singapore.
- 1.3 SingTel welcomes the opportunity to make this submission on the Consultation Paper and the various issues identified by the IDA.
- 1.4 SingTel's submission is structured as follows:
 - Section 1 – Introduction;
 - Section 2 – General Comments;
 - Section 3 – Detailed Comments; and
 - Section 4 – Conclusion.
- 1.5 SingTel would be pleased to clarify any of the views and comments made in this submission, as appropriate.

2. GENERAL COMMENTS

- 2.1 SingTel notes in December 2007, the IDA made available spectrum in the 10.5 GHz frequency band for allocation through an auction process (**December 2007 Auction**); the auction did not proceed as there were no Initial Offers received for any of the 10.5 GHz spectrum lots made available.
- 2.2 In its Information Memorandum on the December 2007 Auction, the IDA indicated that it would allow the 10.5 GHz frequency band to be used to operate P2P and P2MP radio systems for wireless backhaul.
- 2.3 SingTel notes that in its latest consultation, the IDA is proposing to allow the use spectrum in the 10.5 GHz frequency band to operate P2P and P2MP radio systems regardless of whether the systems are deployed in the backhaul or in the access portion of the network.
- 2.4 The IDA has identified that there are proprietary products that can operate in this frequency band for the deployment of P2MP wireless access network(s) and that other countries have also allocated this band for P2P and P2MP links without limiting the use to backhaul.
- 2.5 Notwithstanding this, SingTel believes that the circumstances in Singapore have not changed since 2007; the circumstances do not warrant the allocation of spectrum in the 10.5 GHz frequency band for the purpose of deploying wireless access networks or for deploying wireless backhaul, ie the backbone connections for wireless networks.
- 2.6 In 2005, the IDA conducted an auction during which all the twenty-five (25) spectrum lots identified in the 2.3 GHz and 2.5 GHz frequency bands were auctioned. As a result, six (6) new WBA licensees have already obtained spectrum at a total cost of S\$9.84 million.
- 2.7 Therefore, in respect to the deployment of wireless access networks, there is no need for the proposed allocation of spectrum in the 10.5 GHz frequency band to deploy such networks or services. Licensees already have the option to use existing WBA spectrum in the 2.3 GHz or 2.5 GHz band to deploy WBA networks and services.

- 2.8 Second, operators are able to use, and are in fact currently using, spectrum in other frequency bands, such as the 18 GHz and the 22 GHz bands. Further, LMDS is also available. LMDS is a broadband wireless line-of-sight point-to-multipoint communication system that operates typically in the 24-31GHz bands. Current LMDS systems are able to offer data rates of up to 622Mbps. Therefore, there is no need to allocate the 10.5GHz frequency band as proposed.
- 2.9 Third, as the IDA has clarified, the WBA licensees are able to make use of the WBA spectrum obtained in the auction to deploy any part of a WBA network as long as the WBA spectrum is not used solely within the operator's network for backbone connections (as an alternative to dedicated fixed-line connections), without any WBA telecommunication services delivered to end-users.
- 2.10 In addition to wireless alternatives, there are already extensive wired networks that can deploy wireless backhaul or wireless access networks, whether to connect 2G and 3G mobile networks, WBA networks and WiFi networks or to implement an access network. These wired networks offer better reliability and quality of service.
- 2.11 Furthermore, whilst wireless technologies are substitutes for wireline technologies and can be used to deploy access networks, there are inherent properties in wireless solutions that do not offer the required quality especially where wireless backhaul is concerned. In particular, any wireless backhaul solution must take into account the quality required in the delivery of the mobile or wireless service. The properties of deploying wireless solutions in the 10.5 GHz frequency band may not allow for the types of quality required by, for example, 3G networks.
- 2.12 In light of the above, SingTel believes that the IDA should refrain from allocating the 10.5 GHz frequency band as proposed. The circumstances in Singapore do not warrant the allocation of spectrum in the 10.5 GHz frequency band for the purpose of deploying wireless access networks or for deploying wireless backhaul, ie the backbone connections for wireless networks. There are already ample wireless and wired solutions. There is no compelling need to allocate spectrum in the 10.5 GHz frequency band as proposed.

3. DETAILED COMMENTS

Use of 10.5 GHz frequency band for wireless access networks

- 3.1 SingTel believes that there is already sufficient deployment of access networks using wireless technologies.
- 3.2 In 2005, the IDA conducted an auction during which all the twenty-five (25) spectrum lots identified in the 2.3 GHz and 2.5 GHz frequency bands were auctioned. As a result, six (6) new wireless broadband access (**WBA**) licensees have already obtained spectrum at a total cost of S\$9.84 million to offer WiMAX services and products.
- 3.3 Furthermore, since 2005, mobile telephone operators (**MTOs**) have further deployed high speed wireless services and products, eg SingTel Mobile and M1 have made use of High Speed Data Packet Access (**HSDPA**) to offer high speed mobile internet or access services at speeds higher than current 3G technology speeds.
- 3.4 In December 2006, the IDA launched the Wireless@SG network, with three (3) wireless operators deploying Wi-Fi networks in Singapore offering free seamless wireless broadband access of up to 512kbps at various indoor and outdoor public areas. As at April 2008, there are 7,260 Wireless@SG hotspots located around Singapore¹.
- 3.5 MTOs have also announced their intentions to upgrade their wireless capabilities; SingTel Mobile recently announced investing S\$220 million in its 2G and 3G mobile network expansion and enhancement programme so that customers can expect even better user experience, such as faster download and upload data speeds². In May 2008, StarHub announced a similar programme to expand and upgrade its current nation-wide 3.5G mobile broadband network to HSPA+ by 2Q-2009 in order to offer better overall mobile coverage island-wide indoors and

¹ Wireless Broadband Network, IDA

² "SingTel awards Ericsson S\$220m contract to enhance mobile network", SingTel Mobile press release, 16 May 2008

outdoors, and support even larger volumes of data traffic than current offerings in the market³ and M1 has also announced similar plans⁴.

3.6 As such, we believe that there is no need for the IDA to allocate additional spectrum for the deployment of wireless access networks.

3.7 Notwithstanding the above, were the IDA to allocate spectrum in the 10.5 GHz frequency band, we note that the IDA had previously highlighted that there are no dominant standards-based systems planned for the 10.5 GHz frequency band. In this public consultation, the IDA concedes that there are still only proprietary products operating in the 10.5 GHz frequency band.

3.8 This is similar to the WBA spectrum in the 2.3 GHz and 2.5 GHz frequency bands. Even though the IDA auctioned the WBA spectrum in 2005 at a total cost of S\$9.84 million and granted six (6) WBA licences, there was a delay in the certification of the WiMAX Standard using 2.5GHz frequency band. There is currently still a lack of a formalised WiMAX certification for the CPE.

3.9 Given that all the wireless solutions supporting 10.5GHz frequency band are proprietary systems, this limits providers and customers to equipment from only one vendor for the solution they choose. There will no interoperability between the equipment and systems offered by different vendors; independent CPE manufacturers are also unable to drive down the cost of CPE and customers are unable to avail themselves of readily available and affordable CPE.

3.10 In short, without a formal and universally accepted standard for deployment of solutions in the 10.5 GHz frequency band, any allocation of spectrum in the 10.5 GHz frequency band as proposed will also lead to a similar situation, with inefficiencies and even delays in deployment.

3.11 In terms of current usage, SingTel believes that worldwide, the 10.5 GHz frequency band is one of the high frequency bands that can be used to deploy microwave services in order to deliver voice, data and sometimes video signals.

³ “StarHub to Expand and Upgrade 3.5G Mobile Network to Deliver Unparalleled Mobile Surfing Experience and Improved Indoor and Outdoor Coverage”, StarHub press release, 22 May 2008

⁴ “M1 picks Huawei Technologies for 3G and HSPA network expansion”, M1 press release, 18 April 2008

- 3.12 However, whilst technology has evolved such that microwave systems are still a viable manner to deliver public switched telecommunication services, the improvements in technology and telecommunications development has seen a faster deployment of networks using fibre or wired solutions.
- 3.13 In Singapore, there is clear evidence of networks being built. To illustrate:
- As at 30 June 2004, StarHub had rolled-out more than 2,000 fibre kilometres and directly connected over 800 commercial buildings in Singapore⁵;
 - Between January 2001 and December 2001, Verizon reported that it had wired to all the buildings in the CBD in Singapore and had laid enough fibre cable in Singapore to cross the island 251 times at it widest point⁶.
- 3.14 In addition, as part of the Next Generation National Broadband Network (**Next Gen NBN**) initiatives, the IDA has called Request for Proposal for the Network Company (**NetCo RFP**) to design, build and operate the passive wireline infrastructure layer of the Next Gen NBN and is prepared to offer funding of up to S\$750 million in order to see an alternative wireline infrastructure in Singapore⁷.
- 3.15 Today, microwave solutions are deployed to deliver services to areas that are not feasible for wired solutions. As indicated above, operators are able to use, and are in fact currently using, other spectrum frequency bands, such as the 18 GHz and the 22 GHz bands, for their backbone links/wireless trunk circuits. Further, LMDS is also available in the 24-31GHz bands.
- 3.16 SingTel believes that there is already sufficient spectrum for the deployment of wireless access networks.. On the other hand, SingTel is concerned that the IDA is making available wireless resources when there is no formalised standards, thereby resulting in wastage of resources or inefficient usage. Last, we highlight that there are more deployments using wireline solutions.

⁵ StarHub annual report 2005, pages 8 – 9.

⁶ "Teh Hooi Ling, 'WorldCom Claims Success in S'pore'", *Business Times*, 17 December 2001 (http://it.asia1.com.sg/newsarchive/12/news002_20011217.html).

⁷ "Singapore's Ultra-high Speed Digital Highway Ready by 2015", IDA press release, 11 December 2007

Use Of 10.5 GHz for wireless backhaul

- 3.17 In its December 2007 Auction, the IDA allowed the use of 10.5 GHz frequency band to deploy wireless backhaul to cater to industry demand for resources to deploy wireless backhaul. Nonetheless, there was no interest expressed for the spectrum during the auction.
- 3.18 SingTel believes that nothing has changed; SingTel does not believe that there is a lack of resources to deliver the backbone connections of wireless networks, given the current range of wired and wireless solutions.
- 3.19 WBA operators are already able to make use of their WBA spectrum acquired during the auction in 2001 to build backbone connections pursuant to the conditions set by the IDA. Indeed, SingTel understands that some operators are in fact using the WBA spectrum in such a way already.
- 3.20 All wireless operators also have available to them a range of solutions for their backbone connections through the services delivered by the Facilities-based Operators offering local leased circuit (**LLC**) or equivalent services. As indicated in Section 3, StarHub and Verizon have rolled out extensive networks covering Singapore, offering their LLC equivalent services. SingTel also offers LLC or equivalent solutions in the form of:
- DigiLink
 - DigiPlus
 - Local ATM
 - MetroEthernet
 - Meg@POP suite of services
- 3.21 SingTel, for example, has offered customised packages to Facilities-based Operators (**FBOs**) to use for their “backbone solutions” for wireless networks.
- 3.22 Without prejudice to the above, in the event that the IDA decides to allocate spectrum in the 10.5 GHz frequency band to deploy wireless backhaul, SingTel also wishes to point out that whilst spectrum in the 10.5GHz frequency band can be used for P2P / P2MP backhaul solutions, these solutions require “line-of-sight”.

At high frequencies such as the 10.5 GHz frequency band, obstructions between the transmitting and receiving antenna will block the signals being transmitted. “Line of sight” is therefore essential for the effective delivery of backbone connections for wireless networks and to ensure that the wireless operators are able to then on deliver quality services to their customers.

- 3.23 This differs from backbone solutions offered via digital infrastructure linked by fibre optics with multiplexing equipment and using optical fibre nodes to cater for the high-speed circuits or high volume data traffic demand. LLCs traditionally offer extensive bandwidth options, extensive diversity plans and service level assurance to customers, e.g. mobile telephone operators or WBA operators.
- 3.24 This is unfortunately a matter of concern particularly in urbanized countries where there are frequent commercial and residential developments, with no assurance that the signals over a wireless backhaul solution can be transmitted smoothly. Furthermore, we note that wireless networks deployed in the higher frequency bands like 10.5 GHz frequency band can suffer from rain attenuation thereby affecting reliability and quality of service.
- 3.25 We note that MTOs offering 2G and 3G based services are already subject to very stringent QOS requirements for their services; the use of the 10.5 GHz frequency band for wireless backhaul networks may not provide the required quality. WBA operators or other wireless networks delivering a broadband based service will also find that using the 10.5 GHz will not provide the required quality for data transmission.

IDA decision not to impose conditions on usage of the 10.5 GHz band for the deployment of access systems and services

- 3.26 As indicated above, SingTel does not therefore see a need to make available spectrum in the 10.5 GHz frequency band for the deployment of wireless backhaul or wireless access networks.

- 3.27 Without prejudice to the above, should the IDA decide to make available spectrum in the 10.5 GHz frequency band, SingTel believes that the objective of the regulatory framework should be to establish a level playing field between licensees providing the same or equivalent services to consumers irrespective of the underlying technology (in this case, frequency band) used to provide the service. Hence, SingTel believes that the IDA should adopt a technology neutral approach towards the framework for deployment of solution and services in this frequency band.
- 3.28 This ensures that providers of telephony services do not switch between different technologies in order to avail themselves of more favourable regulatory treatment. Furthermore, it ensures that end-users or consumers are not confused over the quality and nature of the services(s) that they acquire from licensees.
- 3.29 SingTel believes that the IDA has implemented such an approach efficiently and effectively. For example, operators in Singapore offering telephony services to the public using Level 6 numbers are required to obtain an FBO licence, comply with QOS, number portability, provide directory enquiry services, comply with the interconnection framework etc. Operators who make use of Level 3 numbers to offer telephony services have fewer obligations. The IDA took this approach as it felt that

“..there is a need to differentiate, through the assigned numbers, the IP Telephony services from the current PSTN services because of the distinctions in the service features between the 2 services”⁸

and

“In view that there are different attributes between IP Telephony and PSTN services, IDA has decided to maintain the above policy approach so as to protect the interest of end-users and to maintain the level of service quality for basic telephony services in Singapore.”⁹

⁸ Explanatory Memorandum on the Policy Framework for IP Telephony and Electronic Numbering in Singapore 14 June 2005, page 8 of 13

⁹ Explanatory Memorandum on the Policy Framework for IP Telephony and Electronic Numbering in Singapore 14 June 2005, page 10 of 13

- 3.30 We therefore believe that the IDA should adopt a technology neutral approach and require that licensees comply with the prevailing licensing and regulatory framework, including all associated obligations in terms of licence requirements, licence fees, QOS, coverage (where applicable) for the services they offer using this spectrum.

Technical guidelines on transmission power and unwanted emissions

- 3.31 In relation to the proposed technical guidelines, SingTel notes that the IDA proposes that the output power (P) of the radio system(s) should fall in the range of 5 to 5000 W.
- 3.32 We believe it is more appropriate to have different ranges for the wireless backhaul versus the access portions of the network(s). Hence, we propose that the range of 5 to 5000W should apply only where the spectrum is used to deploy wireless backhaul or the backhaul portion of the wireless access network whilst the power output range for the access portion should be capped at lower volumes. For example, we note that in the case of the 2G and 3G networks, the power output is capped at 100W and in the case of WBA networks operating in the 2.3 GHz and 2.5 GHz frequency bands, they are capped at 1000 W. We propose that the IDA considers setting the power output for the access network at a range closer to those applicable for 2G/3G or WBA in the 2.3GHz and 2.5 GHz frequency bands.

Spectrum Allocation Mechanism And Pricing

- 3.33 As indicated above, SingTel believes that there is no need to allocate spectrum in the the 10.5 GHz frequency band as proposed. There are already a range of wired and wireless solutions available.
- 3.34 Without prejudice to the above, in the event that the IDA decides to allocate spectrum in the 10.5 GHz frequency band, SingTel generally supports the IDA proposal in relation to the proposed pricing methodology with regard to imposing a spectrum right duration, an annual spectrum management fee etc:

- spectrum right duration of five (5) years;
- annual spectrum management fee of \$12,000 for the first MHz and \$300 per subsequent MHz or part thereof;
- no cap on spectrum amount; and
- reserve price of \$50,000 for each pair of 14 MHz blocks.

3.35 In terms of the spectrum block size of 14 MHz blocks, we also note that the amount of spectrum needed as well as channel size will largely depend on the type of equipment or solutions available in the market.

4. CONCLUSION

4.1 In summary, SingTel believes that there is no need to allocate spectrum in the 10.5 GHz frequency band as proposed, for the reasons identified above.