SUMMARY OF KEY POINTS RAISED IN RESPONSE TO IMDA'S SECOND PUBLIC CONSULTATION ON 5G MOBILE SERVICES AND NETWORKS

1. IMDA received 62 responses to the *Second Public Consultation on 5G Mobile Services and Networks* from many industry parties such as mobile network and satellite operators, network and equipment vendors, and other interested parties, including individuals, on various aspects of 5G. Overall, respondents were optimistic about the transformative impact that 5G would bring to both businesses and consumers in Singapore.

Balanced Policy Framework for 5G Deployment

2. IMDA is guided by several key policy objectives in the deployment of 5G networks in Singapore. These include:
   a. maximising benefits of 5G technology for enterprises and consumers;
   b. facilitating efficient allocation of scarce spectrum resources;
   c. ensuring Singapore's 5G networks are designed to be trusted and resilient; and
   d. supporting the growth of a vibrant telecommunications sector.

3. Respondents welcomed IMDA's Call for Proposal (**CFP**) approach to assigning 5G spectrum, as they had agreed that this approach would best achieve IMDA's policy objectives and support Singapore's digital ecosystem development.

4. Noting the limited amount of spectrum in the 3.5 GHz band, most respondents understood the constraints that Singapore is facing. Several respondents supported IMDA's proposal to have two nationwide 5G networks at the outset, and the proposed 3.5 GHz spectrum band plan. Some respondents asked IMDA to consider building a single network to be shared by all operators while others asked for more spectrum to be released and assigned to more mobile network operators.

5. Noting the early availability of mmWave spectrum, several respondents requested for flexibility in deciding between standalone (**SA**) and non-standalone (**NSA**) deployments, especially in the initial years of deployment. Several respondents also submitted that IMDA could consider assigning the mmWave spectrum to more operators, including all four mobile network operators, to allow the 5G ecosystem to grow and develop.

6. Several respondents shared that the 28 GHz band (a subset of the mmWave spectrum band) is being used extensively for satellite services globally with many potential investments expected in this band. Similarly, the 3.5 GHz band is widely used for video distribution by broadcast and media companies around the region.

A number of responses have asked IMDA to look into measures to be taken to prevent interference between 5G networks and satellite systems.

Safe, Trusted and Resilient Network Design

7. A trusted and resilient telecommunication network is the backbone of the economy. We note that respondents agreed on the importance of having a trusted 5G network, and that the adoption of a security-by-design approach would ensure that network resilience and cybersecurity requirements and considerations will be incorporated when deploying 5G networks. However, some respondents cautioned the need to balance last mile resilience and deployment costs and preferred for this be left to commercial negotiations between the operator and the customer who requires specific resilience features.

8. As part of the consultation, some respondents raised comments regarding the possible health impact of 5G networks and technology.

9. In Singapore, the ambient level of Radio Frequency (**RF**) radiation is very low, typically below 0.7% of the International Commission on Non-Ionizing Radiation Protection's (**ICNIRP**) [1] guidelines. With 5G services, Singapore will continue to take guidance from ICNIRP guidelines, which are also adopted by other countries. IMDA and the National Environment Agency (**NEA**) will continue to closely monitor developments and consult health experts as appropriate.

Building Singapore's 5G Ecosystem

10. Respondents shared views on innovative use-cases that leverage the ultra-low latency and faster broadband capabilities of 5G. These are built around automation (e.g. industrial automation, autonomous driving), remote operations (e.g. ground robotics, remote surgery), security and communications (e.g. high quality video surveillance, emergency services) and immersive multimedia (e.g. Augmented Reality (**AR**), Virtual Reality (**VR**), gaming).

11. Respondents were also largely of the view that 5G will be integrated with other technologies, applications and processes, and the implementation of these business innovations will be tailored for each sector. Consequently, these

1 ICNIRP is an independent international organisation recognised by the World Health Organisation (WHO). Its safety guidelines on public exposure to RF radiation are widely accepted by many countries, like Australia, Germany, Norway, South Korea, and Sweden, some of which have already rolled out 5G services. The WHO has also found no convincing scientific evidence of adverse health effects from very low RF exposures to populations or individuals.

sectors will demand that their workforce be appropriately skilled, to be able to maximise 5G technologies and help the sectors transform.

Concluding Remarks

12. IMDA will review all submissions to develop policy frameworks that will achieve the intended policy outcomes. IMDA plans to announce its decision towards end-2019.