M1'S RESPONSE TO IMDA'S CONSULTATION ON PROPOSED POLICY FRAMEWORKS FOR THE ALLOCATION OF 800 MHZ, TDD1900 MHZ AND FDD2100 MHZ SPECTRUM BANDS

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PART I: INTRODUCTION

1. M1 is Singapore's most vibrant and dynamic communications company, providing mobile and fixed services to over 2 million customers. With a continual focus on network quality, customer service, value and innovation, M1 links anyone and anything; anytime, anywhere.

2. M1 supports IMDA's overall policy objective of maximising spectral allocation and efficiency, in order to facilitate the innovation of new services while ensuring that current public and enterprise mobile needs are met. This has been implemented through timely reviews of scarce spectrum resources, and the re-allocation and re-farming of spectrum frequencies where necessary or appropriate.

3. M1 welcomes the opportunity to submit our comments to IMDA's consultation on the proposed policy frameworks for the allocation of 800 MHz, Time Division Duplex ("TDD") 1900 MHz and Frequency Division Duplex ("FDD") 2100 MHz spectrum bands. The telecommunication market is facing many challenges. The market continues to evolve, brought about by rapid changes in technology and business operating models, while at the same time facing intensified competition. We believe it is crucial that IMDA's policies and spectrum allocation framework takes into consideration the current market conditions and future needs and help to develop and sustain a thriving telecommunication market. Our specific comments to IMDA's questions are set out in the respective sections below:

a. Part II: 800 MHz Spectrum Band;

b. Part III: TDD1900 MHz Spectrum Band,

c. Part IV: FDD2100 MHz Spectrum Band; and

d. Part V: Proposed Spectrum Assignment Framework

PART II: 800 MHZ SPECTRUM BAND

Question 1: *IMDA seeks views on the proposed allocation approach for the 800 MHz spectrum band, in particular:*
(a) Whether the proposed lot sizes allow for meaningful use of the spectrum or if there are other alternative combinations of spectrum lot sizes that should be considered for efficiency reasons;
(b) Whether the proposed spectrum right duration is adequate from a business viability and investment perspective; and
(c) The reasons for your views on the above

4. M1 notes that the 800 MHz band currently serves several types of services including digital trunk radio ("TR") for businesses and enterprise users, Short-Range Devices ("SRDs") and International Mobile Telecommunications ("IMT") services in the Extended Global System for Mobile Communications ("EGSM") band. Following its earlier industry engagements and public consultations in 2014 and 2015, IMDA has now proposed to allocate 2 x 3 MHz for narrowband digital TR, 1 MHz for SRD use, 2 x 10 MHz for public protection and disaster relief ("PPDR") services, and to reassign the remaining 2 x 13 MHz spectrum via auction, based on 3GPP bands 26 and 27, in the following manner:

a. 2 lots of 2 x 5 MHz spectrum, with 1 lot allocated to existing holder GRID Communications on a First Rights of Refusal ("FROR") basis; and

b. 1 lot of 2 x 3 MHz spectrum.

5. M1 agrees with IMDA's observations that the device ecosystem (i.e. phones and NB-IoT) supporting the adoption of 3GPP bands 26 and band 27 for mobile services is not well-developed. Given the limited use of both bands globally, and with band 26 mainly used only for enterprise-specialised mobile radio applications such as push-to-talk, it will not be ideal to allocate the 800 MHz band for public mobile LTE networks. Additionally, the limited available bandwidth of 3-5 MHz will not be meaningful for the provision of 5G services, such as the eMBB and URLLC applications. Both bands 26 and 27 have not yet been specified as New Radio ("NR") operating bands in 3GPP Release 15. In view of the these factors, we concur with IMDA's assessment that the 800 MHz spectrum band is best suited for LTE-based enterprise services, which would better serve the specialised and niche requirements of enterprise users.

6. M1 notes that IMDA is considering the allocation of a 2 x 5 MHz lot on a FROR basis to existing spectrum holder, GRID Communications, to avoid possible disruption to end users currently operating within the band. To this end, we would propose to assign Lot A on a FROR basis. This approach will lead to contiguous spectrum blocks of Lot B and Lot C, and facilitate a more equitable assignment of spectrum between the operators.

PART III: TDD1900 MHZ SPECTRUM BAND

Question 2: *IMDA seeks views on the proposed allocation approach for the TDD1900 MHz spectrum band, in particular:*
(a) Whether there is a need for additional filters if the guard band between FDD and TDD systems is 5 MHz, and the specifications of the required band-pass filter;
(b) Whether there are known technical frameworks for the co-existence of LTE-based networks operating in 3GPP band 1 and band 33/39;
(c) Whether the proposed lot sizes allow for meaningful use of the spectrum;
(d) Whether the proposed spectrum right duration is adequate from a business viability and investment perspective; and
(e) The reasons for your views on the above.

7. IMDA has identified 10 MHz of spectrum in the TDD1900 MHz band (1905-1915 MHz) to be assigned for LTE-based voice and data communication services, based on 3GPP bands 33 or 39, for enterprises. IMDA also intends to set aside a guard band of 5 MHz to prevent interference between the TDD1900 MHz and FDD2100 MHz spectrum, as well as between the TDD1900 MHz and DECT spectrum.

8. M1 is concerned that a guard band of 5 MHz will be insufficient to prevent TDD interference to FDD 4G services. It is crucial to install customised filters at the TDD1900 MHz transmitter and FDD2100 receiver, in order to protect the FDD2100 MHz uplink from interference. If TDD services are deployed in the 1900 MHz band, the mitigation measures need to be implemented at the outset, so as to prevent disruption to existing FDD services.

9. On the co-existence of LTE-based networks operating in 3GPP band 1 and band 33/39, M1's understanding is that the 3GPP RAN4 - Radio Performance and Protocol Aspects would be relevant in addressing the co-existence requirements (e.g. customized filters).

PART IV: FDD2100 MHZ SPECTRUM BAND

Question 3: *IMDA seeks views on the proposed allocation approach for the FDD2100 MHz spectrum band, in particular:*
(a) Whether the proposed FROR allocation allows existing 3G mobile network operators to serve the needs of their customers or if there are other alternative combinations of FROR allocations that should be considered;
(b) Whether the proposed spectrum right duration is adequate from a business viability and investment perspective; and
(c) The reasons for your views on the above

10. Today, spectrum in the FDD2100 MHz band has been assigned to three mobile operators, M1, Singtel Mobile and Starhub Mobile, in equal proportion of 2 x 20 MHz each. The current spectrum licence will expire in 2021. As such, to reallocate the entire 120 MHz to cater for future demands and uses, IMDA has proposed to assign spectrum in the following approach, for a spectrum right duration of 15 years:

a. 2 lots of 2 x 5 MHz on a FROR basis to be allocated to the 3 existing spectrum holders at a specified reserve price; and

b. 6 lots of 2 x 5 MHz to be allocated via auction on a technology neutral basis, i.e. for the provision of either 3G or 4G services.

11. M1 agrees with IMDA's approach to allocate the 3 existing spectrum holders with some FDD2100 MHz spectrum on a FROR basis, as well as the proposed spectrum right of 15 years. This would provide certainty to the continued provision of 3G services operating within the FDD2100 MHz band. However, we have grave concerns if only 2 lots of the spectrum are set aside on a FROR basis.

12. First, there are still significant outdoor 3G usage, particularly in major event locations such as Orchard Road, Marina Bay, Sentosa, Chinatown etc, by local mobile users and inbound roamers. While the number of 3G users has declined, we note that GSMA has projected that 3G technology will still continue to be used globally until at least 2025. This is also in line with IMDA's own assessment that 3G networks would be still be needed in Singapore until at least 2025, if not later. M1 is of the view sufficient spectrum must be set aside to cater for the capacity during major events, and to maintain satisfactory coverage experience in areas which have high 3G traffic (e.g. transport nodes, town centres, dormitories).

13. Second, we wish to point out that the existing in-building combiners of all 3 mobile operators have been pre-configured to use 2 x 15 MHz of FDD2100 spectrum to provide indoor coverage. Any change in the spectrum allocation will result in significant and costly modifications to the existing in-building combiners, co-ordination of indoor and outdoor site frequencies, and pose a high risk of disruption to current 3G services.

14. Therefore, M1 believes that 3 lots of the FDD2100 MHz should be set aside on a FROR basis for the continued provision of 3G services.

PART IV: PROPOSED SPECTRUM ASSIGNMENT FRAMEWORK

Question 4: *IMDA welcomes views and comments on the proposed allocation of the spectrum bands in the next allocation exercise, including on the proposed uses and spectrum rights durations of the spectrum bands, the proposed "Clock Plus" auction format, the proposed reserve prices as well as the proposed spectrum caps and regulatory obligations to ensure the optimal use of spectrum.*

Reserve Prices and Spectrum Right Duration

15. In its consultation paper, IMDA has proposed indicative reserve prices of each spectrum lot, taking into consideration the intrinsic value of the spectrum bands and where relevant, the international benchmarks of reserve and final bid prices for similar bands.

Spectrum Auction	Relevant Reserve Prices
800 MHz and TDD1900 MHz Spectrum Auction for a spectrum right duration of 7 – 10 years	S$450,000 – S$900,000 for a 2 x 5 MHz lot in the 800 MHz band; S$100,000 – S$250,000 for a 2 x 3 MHz lot in the 800 MHz band; and S$450,000 – S$900,000 for an unpaired 10 MHz lot in the TDD1900 MHz band
FDD2100 MHz Spectrum Auction for a spectrum right duration of 10 – 15 years	S$10 million – 15 million for each 2 x 5 MHz lot in the FDD2100 MHz band

16. M1 is of the view that IMDA could set a lower reserve price for the TDD1900 MHz. This is because the spectrum has been largely unused due to poor device support and ecosystem development. Additionally, there is unlikely to have any further development for 3G/4G in the TDD1900 MHz band.

17. For FDD2100 MHz band, M1 is concerned with the proposed high reserve price for each 2 x 5 MHz lot. M1 notes that during the recent auction by IMDA in 2016, the reserve price of FDD900 MHz was already set at S$20 million. As the FDD900 MHz band has far better propagation characteristics than the FDD2100 MHz band, the reserve price for FDD2100 MHz should be considerably lower. Additionally, in a recent June 2019 spectrum auction conducted in Norway, the reserve price for 2.1 GHz band was set at only NOK 25,000,000 (~ S$4 million)[1]. M1 is of the view that the reserve price for FDD2100 MHz should be set in the region of S$5 million.

18. IMDA has also proposed a spectrum right duration of 10 – 15 years for the FDD2100 MHz band. M1 is of the view that a spectrum right duration of 15 years for this band would be more appropriate.

[1] Norwegian Communications Authority - Auction # 28 (700 MHz and 2.1 GHz bands).