TELECOM

Ref: TPG2019-0171

23rd August 2019

Ms. Aileen Chia
Deputy Chief Executive (Policy, Regulatory & Competition Development)
Director-General (Telecoms & Post)
Infocomm Media Development Authority
10 Pasir Panjang Road,
#03-01, Mapletree Business City,
Singapore 117438

Dear Ms. Chia,

Consultation on Proposed Policy Frameworks for the Allocation of 800 MHz, TDD 1900 MHz and FDD 2100 MHz Spectrum Bands

TPG Telecom Pte. Ltd. (**TPG**) thanks IMDA for the opportunity to comment on the abovementioned Consultation dated 17th May 2019 in relation to:

(i) Allocating dedicated spectrum in the 800 MHz and the 1900 MHz bands to serve enterprise users' needs in light of growing demand for enterprise data services;

(ii) Allocating the 2100 MHz spectrum originally used for public 3G mobile services to be used for both public 3G and 4G mobile services in light of the ubiquity of 4G services today; and

(iii) The assignment approaches for the above spectrum bands, including the mechanism for assigning the spectrum through an auction.

We respond by first restating IMDA's questions 1-4 in the above Consultation, and followed by our comments.

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.

TPG's Comments:

a) TPG welcomes IMDA's initiative to consider re-farming of 800MHz band and make it available for auction. TPG agrees with the proposed lot sizes (2 lots of 2x 5MHz and 1 lot of 2x 3MHz).

The existing spectrum holders are offering TR and MC-PTT services to enterprises using narrow band radio technology (iDEN/Tetra) in 800MHz. TPG recommends that the First Rights of Refusal (FROR) allotment should be limited to 2x 3MHz and two

lots of 2x 5MHz should be opened for auction. The FROR allotment period should be for five years and the FROR allocated frequency should be considered for re-farming in coming years to optimize utilization of critical low-band spectrum. TPG recommends that the FROR spectrum allocation (2x 3MHz) should be placed next to TR spectrum range to allow for the allocation of 2x 5MHz contiguous blocks for new services like IMT/5G.

Band 26 is used extensively by carriers such as Sprint USA and KDDI, and the device ecosystem has strong support for Band 26. For example, Smartfren Indonesia supports both Band 26 and Band 5 simultaneously through the use of MBFI. Band 27 deployments are not as common and device ecosystem support is considerably weaker.

In future, when the spectrum reserved for SDR is vacated, IMDA may consider shifting the allocated lots (2x 5MHz) to towards PDDR spectrum by 1 MHz to enable full utilization of band 26 by the MNOs given the significantly better device support.

b) TPG believes that the spectrum right duration should be 15-20 years as the spectrum blocks are narrow and RAN CAPEX efficiency will be lower correspondingly. It should also be technology neutral. The 20 years span will allow the MNOs to recover the investment cost and generate revenue, and leverage the propagation characteristics to deepen coverage for 5G.

c) As explained above.

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;

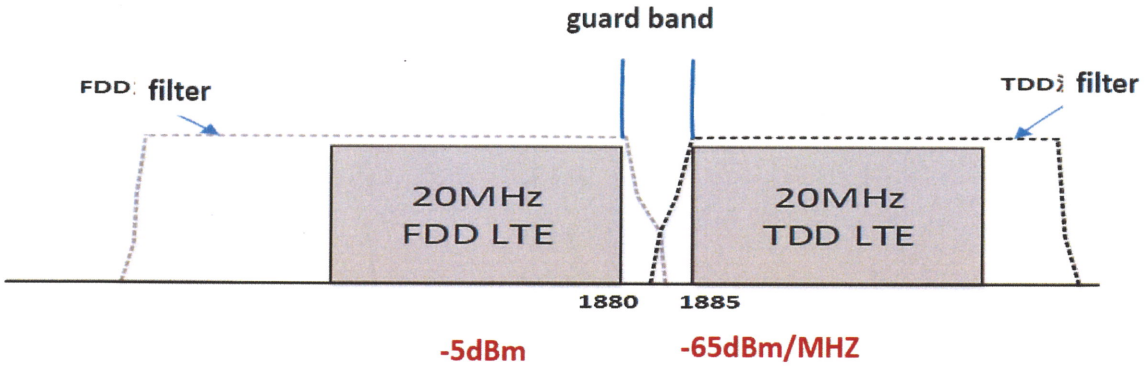
(c) Whether the proposed lot sizes allow for meaningful use of the spectrum;

(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.

TPG's Comments:

a) Based on prior studies of other markets where TDD1900 MHz has been deployed, TPG believes that 5MHz guard band may not be sufficient to mitigate Adjacent Channel Interference to the uplink of the existing band 1 network at the edge of 1920MHz. It will require customized steep filters to be installed by the operator of the TDD1900 MHz band and co-location with existing band-1 base stations/antennas will have interference impacts. In China, a guard band of 5MHz is deployed between the FDD1800MHz downlink and the TDD1900MHz 20MHz LTE carrier as shown below with filters installed to ensure -65dBm/MHz attenuation.



This leaves a 15MHz "gap" between TDD1900MHz and FDD2100MHz uplink (band 1).

TPG suggests IMDA should conduct a detailed interference study and field testing on the co-existence of 3GPP bands 33/39 with band 1 before putting the spectrum for auction.

b) Based on TPG's understanding, while some countries have allocated the band 33/39 spectrum, this spectrum remains mostly unused due to poor economics of deployment. TPG is not aware of any large-scale commercial band 33/39 TDD networks in co-existence with 3GPP band-1 mobile networks other than the China market. However, China has deployed customized filter solution for 3GPP band 1, band 3 and band 39 from very first day of the deployment of these bands and do not deploy DECT systems.

c) TPG suggests IMDA to consider provisioning of sufficient guard band to prevent interference from the proposed TDD1900MHz deployment to existing 3GPP band 1 mobile networks, ideally without the need to retrofit existing 3GPP band 1 networks with additional filters. With the continued use of DECT systems, no meaningful TDD1900 MHz allocation is feasible.

d) TPG do not have any comment on the duration of spectrum right at this stage given the issues raised above.

e) As explained above.

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.

TPG's Comments:

a) As per TPG's understanding, 2100MHz will be available for 5G services in the coming years. It is crucial to keep in view the long-term objectives and optimum resource allocation to support future needs. 3G technology will slowly vanish in next decade

due to the fact that the most of the mobile services are data oriented. The number of 3G subscribers in Singapore has dropped from its peak of 6.6M to the current level of 1.73M subscribers.

TPG believes that 900MHz band is good choice to support legacy 3G devices; the spectrum provides good indoor penetration, is supported across all existing CAS systems (including tunnels) and can provide continuous coverage for 3G voice. All 3G MNOs Singtel, M1 and Starhub are currently deploying 2x5MHz for UMTS900.

With evolution of 5G SA architecture in the next few years, 5G network will carry majority percentage of voice traffic besides data and the 4G network will overlay 5G network. More importantly, the FDD2100 MHz spectrum band has been identified as a critical 5G NR global band for initial deployments given its uniform availability globally. Coupled with the 3GPP Release 15 specifications for Dynamic Spectrum Sharing, it is the primary band to support simultaneous deployment of LTE and NR to help MNOs with the technology transition.

Given the strategic importance of the FDD2100 MHz spectrum band, TPG recommends the entire spectrum (2x 60MHz) be made available for auction without restricting the spectrum with specific technology. The spectrum will be helpful in improving C-Band NR coverage.

Alternatively, 2x 15MHz spectrum can be reserved under FROR (2x 5MHz for each of the three MNOs) and the allocation of remaining 2x 45MHz should be limited to the MNOs who did not get C-band in the first wave of 5G spectrum allocation.

Any spectrum allocated on the pretext of FROR should be used for that specific technology only, and should be allocated for shorter period e.g. 5 years, considering it as a technology-transition period.

b) The new allocation of FDD2100 MHz spectrum should be technology neutral and the spectrum rights duration should be 15 years to 20 years as it is a primary band for 5G coverage which will augment the initial patchy availability of C-Band NR coverage.

c) As explained above.

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.

TPG's Comments:

TPG do not see a reason to combine 800MHz and TDD1900 in single auction, rather TPG believes that MNOs should have freedom to choose the individual spectrum bands based on their business plan and needs. Guard band requirements need further studies before finalization of spectrum auction in TDD1900 MHz.

IMDA has reiterated a few times in the document that 2100MHz is to be used for 3G or 4G services, however TPG strongly recommends not to restrict the spectrum deployment to 3G/4G only but make it technology neutral given the 3GPP RAN1 (under

Release 15) standards for Dynamic Spectrum Sharing which allows for the co-existence of both 4G and 5G - this will help accelerate the migration to 5G.

IMDA has suggested regulation of 2100MHz nationwide coverage, TPG believes that the nationwide coverage threshold should be set and regulated for services, not for spectrum. The MNOs should have choice and option to deploy the spectrum based on their needs and business requirements.

Deployment of 800MHz and 1900MHz will be based on specific use cases, and for specific purpose. Therefore, imposing 50-75% nationwide coverage threshold is not required especially when the device ecosystem is challenged for bands 27, 33 and 39.

IMDA's proposes to adopt the same Clock Plus auction format as was previously adopted in the 4G spectrum auctions in 2013 and 2017. Clock Plus auction processes if applied to a competitive market promotes price discovery and ensures allocative efficiency. TPG recommends the following modifications to the auctions:

(i) In relation to the 800 MHz spectrum, TPG recommends the adoption of FROR allotment to 2x 3MHz and two lots of 2x 5MHz be opened for auction; and

(ii) In relation to the FDD2100 MHz spectrum, TPG recommends the entire spectrum (2x 60MHz) be made available for auction without restricting the spectrum with specific technologies. Alternatively, 2x 15MHz spectrum can be reserved under FROR (2x 5MHz for each of the three MNOs) and the allocation of remaining 2x 45MHz should be limited to the MNOs who did not get C-band in the first wave of 5G spectrum allocation under the CFP process.

Thank you once again for the opportunity to respond to the Consultation and we look forward to any feedback.

Yours sincerely,

Richard Chung Yaw Tan
General Manager/ Acting CEO