The Manager
Spectrum Planning Section
Spectrum Infrastructure Branch
Australian Communications and Media Authority
PO Box 78
Belconnen ACT 2616

freqplan@acma.gov.au

Subject: Spectrum reallocation for the 3.6 GHz band

Dear Madam/Sir,

Huawei thanks the ACMA for seeking input and feedback from industry stakeholders on the draft spectrum reallocation recommendation for the 3.6 GHz band before its final submission to the minister.

The main purpose of Huawei's response to this paper is to support the ACMA in proceeding with the spectrum reallocation recommendation to the minister for the 3.6 GHz band, in the frequency range of 3575 – 3700 MHz (125 MHz of spectrum) – subject to the practical considerations noted below.

We would also like to refer to our earlier submission to the ACMA, made in August 2017 for *"Future use of the 3.6 GHz band, Options paper and highest value use assessment - Quantitative analysis"*, for our input and suggestions, and as background information of this submission. (https://www.acma.gov.au/Home/theACMA/future-approach-to-the-3_6-ghz-band)

Overall, Huawei supports the ACMA's considerations and preliminary proposals on matters relevant to the auction process, including auction methodology and spectrum configuration for allocation.

- Metropolitan Australia, regional Australia, and Perth are to be allocated by issuing spectrum licences, permitting spectrum licensees for optimised use of their specified frequency band anywhere within the geographical boundaries

  Huawei observes that the 3.6 GHz band boundaries differ from the geographic areas licensed for the 3.4 GHz spectrum band. There may be a practical issue where the metro 3.6 GHz areas overlap the inner and outer metro areas for 3.4 GHz band. There will be more complex, especially where there are existing holdings in 3.4 GHz band and network operators cannot operate under a common set of boundaries across the wider band.

- Reallocation periods for the above three specific areas, allowing spectrum licensees earlier access in areas of highest demand while also protecting incumbent services during reallocation periods

- Common licence expiry dates with the adjacent 3.4 GHz band, giving licensees confidence in their investment planning decisions of the wider band (a contiguous 3.4 GHz band and 3.6 GHz band) including the potential trading and consolidation of their asset holdings among licensees

  It is important to note that long reallocation periods combined with fixed licence terms will reduce the value of this 3.6 GHz band license. Some licenses may only allow for use of the spectrum around five years before their licence expires. This may not be sufficient for network operators to recover their investment.

- Price based allocation and lot configuration, allowing licensees to use spectrum rights in large contiguous blocks of Time Division Duplex (TDD) spectrum in multiples of 5 MHz

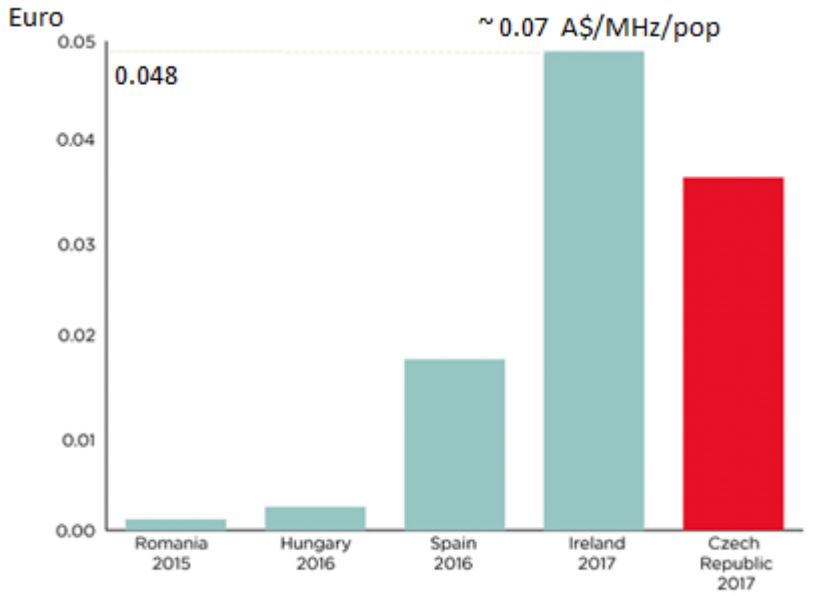
  Huawei appreciates the ACMA's explanation to all stakeholders on this matter and will respect all bidders' views of individual requirement, depending on their intended usage of the network with medium and long-term strategies. However, Huawei wishes not to comment on matters in relation to the Minimum Bid Requirement (MBR) feature for the 3.6 GHz band auction in Australia.

  This is due to Huawei's observation of international auctions for mobile broadband spectrum bands in the specific frequency range of 3.3 GHz to 4.2 GHz, and found that network operators acquire various sizes in spectrum bandwidth nationally based on differing geographical areas and for services - consumer and enterprise, in order to be ready for 5G commercial network deployments in their countries.

Huawei also suggests the following additional factors to be considered.

- **Spectrum market value benchmarking for the 3.6 GHz band**

  While no two auctions are alike, in our opinion, benchmarking of similar auction situations can provide valuable information to help ensure a successful auction.



Auction Price: $/MHz/pop for 3.5 GHz and 3.7 GHz range
(Source: GSMA Intelligent)

The Irish Commission for Communications Regulation (ComReg) awarded the 3.6 GHz band at an average spectrum price of Euro 0.0486 (~A$ 0.07) paid per MHz per population for a 15 years licence (https://www.comreg.ie/publication/results-3-6-ghz-band-spectrum-award/). This report, including the auction results, has been published by ComReg so as to allow for the review of their results and possible methods of replicating their success in the future.

- **The best use of the adjacent 3.4 GHz band**

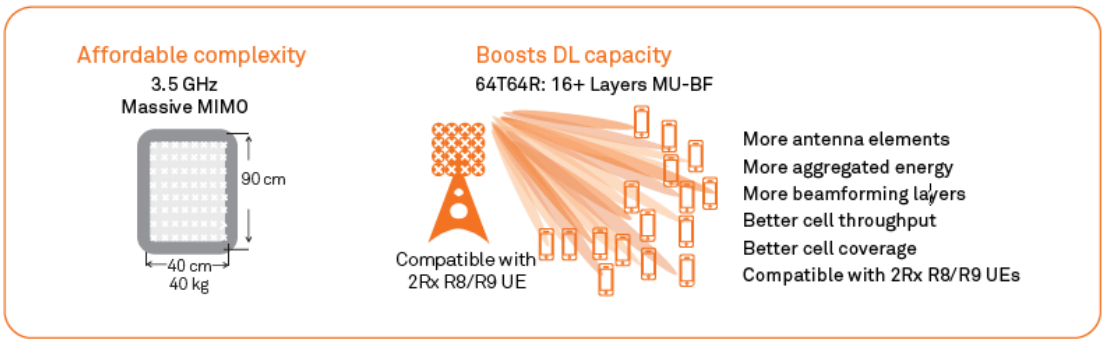
  The 3.4 GHz band frequency configuration lots are currently very fragmented and licensees are unable to utilise their holdings to the utmost efficiency. Since this 3.4 GHz band is one of the highest valued bands for 5G, the best use of the band is essential to yield the benefits that mobile broadband can offer. This can be corrected with a simple collaborative approach among licensees, such as trading of spectrum frequency lots, resulting in contiguous bandwidth for licensees as well as omitting guard bands. Huawei would urge the ACMA to facilitate in removing commercial obstacles with suitable regulatory instruments for their trading agreements.

- **Network synchronization (inter-operator) requirement**

  One of the benefits of the Time Division Duplex (TDD) Access scheme is an adoption of common synchronisation and alignment of uplink/downlink transmissions (slot and frame synchronisation) which can be implemented between operators without having a guard band, allowing for the maximum use of valuable spectrum resources. This benefit has been proven with today's commercial 4G TDD networks.

  Huawei recommends the ACMA to specify network synchronisation design requirement at Radiocommunication Assignment and Licensing Instruction (RALI) to instruct operators as a process to be followed. This requirement is further to be stated when issuing license core conditions to licensees in order to benefit from this access scheme in their actual network design and implementation. .

- **Review of regulatory and technical frame work , considering massive MIMO technology**



  Massive Multiple in Multiple out (MIMO) is a key 5G feature which uses beam-forming technology to focus signals on each user, thereby increasing data rates and effectively manages both interference and total emitted radio power. It adopts large-scale antenna arrays that control its vertical and horizontal width and tilt for three dimensional beam-forming.

  Huawei recommends the ACMA to review existing regulatory policies and relevant technical frameworks for proposing changes (enhancing parameters for time and spatial domain) in order to incorporate the latest technology development for the statistical nature of signals in massive MIMO antenna systems.

- **Review of spurious emission calculation technique**

  The existing spurious emission calculation defined for 700 MHz, 850 MHz, 1800 MHz, 2600 MHz, and 3500 MHz spectrum bands do not exclude Antenna Gain. Comparatively, the ITU, the 3GPP and the CEPT, calculations exclude antenna gain for spurious emission values. The ACMA's differing method has led to a requirement of radio product customisation specifically for Australian market.

  The possibility to deploy globally harmonised radio equipment, which is well aligned with ITU and the 3GPP standardisation, in Australia will create a better economy for investment in network infrastructure and thus benefitting the end consumers. Huawei wishes to advise the ACMA to consider excluding antenna gain for the spurious emission at the new 3.6 GHz band.

  The ACMA indicated in FYSO 2016-2020 that a review of spurious emission would be carried out. Huawei will look forward to participate in any future technical liaison group discussions in developing unwanted emission limits for the 3.6 GHz band.

Huawei welcomes the opportunity to make this submission to the Australian Communications and Media Authority (ACMA), and will continue to support the ACMA's commitments to the development of policies and regulatory frameworks in facilitating the Australian telecommunication industry with efficient spectrum planning for the national requirements in timely manner.

Huawei is also eager for any future collaboration with the ACMA for this important matter of spectrum management and work programs.

Please do not hesitate to contact us if you have any queries regarding our points in this submission.

Tintin Madayag
Head, Business and Network Consulting Department,
Huawei Technologies (Australia) Pty Ltd.
ABN 49 103 793 380

Level 10, Tower B, 799 Pacific Highway
Chatswood NSW 2067, Australia
Phone: +61 (0) 434 564 727
Email: tintin.madayag@huawei.com

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