

FRAMEWORK FOR THIRD GENERATION (3G) CELLULAR NETWORK DEPLOYMENT AND SERVICES OFFERING IN SINGAPORE

RESPONSE FROM STARHUB

StarHub's positions on IDA's clause (a) to (g)

1. Clause (a) – an assessment of the development of 3G cellular technology, the likely services being developed and the potential demand from business and consumers;

1.1 Observing various 3G technology field trials carried out in Japan, UK and the other countries, the 3G technology development has arrived at a commercially acceptable level. As for the applications that require full functionality of the 3G technology, it is yet to be seen that this technology will evolve as an essential technology. One of such limitation is the screen size of the 3G technology enabled handset which would be limited to a portable size.

1.2 GPRS however, as a plowing pilot into 3G technology can be used as a testbed to explore the potential mobile applications and to set the stage for consumers' expectation for such applications, before migration to the 3G technology. The penetration curve could potentially be steeper when the cost stabilizes at a viable level.

2. Clause (b) – the potential of 3G technology and the scope of the 3G licence;

2.1 As the 3G technology has a revolutionary flexible and high technical capability, the scope of the 3G technology should not be confined to conventional mobile communications. For its higher mobile bandwidth capabilities, non-conventional mobile applications such as the variation of private network applications, semi-fixed applications, Internet and data accesses, multimedia applications (video conferencing etc) can be made possible.

2.2 However, the network infrastructure implementation for the 3G technology has other critical factors that require careful evaluation and consideration by both operators and the national regulator. Cost of network deployment to ensure network coverage and capacity for optimum usage of resources as well as output to the consumers can potentially drive and influence the future of 3G deployment and take up. Having an increased number of operators will not necessarily facilitate optimized and efficient network deployment. As such the scope of the 3G license in Singapore should not be a platform for fully unconstrained environment. However, the infinite quantum of ubiquitous applications that can be deployed over the 3G technology, which is possibly unrelated to the 3G licence itself should be made easy to deploy by service providers to the consumers at large. Whilst the service providers focus on the deployment of potential applications, the QOS, network coverage and capacity, fully enhanced network capabilities are left to the 3G network operators.

3. Clause (c) – the spectrum allocation mechanism and the spectrum requirements per operator;

3.1 The following factors need to be carefully considered before a viable spectrum allocation mechanism can be formulated.

- **Border Frequency Co-ordination**

The spectrum requirement per operator is impacted by Singapore's difficult environment for cross-border frequency co-ordination. In particular, densely populated urban centers on both sides of the border between Singapore and Malaysia & Indonesia, separated only by coastal waters, require substantial local network capacity. IDA and the relevant local and foreign administration agencies could define basic rules and procedures for border frequency co-ordination. 3G technology operators will have to carry out detailed code and/or frequency co-ordination resulting in a diminished network capacity in these areas. Consequently, in order for the operators to provide appropriate capacity while maintaining quality of service standards at border areas, additional spectrum may be required and should be considered in allocating a minimum band per operator.

- **Guard Band**

To insure that there is no interference between 3G technology networks and existing systems in Singapore (e.g. PCS-CDMA, private DECT, and PHS system), sufficient guard band must be allocated.

Downlink frequencies of M1's PCS system (narrow band CDMA) overlap with a portion of IDA's earmarked uplink for the 3G band. The Spectrum Allocation Chart is attached for easy reference. This implies that the 3G base station receiver band is adjacent to the PCS base station transmitter band, resulting in the need for a large guard band. While a 1.5 MHz guard band (at each boundary) is the required minimum, it does not eliminate interference and a geographical separation between base stations is required.

The issue of PHS is currently under study in Japan and its Ministry of Post and Telecommunications (MPT) is expected to set the guard band of 5MHz to avoid interference between 3G and PHS networks.

ERC's (European Radiocommunication Committee) recommendation for the guard band between DECT and UMTS is at 4.7 MHz.

- **Other Spectrum Requirements**

Singapore's Central Business District is one of the world's densest urban environments and most residential areas are highly concentrated with high-rise (HDB and condominiums) buildings. This is further coupled with the world's highest standard for in-building coverage. In order to establish high quality 3G technology systems and to be capable of providing high bit rate services, a three-layer network will be required.

- 3.2 Consequently, the allocation per operator in an ideal scenario should be 20MHz of paired spectrum. This would allow flexibility and efficiency in the network design. In Japan, the intention is also to grant 20MHz of paired spectrum to the operators. However, UMTS forum has recommended 15MHz of paired spectrum per operator in addition to 5MHz of unpaired spectrum, i.e. 2 x 15MHz + 5MHz. StarHub is of the opinion that for Singapore's environment, UMTS forum's recommendation should be adopted resulting in the existence of up to 4 operators.
- 3.3 IDA has highlighted the 2 x 60MHz of paired spectrum which has been earmarked. However, there is no indication on the available unpaired segment of the 3G band. This unpaired spectrum could be allocated as unpaired additions to the recommended 2 x 15 MHz allocation per operator in order to facilitate provision of higher speed data services.
- 3.4 It is observed that in some countries where spectrum auction is adopted, the development of the cellular businesses is distorted due to the resulted high cost of the auctioned spectrum. Spectrum auctioning is therefore not recommended for implementation in Singapore.

4. Clause (d) – the optimal number of operators to licence;

- 4.1 Taking into account that IDA has identified 2 X 60 MHz for 3G services and spectrum requirements as identified in para 2.3.1, licensing up to 4 operators is preferred and recommended.
- 4.2 It is also noted that M1's N-CDMA system has current occupation of a portion of the 3G spectrum. This limits the number of possible operators to 5, even at a 2X10 MHz Frequency Division Duplex (FDD) per operator, as there will be less than 2X60 MHz available if M1 is to retain its current allocation. Moreover, M1's present frequency allocation for its 2G PCS N-CDMA system makes it technically possible for the refarming of its current spectrum for 3G services in future. This can be accomplished using CDMA-2000 technology currently. Should M1 pursue this option, the allocation of M1's 3G spectrum must take into account its current allocation to ensure a level playing field for all 3G operators. Allocation of the 3G spectrum should not be made at the expense of the other operators.
- 4.3 Although the Singapore market is relatively small, a large capital investment is required to deploy a 3G technology network. In addition, this will be necessary to fulfill the IDA network coverage requirements for outdoor and in-building environment and to ensure that the high-speed mobile multimedia services can be supported. As the economy of scale is one of the key factors for the success of this business a larger number of 3G operators may lead to market dilution and result in insufficient basis for a commercially viable operation/business for some. Furthermore, the risk for offering 3G services, which is data-centric, is higher given that the current success of mobile services is based on voice-centric services.
- 4.4 The greater the number of 3G networks, the more base stations are required. The reason is not solely due to the additional number of operators but also the reduced available spectrum per operator. Reduced spectrum per operator will necessitate

additional base stations in order to meet the capacity demands stemming primarily from the high data rate services. Moreover, the increased quantum of base stations with antennas will have negative aesthetic impact on the Singapore skyline.

5. Clause (e) – the approach for licensing additional 3G service providers;

5.1 StarHub has demonstrated its commitment to IDA, in the 3G network deployment and is expected to deliver 3G services by the year committed to IDA. In addition, we support IDA's current method of license award which requires a public tender bid submission from the potential operators, and approval based on the technical/commercial plans and financial qualifications.

5.2 With the identified 2X60 MHz for 3G services, the recommendation is to license up to 4 operators in order for sensible deployment and utilization of the spectrum. As such, the 4th operator could be awarded via IDA's license bidding criteria. The criteria should include the committed list of 3G services to be deployed so as to justify the existence for a 4th operator.

6. Clause (f) – how existing mobile phone operators should be treated;

6.1 A major portion of the existing PCMTS operators' infrastructure can be utilized towards the 3G technology systems. The synergy between 2G and 3G networks will lead to significant cost savings which will be passed onto the consumers. As long as the current 2G operators successfully implement their present operations, they should be granted a fair allocation of the 3G spectrum. In view of the efficient utilization of the existing infrastructures, existing operators should be given the licenses as long as they have a sound plan and sufficient financial support for 3G technology implementation.

7. Clause (g) – the timing for award of 3G licences and services launch dates.

7.1 Considering the movement of the other countries and market trend, year 2002 or 2003 could be appropriate. However, existing mobile operators like StarHub, which has an obligation under the IDA Performance Bond to deliver 3G services must be allocated spectrum as and when the development is completed and are ready to trial the 3G services.