M1'S RESPONSE TO IDA'S PUBLIC CONSULTATION ON PROPOSED ALLOCATION OF SPECTRUM FOR INTERNATIONAL MOBILE TELECOMMUNICATIONS ("IMT") AND IMT-ADVANCED SERVICES AND OPTIONS TO ENHANCE MOBILE COMPETITION

Introduction

1. M1 is a leading integrated provider of info-communication services in Singapore. Since commercial launch in 1997, M1 has made significant inroads into the info-communications market and achieved an outstanding track record in innovation, service and technical excellence:-

   - Feb 2005 - first operator in Singapore to launch 3G services;
   - Dec 2006 - launched Singapore's first island-wide wireless broadband service;
   - Sep 2009 - launched MiFi, the industry's first ultra portable credit card-sized Intelligent Mobile Hotspot, revolutionizing the way mobile broadband is used;
   - Oct 2009 - first operator in Asia Pacific to adopt MIMO (Multiple-Input Multiple-Output) technology for its HSPA+ network and achieved Singapore's fastest download speeds of 28 Mbps;
   - Jun 2011 - launched South East Asia's first 4G network or Next Generation Mobile Network ("NGMN").

2. M1 welcome the opportunity to submit our views and comments to IDA for its consideration on the proposed allocation of spectrum for international mobile telecommunications and IMT-advanced services and options to enhance mobile competition.

Options to Enhance Competition

3. Since market liberalisation in Y2000, Singapore has established itself as a regional leader and global player in telecommunications through a progressive regulatory regime which promoted a vibrant mobile ecosystem. Its 5.4 million population is effectively served by 3 mobile operators with extensive and technologically advanced networks. There is product innovation, competitive pricing and tariff diversity. The current mobile penetration rate of close to 160% is clear evidence of Singapore's success as one of the competitive and mature mobile markets globally which has flourished under the operation of market forces.

4. The Singapore mobile market offers opportunities for any interested and committed new entrants. There is no regulatory barrier to entry for new mobile players in the market. A fourth 3G licence was made available for more than 12 years but there was no taker. Spectrum was also set aside for new entrants during the 4G spectrum allocation exercise in Y2013 but was not taken up.

5. Conversely, we have seen Mobile Virtual Network Operators ("MVNO") successfully entered the Singapore market without the need for any regulatory intervention and availability of competitive wholesale pricing from the Mobile Network Operators ("MNOs"). To date, there are 13 licensed MVNOs in Singapore. As early as Y2005, M1 had entered into commercial arrangements with a successful MVNO in Singapore and we have two MVNOs currently hosted on our network.

6. A light-touch free-market approach is crucial for competitive markets like Singapore as it provides an attractive and stable investment climate that does not undermine profitability and innovation. The mobile operators in Singapore are publicly listed companies accountable to shareholders and are expected to deliver a reasonable return from the substantial spectrum costs and network investments, as well as ensure cost-effective and efficient use of network capacity.

7. In the absence of any market failure, M1 is of the view that MVNO arrangements should be driven by market forces and are best established through commercial negotiations. This is supported by global practices in many competitive mobile markets, such as UK, US and Australia, which do not regulate MNO-MVNO arrangements. Such business partnerships are left entirely to commercial negotiations. We note that the successful MVNO models cited by IDA in the consultation paper, such as Tesco Mobile and LycaMobile are examples of voluntary MNO-MVNO relationships arising from commercial negotiations, not regulatory intervention.

Voluntary MNO-MVNO relationship motivates innovation

8. M1 believes that the most sustainable and effective MNO-MVNO relationship is formed through voluntary and commercial negotiations. Despite the typical notion that MVNOs pose a competitive threat to the MNOs, they could in fact be strategic partners for the MNOs. There are market segments untapped by the MNOs that can be addressed by the MVNOs, while there is also incentive from the MNOs, with the opportunity to increase their share of mobile wholesale revenues through leasing of excess network capacity to maximise utilisation of network resources. Such win-win relationship can arise when both parties are able to work together in achieving a combined higher retail and wholesale profits.

9. The experience of mature markets shows that when MNO-MVNO relationship is left to market forces, it is more likely that the MVNO would strive to innovate and deliver differentiated, focused value propositions to their customers. Intuitively, a voluntary partnership will only be reached when the MVNO is able to add value to the collaboration and the MNO also recognises that it is able to leverage the potential of the MVNO to complement and strengthen its business through the alliance.

10. In summary, while the IDA may put in place a general framework to support and guide MNO-MVNO negotiations, the approach should be to encourage industry co-operation through commercial negotiations. This will ensure a healthy and sustainable MVNO market in Singapore.

Proposed Allocation of EGSM and 900 MHz Band

11. M1 support the proposal to continue allowing the EGSM/900 MHz band to be used for the provision of PCMTS. Currently, these bands are used by the three existing mobile operators for the provision of nationwide PCMTS based on 2G and 3G technologies.

Considerations of the IDA's proposed options

12. M1's views on the proposed options for the re-allocation of 900 MHz band are set out as follows:

Description	Considerations	
	Pros	**Cons**
Option 1: Standalone allocation of 900 MHz band	• Provides certainty for investment planning and service continuity • Practical consideration of spectrum currently "in use" for mobile services and key to continual enhancement of 3G QoS for existing customers • Avoids complications when coupled with other bands which are dependent on neighbour countries	• Limited spectrum available • Pragmatically, there should be overall spectrum caps imposed to ensure equitable allocation of scarce spectrum resources
Option 2: Coupled bands with short-term extension of current rights	• Coupling allocation with low frequency bands (such as 700 MHz and/or 800 MHz) enables additional coverage with lower CAPEX due to better propagation at low frequency bands	• Short-term extension of current rights on 900 MHz: ➢ Does not encourage long-term infrastructure investment ➢ Expected returns on spectrum and infrastructure costs within short timeframe may potentially impact end-users pricing • No technical benefits in coupling with TDD bands ➢ Fewer TDD deployments globally ➢ Higher CAPEX required to invest in the new technology
Option 3: Coupled bands in early allocation exercise for long term spectrum rights	• Certainty on long-term spectrum portfolios facilitates planning and investment in CAPEX	• Network rollout and frequency planning will be complicated with staggered availability of spectrum.

Heterogeneous Networks ("Het-Net")

13. M1 is excited and interested in the developments of Het-Net which enables increased capacity, performance and improves end user experience. M1 participates actively in the Industry Dialogues and discussions facilitated by IDA to formulate the strategy and framework for Het-Net deployment in Singapore. Considering that the Het-Net concept, technology and standards are still at the nascent stage of development, we recommend a phased approach with initial focus on establishing the fundamentals for a strong foundational base whereby subsequent phases can build upon for the Het-Net ecosystem.

14. As deployment of Het-Net would involve installations of a substantial number of small cells, it is expected that huge scale of site acquisition would be required. Presently, the mobile operators are already facing issues with acquiring mobile deployment space, including, but not limited to unreasonably high access fee, restricted or denied access and insufficient allocation of the deployment space. Such problems are likely to be aggravated with the rollout of Het-Net.

15. In order to build a strong foundation for Het-Net, M1 advocates that IDA exercise its regulatory power to facilitate the acquisition of sites for Het-Net deployment. For instance, IDA could consider incorporating requirements in the COPIF to provide free and unrestricted access to the deploying parties. Given the nature of the Het-Net technologies, the ideal locations for small-cell installations could include lamp-posts, bus interchanges, sides of buildings and indoor areas. It will also be more efficient and effective if a centralized governing body can be set up within IDA to coordinate with the relevant authorities, such as LTA, URA etc. to facilitate and expedite site acquisitions. Government support in public education is also important for efficient use of resources and to manage perception on radiation concerns as base stations will be deployed closer to users in a variety of coverage options – from metro cells and micro cells to pico cells and femto cells. Otherwise, subsequent demands on removal of sites due to public complaints will be highly costly and disruptive.

16. Technically, M1 notes that there are still significant challenges in terms of multilayer networks management. The current approaches and infrastructure, which rely primarily on manual intervention, would hardly be able to support the dense and high traffic loads under an advanced Het-Net environment. While there are some preliminary solutions being proposed, such as the "Self Organizing Networks" (SON) tool, we suggest that IDA continues to monitor the evolution of the relevant technologies.

17. Given the widespread and sporadic nature of small cells, it is challenging to establish the backhaul facilities in a cost-effective manner. In addition, considering the low reach-out range of small cells, precise traffic mapping will be required. To support deployment of Het-Net, IDA can consider setting aside funding to incentivise the development of cost-effective back-haul facilities, together with dedicated resources to assist parties in cost effective deployments.

Technical Considerations on the Re-farm of 700/800 MHz

18. Our comments are as follows:

Spectrum	3GPP	Considerations	Remarks
800 MHz	Band 5	• Overlap with EGSM and part of the GSM • *Problematic co-siting:* the downlink of the band 5/26 is sitting adjacent to the uplink channel in the GSM band, leading to interference • The strong transmission of base station would lead to saturation in the highly sensitive GSM receiver • Huge guard band will be required to overcome interference between Band 5/26 and GSM	Not Recommended
	Band 26		
	Band 27	• Very limited bandwidth available for mobile services (i.e. 2 x 17 MHz)	Not Recommended
	Band 20	• Minimal interference as it is the uplink of the band sitting adjacent to the uplink of EGSM • No additional guard band is required between Band 20 and EGSM • 2x20 MHz available (less the overlapping portion with APT 700 Band), i.e. 801 to 821 MHz • Wide acceptance of band in other networks	**Recommended**
700 MHz	**Band 28**	• 2x40 MHz available (less the overlapping portion with Band 20), i.e. 758-798 MHz • Minimal interference as it is the downlink of the band sitting adjacent to the downlink of Band 20 • No additional guard band is required between Band 28 and Band 20 • Wide acceptance of band in other networks	**Recommended**

Note: The APT 700 should start from 758 MHz to 803 MHz (45 MHz bandwidth) instead of 768 MHz to 803 MHz as stated in the diagram, Page 6 of IDA's paper. The centre gap is only 10 MHz instead of 20 MHz.