

**M1'S RESPONSE TO IDA'S CONSULTATION PAPER ON
THE SPECTRUM FRAMEWORK FOR FOURTH GENERATION (4G) MOBILE
COMMUNICATION SYSTEMS IN SINGAPORE**

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M1'S RESPONSE TO IDA'S CONSULTATION PAPER ON THE SPECTRUM FRAMEWORK FOR FOURTH GENERATION (4G) MOBILE COMMUNICATIONS IN SINGAPORE

1. M1 is a leading integrated communications service provider in Singapore, providing a full range of voice and data communications services over its network. Since 1 Apr 1997, M1 has made significant inroads into the local mobile communications market, gaining considerable brand presence and market share. In 2000, we launched our international telephone services and in February 2005, M1 took the lead in launching 3G services in Singapore. M1 was also the first to launch Singapore's first true island-wide wireless broadband service, M1 Broadband Service, in 2006. We became a full-fledged broadband player with the introduction of M1 Fixed Broadband service in 2008, transforming M1 from a single-play mobile operator to a dynamic multi-play operator, with interests in both the mobile and fixed sectors.
2. Firstly, we would like to clarify that 4G mobile communications, according to ITU requirements¹, refers to the fourth generation of cellular wireless standards that have target peak data rates of up to approximately 100Mbps for high mobility eg. mobile access, and up to approximately 1Gbps for low mobility eg. nomadic or local wireless access. Although a number of existing technologies such as Long Term Evolution ("LTE") from 3GPP are often branded as "4G", they are in fact pre-4G technologies. LTE has a theoretical net bit-rate capacity of up to 100Mbps in the downlink and 50Mbps in the uplink if a 20MHz channel is used and more if Multiple-input multiple-output ("MIMO") are used. However, for the ease of reference and to align with the terms used in the consultation paper, we shall also refer LTE as 4G mobile communications in this paper since LTE is the first step in the evolutionary path towards 4G mobile technologies.

M1's interest in 4G mobile communications

3. We welcome the opportunity to participate in the consultation on the spectrum framework for fourth generation (4G) mobile communications in Singapore. M1 has always been a strong advocate of the pervasive deployment of high speed mobile communications in Singapore, moving towards being an integral part of Singapore's Next Generation Mobile Broadband Network ("NGMBN") ecosystem:
 - As early as Y2004, M1 had actively explored, trialled, and evaluated the potential of various wireless broadband access technologies ranging from proprietary systems such as SOMA, iBurst, IP Wireless etc, to standards-based technologies such as WLANs, Wi-Fi, WiMax and the IMT-2000 family of standards.
 - M1 was the first to trial an interesting and innovative end-to-end Mesh Wi-Fi and pre-WiMax solution.
 - We were the first mobile operator in Singapore to launch high speed mobile broadband for both postpaid and prepaid customers, offering unlimited usage.

¹ ITU-R, Report M.2134, Requirements related to technical performance for IMT-Advanced radio interface(s), Nov 2008.

- M1's High-Speed Packet Access ("HSPA") network was the first in Singapore and Asia to go live with nationwide downlink speed of 14.4 Mbps and uplink speed of 5.76 Mbps.
 - Our HSPA+ network was the first in Asia Pacific to deploy MIMO to achieve Singapore's fastest download speed of 28 Mbps.
 - We have already started modernizing our network since 2009 to provide a smooth transition path towards LTE.
 - M1 is on track in our LTE or 4G mobile communications deployment. We have started our LTE trial since Feb 2010. As part of our LTE trial, M1 showcase the ultra high speed wireless broadband capabilities of LTE at our flagship store in Paragon on Orchard Road. This would allow customers to experience amongst other things High Definition (HD) TV streaming, internet browsing, and web surfing over the LTE network.
4. M1 sees 4G mobile communications as an attractive proposition for Singaporeans and is interested in leveraging on our existing investment, knowledge, area of expertise and experience to offer our customers a comprehensive suite of high quality communication services that complement ultra high speed with mobility. Evident from our track records, M1 is committed to deploy 4G mobile communications and has already taken a leadership role in the development or deployment of ultra high speed networks. We are targeting to have our initial LTE network rollout by early 2011. Hence, we look forward to favourable policies that encourage investment in 4G mobile communications and create conducive environment that provides business certainty as well as facilitate early growth of 4G mobile communications and services in Singapore. We believe that this would better position Singapore for growth and spur the introduction of new, exciting, and innovative services that enhance the lifestyles of Singaporeans through convenience, mobility, as well as "anytime and anywhere" communications or entertainment services.

Singapore's 4G spectrum planning and allocation started as early as Y2004

5. Singapore's recognition of the growing demand in Wireless Broadband Access ("WBA") services and IDA's early release of 2.3/2.5GHz spectrum rights in Y2005 has enabled Singapore to be at the forefront for 4G mobile communications. Since then, the 2500-2690 MHz spectrum has already been identified globally as the 3G extension band or 3G evolutionary path for the IMT family of standards (ie. 3.5G/4G and beyond). IDA's foresight in its earlier decisions of not restricting 3G operators to bid for 2.3 or 2.5GHz spectrum and allowing WBA operators to deploy any technology, including IMT technologies that are established and proven solutions adopted worldwide, are highly commendable. These decisions now put Singapore in good stead to be one of the leading countries in the world for LTE implementation.
6. As IDA is aware, LTE is the initial building block in the evolutionary path to 4G mobile technology and is based on the proven standards of the GSM/IMT family of technologies with more than billions of subscriptions across numerous networks and countries, translating to a global market share in excess of 90%². The GSM/IMT has unrivalled success in the global harmonisation of standards and spectrum bands, enabling manufacturers and networks to realise significant economies of scale and seamless global roaming. These have benefited

² GSMA's response to TRAI's Consultation on 4G, 15 Apr 2010.

many countries globally by enhancing the quality of life and providing expanded economic opportunities through the provision of high speed access to vital communication services, promoting the development of technology advancements, and delivering a plethora of innovative and compelling services to millions globally.

7. Worldwide, LTE trials and deployment are picking up pace, with operators eager to roll out LTE networks as soon as possible. As of the end of September 2009, 100 mobile networks had LTE trials or commitments to trial underway³. The Asia-Pacific region accounted for more than 40 of these trials, with operators in Japan and South Korea leading the way. NTT DoCoMo (DCM), the largest wireless service providers in Japan is likely to become the first carrier in Asia to deploy LTE network. NTT DoCoMo is all set to commercially launch its LTE service from Dec 2010. China Mobile Ltd, the world's largest mobile operator with respect to subscriber count, is also conducting several trials for its nationwide LTE deployment from end Y2011. It is forecasted that LTE subscribers will reach 32.6 million by Y2013.
8. Given the tremendous benefits and opportunities that LTE could bring about for Singapore, and that developments in LTE are progressing at full speed, it is important that IDA capitalize on its foresight and advantaged position of early head-start in spectrum planning and allocation to enable the launch of LTE in Singapore as soon as possible. Singapore should leverage on its competitive advantage to position itself at the forefront in technological and market development for LTE and reap the maximum benefits for the country. Furthermore, the early adoption and deployment of LTE is also pivotal in shaping the competition dynamics in the Next Generation Broadband market for both fixed and mobile sectors.

Extend 2.5GHz Spectrum Rights of existing 3.5G operators with LTE plans/investment

9. In light of the above, it is important that IDA seriously consider extending the 2.5GHz Spectrum Rights of existing 3.5 operators with LTE plans/investment to provide business certainty and support to kick-start an early LTE deployment and adoption in Singapore before Y2012. The deployment of LTE in 2.5GHz spectrum band is highly likely as 2.5GHz terminal and network equipment is available commercially and LTE networks using these bands are already commercially launched in European cities such as Oslo and Stockholm. Furthermore, LTE technology using 2.5GHz can be used to complement the current mobile broadband network instead of replacing the existing networks. As such, the existing 2.5GHz spectrum bands that are suitable for LTE deployment should be preserved for the primary purpose of deploying LTE before Y2012, and there is a clear need of the current spectrum for the continued and uninterrupted provision of the LTE services to customers beyond Y2015.
10. M1 had envisaged the potential of 2.5GHz spectrum for 4G mobile communications as early as Y2004. Our acquisition of specific 2.5GHz spectrum lots in Y2005 was targeted and aimed to provide maximum flexibility for WBA deployment and/or LTE (ie. 4G mobile communications). In anticipation of the rapid changes in telecommunications ecosystem as a result of the convergence of communications and entertainment services, as well as increasing interdependence of devices, networks, application services and content, we had incorporated 4G mobile communications in our strategic planning and transformation. This is crucial as long term planning in the mobile industry is important due to the significant capital investments required and the complexities involved in network implementation and

³ Earthtimes.org, Operators Rushing to Upgrade their 3G Networks while LTE waits in the Wings, According to ABI Research, 23 Nov 2009.

deployment. We aim to preserve M1's position as the market leader in the deployment of ultra high speed mobile communications in Singapore and to secure the necessary spectrum for M1 to have a head-start in the deployment of LTE/4G mobile communications. Depending on the outcome of IDA's decision, as well as market trends and industry adoption, M1 may consider full-scale deployment of such technologies before Y2015 to meet the next generation demands for mobile broadband services. Currently, efforts are ongoing and focused on 4G deployment in the 2.5GHz spectrum bandwidth attained in Y2005.

11. We believe the best long term spectrum approach by IDA is to encourage existing 3.5G operators who had exercised foresight and shown commitment in 4G mobile communications to use its 2.5GHz spectrum acquired since Y2005 to kick-start an early LTE deployment and adoption. This enables IDA to manage the transition to the next generation of spectrum licences in a way which minimizes uncertainty and disruption to investment and which anticipates the future needs of users.
12. Operators need certainty regarding the continuation of their spectrum licences if they are to continue investing. Mobile networks require substantial investments and most of the RF components used in the networks are also cut to a specific spectrum band in order not to introduce spurious transmission that may interfere with the adjacent bands. It is obviously more cost-effective to re-use/enhance infrastructure already in place. Any change in the allocation of spectrum bands would have significant cascading effect and cost implications in having to change out all the frequency dependent components such as combiners, base stations etc. It could also even entail a complete network swap and change of user terminals to the right frequency format. Such disruption is unnecessary and could also lead to distortion of competition which is not in the interest of consumers.
13. Extension of the operators' existing spectrum rights also provides an opportunity to upgrade/modernise the network. In light of the rapid developments in LTE, it is expected that existing 3.5G operators would incur considerable investment in network infrastructure by end Y2015. Decision on such investment will hinge on whether an extension of the 2.5GHz Spectrum Rights would be granted on reasonable terms.
14. In summary, we respectfully submit that an extension of existing 2.5GHz Spectrum Right of 3.5G operators with LTE plan/investment or the conferment of residual rights by way of a preference is necessary and best serve national and consumer interest as it would:
 - instil confidence for 3.5G operators to embark on full scale launch of LTE services;
 - provide a stable investment environment;
 - ascertain an early and smooth transition to 4G mobile communications;
 - ensure continuity of services for customers, minimising any unnecessary service disruption or inconveniences beyond 2015; and
 - enable Singapore to capitalize on its advantaged position of early head-start in spectrum planning and allocation.

Criticality of ensuring equal opportunity for existing 3.5G operators to extend and expand their respective 2.5GHz Spectrum Rights

15. M1 would like to highlight that Option B of the proposed channelling plan for 2.5GHz spectrum band after Y2015 is fundamentally flawed. Please refer to Annex 1 of this paper which illustrates the spectrum rights granted in Y2005 mapped on the proposed Option B.
16. First and foremost, amongst all the existing 2.5GHz Spectrum Rights holders, only one 3.5G operator's current spectrum assignment would not be reallocated. While there will be service disruption for the rest of the 3.5G operators due to the reallocation, that single 3.5G operator is not affected and will have an unfair advantage over the other 3.5G operators, in terms of a head start in 4G deployment.
17. In addition, we note that the only paired spectrum block of 20 MHz is also allocated right next to that 3.5G operator's current assignment which would not be reallocated. An extension of current holder's rights will allow this specific 3.5G operator to be the only operator with the ability to expand its bandwidth with ease to provide a true 4G user experience, given that contiguous lots of spectrum will be required to maximize the potential and opportunities of the 4G bandwidth. The proposed channelling plan in Option B makes it plainly clear to the rest of the 3.5G operators that full-scale 4G deployment in 2.5GHz spectrum for them would be limited, and only one specific 3.5G operator is best positioned to benefit from such an arrangement.
18. M1, therefore, strongly opposes the channelling plan in Option B as it is obviously unfair to the rest of the 3.5G operators who have invested similar amount or more in their respective existing 2.5 GHz bandwidth. Any regulatory decision must not unduly favour one specific 3.5G operator or confer an advantage on any particular operator. M1 urges IDA to ensure equal opportunity for existing 3.5G operators to extend their respective 2.5GHz Spectrum Rights. In fact, contiguous blocks of spectrum would maximize the potential and opportunities of 4G mobile communications and deliver the best user experience. IDA should structure the spectrum allocation plan in a way that enables each 3.5G operator with LTE plans/investments to have fair and equal opportunity in expanding their 2.5GHz bandwidth from their respective 2.5G spectrum lots acquired in Y2005.
19. We would also like to highlight that there should be sufficient guard band between the FDD and TDD spectrum so that the TDD signals would not interfere with the FDD bands. A 5MHz guard band at the frequency boundaries should suffice in safeguarding interference of adjacent bands. Alternatively, the guard band requirements at frequency boundaries could be left to the respective licensees to coordinate and arrange amongst themselves.

Premature to impose service provisioning and coverage obligations

20. M1's position is that wireless broadband technologies should be allowed to flourish according to the precepts of market forces or development. This is especially the case for LTE which is still in the early stages of evolution. Any undue or premature regulatory requirements may curb/limit investment decisions/plans and restrain 4G deployment. The industry will continually invest in order to build the 4G platforms of the future. It is best left to commercial decisions as to how the 4G operator intends to build out its network coverage and sets its service provisioning or quality of service standards. The factors of intense competition, particularly in the existing mobile broadband sector, would create the necessary impetus for timely roll-out, appropriate coverage and service levels. As such, M1 submits that

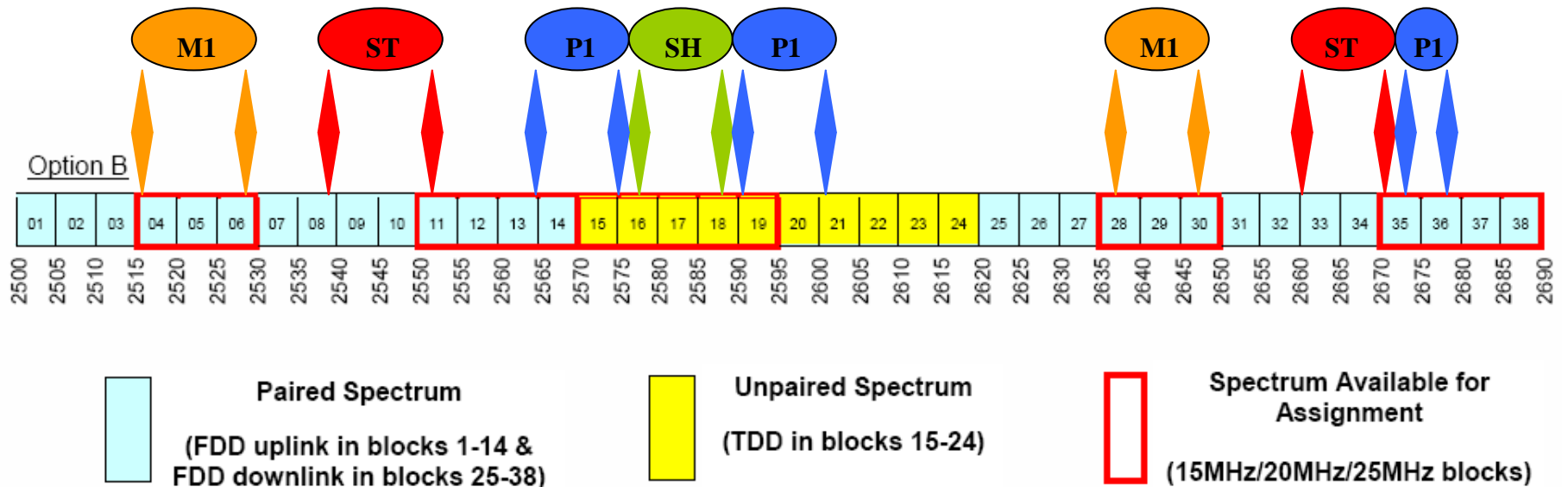
IDA need not mandate any service provisioning and coverage requirements for the 2.5GHz spectrum after Y2015.

Conclusion

21. In summary, M1 recommends that IDA:

- extends 2.5GHz Spectrum Rights of existing 3.5G operators with LTE plans/investment;
- ensures equal opportunity for existing 3.5G operators to extend or expand their respective 2.5GHz Spectrum Rights in its spectrum channelling plan; and
- does not mandate any service provisioning and coverage requirements for the 2.5GHz spectrum after Y2015.

Annex 1: Spectrum Rights granted in Y2005 mapped on IDA's proposed Option B



Spectrum granted in 2005:

M1: (2516-2528), (2636-2648) MHz

ST (SingTel Mobile): (2540-2552), (2660-2672) MHz

P1 (Packet One): (2564-2576), (2588-2600), (2672-2678) MHz

SH (StarHub): (2576-2588) MHz