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Ms. Aileen Chia
Deputy Director-General (Telecoms & Post)
Infocomm Development Authority of Singapore
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Via email to IDA_consultation@ida.gov.sg

Dear Ms. Chia,

Qualcomm Incorporated, on behalf of itself and its subsidiaries (collectively, "Qualcomm") appreciates the opportunity to provide input to the Infocomm Development Authority of Singapore (hereafter, "IDA") on its "Proposed Amendments to the Telecommunications (Radio-Communication) Regulations" consultation paper (hereafter, "the consultation paper"). Qualcomm is a world leader in 3G, 4G and next-generation wireless technologies. Our ideas and inventions have driven the evolution of wireless communications, connecting people more closely to information, entertainment and each other. Qualcomm Technologies, Inc., a wholly-owned subsidiary of Qualcomm Incorporated, is the world's largest fabless semiconductor producer and the largest provider of wireless chipset and software technology, which powers many wireless devices commercially available today. Qualcomm is a recognized world leader in advanced wireless technologies and continues to bring enhancements to market that increase network capacity and performance.

As noted in the consultation paper, demand for radiofrequency spectrum is expected to rise quite rapidly in the coming years, and a review of the regulations governing pricing and sharing is important to ensuring that Singapore is equipped to meet that increasing demand. Global mobile data consumption is growing at a rapid pace, with many Asia-Pacific countries experiencing exponential traffic growth in recent years. Worldwide,

mobile data consumption grew by 81 percent in 2013, according to one estimate.[1] While the projections vary, all indications point to this growth continuing unabated.

The mobile industry is therefore preparing for a major increase in mobile data traffic growth that Qualcomm refers to as "The 1000x Data Challenge."[2] The latest wireless technologies and trends offer solutions that will help to meet the 1000x challenge, and there is a robust roadmap for more improvements, but as wireless networks strain to meet the growing demand for mobile broadband services, access to additional radio frequency spectrum remains critical. While there are many enhancements allowing for more efficient use of existing spectrum, meeting an increase of the magnitude of 1000x will unquestionably require more spectrum. As noted in the consultation paper, the IDA has already estimated that significant additional spectrum may be necessary to support commercial mobile services by 2020. Given the increasing demand for ever faster mobile data connections, and the corresponding need for additional spectrum suitable for mobile broadband services, Qualcomm believes that the IDA's effort to review and update the existing spectrum allocation framework and governing regulations is a timely and important step in ensuring a forward-looking approach to Singapore's spectrum policy. Periodic reviews of spectrum management frameworks are crucial in ensuring efficient allocation and use of a valuable and scarce resource.

Efficient Spectrum Usage and Benefits of Shared Access

The IDA's review of spectrum pricing frameworks is an important step to both meet the policy objectives of maximizing the benefits to society of Singapore's spectrum resources and allowing spectrum to move to its highest-value use. Periodically reviewing the pricing framework to ensure that it is in line with current policy objectives and market realities is an important part of an overall plan to ensure effective and efficient management of the radiofrequency spectrum.

In addition, providing the maximum amount of flexibility in spectrum use is a key enabler of evolution and innovations in wireless services. Flexible arrangements increase service providers' ability to nimbly respond to changes in technology, services or usage patterns. Qualcomm is encouraged by the IDA's support for spectrum sharing among licensees, spectrum rights holders and users of equipment that is exempt from licensing. There is growing interest globally in increased use of spectrum sharing as a means to allow greater access to scarce spectrum resources. As noted in the consultation paper, regulators in other jurisdictions have also been considering options for spectrum sharing.

For the cases when exclusive licensing for 3G/4G use is not feasible in a timely manner or in all geographic locations, Qualcomm, together with our partners, has proposed a new and innovative spectrum use regime called Authorized Shared Access (ASA) or Licensed Shared Access (LSA). ASA/LSA provides a regulatory approach that allows operators to collaborate with incumbent non-mobile spectrum licensees to obtain exclusive access to part of the latter's spectrum. ASA/LSA permits the incumbent licensed user – for example defense or other non-mobile licensees – to share spectrum with mobile licensees. The sharing can be in terms of geography, frequency, or time, on an exclusive basis without interfering with the incumbent's

[1] Cisco, "Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2013-2018," available at http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white_paper_c11-520862.html.

[2] http://www.qualcomm.com/solutions/wireless-networks/technologies/1000x-data.

operations. ASA/LSA aims to provide a level of interference protection for both incumbents and ASA/LSA licensees, thereby allowing for a predictable quality of mobile service.

The GSMA refers to such sharing as "vertical sharing," or the sharing of spectrum between a mobile network operator (MNO) and a non-MNO.[3] Vertical sharing opportunities in which non-MNOs share spectrum with MNOs present arguably the greatest potential to increase mobile spectrum supply. Qualcomm believes that using an ASA/LSA approach can extend the performance and reliability of LTE Advanced systems into additional licensed spectrum, allowing operators to augment capacity with a unified network and to provide enhanced broadband experience to users. Higher frequency bands are one of the options now being considered for new spectrum allocations for mobile services, and they have become prime candidates for using ASA/LSA. Supplementing wide-area LTE networks with small cells in higher frequency bands licensed under an ASA regime can help to improve capacity in high-traffic settings.

We note that there have been some developments on ASA/LSA in Europe and the United States. For example, the European Conference of Postal and Telecommunications Administrations (CEPT) has issued a report on the benefits of Licensed Shared Access and is undertaking additional work to support the introduction of LSA.[4] In the United States, the Federal Communications Commission has considered the authorization of a variety of small cell and other broadband uses of the 3.5 GHz band on a shared basis with incumbent federal and non-federal users of the band.[5] A growing number of regulators and governments are recognizing the utility of licensed shared spectrum access as a means to make the most efficient use of spectrum, and we encourage the IDA to consider ASA/LSA among the tools available to increase the amount of spectrum available for mobile broadband services in the future.

Qualcomm appreciates the opportunity to provide input to the IDA on this consultation paper. We look forward to future opportunities to provide information on spectrum management and sharing issues to help Singapore meet its future spectrum requirements. Should you desire more detail on Qualcomm's views, please do not hesitate to let me know.

Sincerely,

Julie Garcia Welch
Senior Director, Government Affairs, Southeast Asia & Pacific

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[3] Deloitte and GSMA, "The Impact of Licensed Shared Use of Spectrum," (January 23, 2014) at 16, available at http://www.gsma.com/spectrum/wp-content/uploads/2014/02/The-Impacts-of-Licensed-Shared-Use-of-Spectrum.-Deloitte.-Feb-20142.pdf.

[4] See, for example, CEPT ECC Report 205 on Licensed Shared Access (LSA) (February 2014), available at http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP205.PDF.

[5] See, for example, GN Docket No. 12-354 Further Notice of Proposed Rulemaking (April 23, 2014), available at http://www.fcc.gov/document/proposes-creation-new-citizens-broadband-radio-service-35-ghz.