Singtel

SINGAPORE TELECOMMUNICATIONS LTD

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

1. CONTENTS

1.1. This submission is structured as follows:

2. SUMMARY OF MAJOR POINTS

2.1. Singtel notes the IMDA's proposed allocation approach for the 800 MHz spectrum band and has no comments in this regard.

2.2. Singtel notes the IMDA's proposed allocation approach for the TDD1900 MHz spectrum band and has no comments save for the following:

- Singtel agrees that a minimum guard band of 5 MHz is required to prevent interference however, additional mitigations may be necessary in the event of strong out of band emissions generated from the TDD1900 MHz system into the FDD2100 MHz system. Singtel also agrees with the IMDA's assessment that a new TDD1900 MHz network operator may need to deploy band-pass filters in the event the 5 MHz guard band is insufficient to prevent interference between the TDD and FDD systems;

- Network and user equipment suppliers should provide evidence during the equipment type approval process that unwanted emissions (ie, out-of-band and spurious emissions) are maintained within the levels defined in 3GPP technical specifications 36.101 and 36.104 to ensure the equipment will not interfere with any adjacent FDD2100 MHz system; and

- Singtel is not aware of any technical frameworks for the co-existence of LTE-based networks operating in 3GPP band 1 and band 33/39.

Singtel

2.3. Singtel envisages that at least 15 MHz of FDD2100 MHz is required to adequately support 3G and 4G mobile services at a high level of service quality at all times and particularly during special events, and requests that IMDA allocate 3 lots of 2 x 5 MHz of FDD2100 MHz on a First-Right- of-Refusal (**FROR**) basis to each of the existing 3G mobile network operators, M1, Singtel and StarHub Mobile (collectively **MNOs**).

2.4. Given that the IMDA also recognises that the FDD2100 MHz band has been included as New Radio (**NR**) operating band, "n1", under 3GPP Release 15 specification for 5G NR, Singtel requests for the flexibility to use any part of the FDD2100 MHz spectrum allocated under this spectrum allocation exercise to provide 5G services should the ecosystem gather pace during the spectrum right duration.

2.5. With continued use of FDD2100 MHz for 3G and 4G services, and the flexibility to use FDD2100 MHz for 5G services, Singtel recommends a spectrum right duration of at least 20 – 25 years to provide certainty in terms of business viability and investment.

2.6. Singtel notes the IMDA's proposed "Clock Plus" auction format for the assignment of the 800 MHz and TDD1900 MHz spectrum bands and the assignment of the FDD2100 MHz band for mobile services, and has no comment in this regard.

2.7. In determining the base price for the FDD2100 MHz spectrum lots, Singtel recommends that IMDA take the base and final bid price references from international benchmarks of price per MHz per population for similar bands auctioned globally between 2017 and such time as the spectrum assignment framework is finalised. Singtel proposes that the base price be pegged lower than the 25th percentile of the international benchmarks in view of the continuous investments that MNOs will be making into the 3G, 4G and 5G networks to provide a superior service to customers.

2.8. Singtel supports IMDA's proposal requiring new FDD2100 MHz spectrum holder(s) to utilize the FDD2100 MHz on a standalone basis to provide at least 50% nationwide outdoor coverage of 4G and/or IMT-Advanced services within 12-18 months from the commencement of the spectrum right. This is to ensure efficient use of the spectrum.

3. STATEMENT OF INTEREST

3.1. Singtel and its subsidiaries are licensed to provide info-communications services in Singapore. Singtel is committed to the provision of state-of-the-art info-communications technologies and services in Singapore.

3.2. Singtel has a comprehensive portfolio of services that includes voice and data services over fixed, wireless and Internet platforms. Singtel services both corporate and

residential customers and is committed to bringing the best of global info-communications to its customers in Asia Pacific and beyond.

3.3. Singtel welcomes the opportunity to make this submission on the Consultation Paper.

3.4. Singtel would be pleased to clarify any of the views and comments made in this submission, as appropriate.

4. COMMENTS

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.

4.1. Singtel notes the IMDA's proposed allocation approach for the 800 MHz spectrum band and has no comments in this regard.

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.

4.2. Singtel notes the IMDA's proposed allocation approach for the TDD1900 MHz spectrum band and has no comments save for the following:

- IMDA has proposed a guard band of 5 MHz at both ends between the TDD1900 MHz and FDD2100 MHz bands. Singtel agrees that a minimum guard band of 5

MHz is required to prevent interference however, additional mitigations may be necessary in the event of strong out of band emissions generated from the TDD1900 MHz system into the FDD2100 MHz system (e.g. if the antennas of both systems are pointing directly at each other and are separated by a distance of 30 metres or less). Singtel also agrees with IMDA's assessment that a new TDD1900 MHz network operator may need to deploy band-pass filters in the event the 5 MHz guard band is insufficient to prevent interference between the TDD and FDD systems;

- Singtel recommends that network and user equipment suppliers provide evidence during the equipment type approval process that unwanted emissions (ie, out-of-band and spurious emissions) are maintained within the levels defined in 3GPP technical specifications 36.101 and 36.104 to ensure the equipment will not interfere with any adjacent FDD2100 MHz system; and

- Singtel is not aware of any technical frameworks for the co-existence of LTE-based networks operating in 3GPP band 1 and band 33/39. To the best of our knowledge, there is limited deployment of band 39 in China and no known network using band 33.

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; and* *(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.*

4.3. The IMDA has proposed to allocate 2 lots of 2 x 5 MHz on an FROR basis to each existing MNO at a specified reserve price. Singtel requests that IMDA allocate 3 lots of 2 x 5 MHz on an FROR basis to each MNO for the following reasons:

a. The MNOs have deployed the existing fixed FDD2100 MHz frequency bands allocated to them in the more than 1,000 customised combiners installed in Common Antenna Systems (**CAS**) deployed in large shopping malls, and train and road tunnels including Singapore Sports Hub, Changi Airport, Marina Bay Sands and Resorts World Sentosa. With only 2 lots of 2 x 5 MHz each, the MNOs will need to retrofit and change-out all the customised combiners which, aside from the significant and unnecessary costs incurred, will take a substantial period of a 1 year

or more to implement[1] during which time, 3G mobile services at locations that have not been retrofitted and changed-out will be affected.

b. Singtel refers IMDA to our response to the closed consultation on the provision of 3G services and use of FDD2100 MHz and TDD1900 MHz spectrum bands for the provision of such services on 16 November 2018 – Singtel had indicated that at least 15 MHz of FDD2100 MHz is required for the continued provision of 3G services in order to maintain the existing quality of service standards and user experience. This is especially essential in locations with high 3G traffic such as around Marina Bay, Padang and Singapore Sports Hub during the National Day Parade and other special events as well as at foreign worker dormitories in order to maintain the existing quality of service standards and user experience.

c. The amount of FDD2100 MHz spectrum required to support 3G and 4G services will be driven by factors such as M2M 3G devices migration, VoLTE take-up rate, prepaid VoLTE availability, proliferation of VoLTE handset and adoption of VoLTE roaming services by overseas operators which are expected to increase rapidly in the short to medium term thereby necessitating more spectrum in the FDD2100 MHz band.

4.4. For the reasons stated above, Singtel submits that at least 15 MHz (ie, 3 lots of 2 x 5 MHz) is required to adequately support 3G and 4G mobile services at the high level of service quality at all times and particularly during special events as required by the IMDA.

4.5. Given that IMDA also recognises that the FDD2100 MHz band has been included as New Radio (**NR**) operating band, "n1", under 3GPP Release 15 specification for 5G NR, Singtel requests for the flexibility to use any part of the FDD2100 MHz spectrum allocated under this spectrum allocation exercise to provide 5G services should the ecosystem gather pace during the spectrum right duration.

4.6. With continued use of FDD2100 MHz for 3G and 4G services, and the flexibility to use FDD2100 MHz for 5G services, Singtel recommends a spectrum right duration of at least 20 – 25 years to provide certainty in terms of business viability and investment.

[1] Maintenance work can only be carried out during off-peak hours when these buildings are closed to the public. At a rate of 20 combiners per week, the affected MNOs will require approximately 50 weeks to retrofit and change out all the combiners. Taking into consideration network freezes and other circumstances which may not allow for maintenance work to be carried out, the entire duration will be more than 50 weeks.)

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 right 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.*

4.7. Singtel notes the IMDA's proposed "Clock Plus" auction format for the assignment of the 800 MHz and TDD1900 MHz spectrum bands and the assignment of the FDD2100 MHz band for mobile services, and has no comment in this regard.

4.8. In determining the base price for the FDD2100 MHz spectrum lots, Singtel recommends that IMDA take the base and final bid price references from international benchmarks of price per MHz per population for similar bands auctioned globally between 2017 and such time as the spectrum assignment framework is finalised. Singtel proposes that the base price be pegged lower than the 25th percentile of the international benchmarks in view of the continuous investments that MNOs will be making into the 3G, 4G and 5G networks to provide a superior service to customers.

4.9. Singtel supports IMDA's proposal requiring new FDD2100 MHz spectrum holder(s) to utilize the FDD2100 MHz on a standalone basis to provide at least 50% nationwide outdoor coverage of 4G and/or IMT-Advanced services within 12-18 months from the commencement of the spectrum right. This is to ensure efficient use of the spectrum.

5. CONCLUSION

5.1. The IMDA should continue to actively engage the industry post-consultation to ensure that existing 3G service providers can continue to support 3G services without compromising on service quality and standards. Singtel would be pleased to clarify any of the views and comments made in this submission, as appropriate.