Fact Sheet

23 May 2017

FACILITATING 5G DEPLOYMENTS IN SINGAPORE

Background

1. Technologies such as Virtual Reality, the Internet of Things (IoT) and Autonomous Vehicles are expected to shape future digital interactions for our economy and society. The emergence of these technologies is underpinned by reliable and secure telecommunication infrastructure, which enables wireless and mobile communication technology to play an increasingly important role going forward.

2. The mobile sector worldwide continues to invest in network improvements, in order to enhance its service offerings. Notably, both the regulators and the telecoms industry globally have already started working towards the development of 5th generation mobile networks, more commonly known as 5G. 5G is seen as a comprehensive wireless-access solution with the capacity to address the demands and requirements of mobile communications beyond 2020.

Encouraging 5G Trials in Singapore

3. 5G trials conducted by mobile network operators (MNOs) in Singapore have demonstrated promising capabilities, having achieved throughputs of more than 1Gbps with an extremely low latency of less than 1 millisecond. To promote greater technological innovation, IMDA will be waiving frequency fees for 5G trials with immediate effect. This will lower regulatory barriers for interested companies and encourage the industry to explore the potential benefits and applications of 5G networks. Trials conducted in a real-world environment will also assist the industry in better understanding how 5G will operate in Singapore's business environment and its optimum deployment scenarios. Companies that are interested in conducting 5G trials may utilise the existing IMDA's Technical Trial and Market Trial framework.

4. Besides facilitating trials, IMDA recognises that new spectrum resources will be needed to fuel the next generation of mobile services. With the commercial deployment of 5G services and applications, IMDA has projected that spectrum demand will increase substantially. IMDA has thus identified several spectrum bands that may be suitable for 5G deployments in Singapore. The detailed list of spectrum bands under consideration can be found in Annex A.

5. In addition, the mobile industry has begun to explore technologies that enable spectrum to be aggregated across both the licensed and licence-exempt bands. Such technologies enable the MNOs to increase mobile data speeds and overall network capacity. IMDA is thus considering developing regulations to support the deployment of such aggregation technologies while ensuring that deployment of technologies such as Wi-Fi can continue in licence-exempt spectrum bands in Singapore.

6. IMDA has launched a public consultation on these and related issues to facilitate the development and deployment of 5G in Singapore. The consultation period will be from 23 May to 7 July 2017.

7. IMDA would like to encourage industry participation in the public consultation, so as to help IMDA shape the spectrum roadmap and regulatory frameworks for 5G, foster growth and business opportunities for the industry and businesses, and enhance high-speed broadband experience for mobile users.

For media clarifications, please contact:

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INFOCOMM MEDIA DEVELOPMENT AUTHORITY

ANNEX A

POTENTIAL SPECTRUM BANDS FOR 5G DEPLOYMENTS

Category	Potential Spectrum Bands
Below 1GHz	800MHz
1 – 6GHz	1427 – 1518MHz 3400 – 3600MHz
Above 6GHz	24.25 – 29.5 GHz 31.8 – 33.4 GHz 37 – 43.5 GHz 45.5 – 50.2 GHz 50.4 – 52.6 GHz 66 – 76 GHz 81 – 86 GHz

ANNEX B

EXTRACT FROM DR YAACOB IBRAHIM'S SPEECH AT THE INFOCOMM MEDIA BUSINESS EXCHANGE 2017 OPENING CEREMONY

"The fourth focus area is the Internet of Things and future communications infrastructure. Exponential growth in processing power, internet connectivity, and usage of mobile devices have led to rapid growth of devices, services, and software for the Internet of Things, or IoT, worldwide. To further multiply the potential of IoT, and to further fuel the digital economy, IMDA will be partnering the industry to develop and put in place key components of future-ready and resilient communications infrastructure that will benefit consumers and businesses across various sectors. Components of the infrastructure include enhancements to the Nationwide Broadband Network, Internet of Things networks, 5G mobile network, and sensor networks. These will enable businesses to leverage high-speed networks, real-time communications, and high-accuracy location positioning to better deliver their services.

To ensure that these infrastructural plans will address and meet the industry's needs, IMDA will be conducting industry consultations to seek feedback and ideas. In fact, the first set of consultations will kick off later today. IMDA will be seeking your views on 5G spectrum requirements and regulatory provisions, and on how policies can move in tandem with technology and address your needs. Going ahead, IMDA also intends to waive frequency fees for 5G trials to lower the regulatory barrier and to encourage industry trials in 5G technology."

QUOTES FROM THE INDUSTRY

Mr Martin Wiktorin, Country Head, Ericsson Singapore and Brunei

"At CommunicAsia 2017, IMDA and Ericsson will demonstrate how 5G can enable industry transformation through the use of interactive demonstrations such as a motion-sensing robotic arm. Ericsson is driving 5G through standardization and collaboration with mobile operators and industry partners. Ericsson's global leadership in end-to-end 5G technology innovation, combined with IMDA's vision of creating the world's first Smart Nation, will drive Singapore as a front-runner for 5G adoption."

Huawei Technologies

"We are moving towards the era of "Everything on Mobile". IMDA's public consultation is timely as 5G technology will accelerate the transformation. Huawei is of the view that additional spectrum must be available for 5G usage before its global commercial deployment in 2020, in particular, high bands with large bandwidths and low bands that can provide large coverage. Huawei has been working closely across governments and industry partners on 3GPP-based unified standards for 5G to construct globally harmonized spectrum ecosystem for 5G. Huawei is also cultivating and verifying new services that will be realized through 5G such as Virtualized Reality, Augmented Reality, Autonomous Vehicles etc. We believe this will push forward innovation and industrialization of 5G and help realize the Smart Nation 2020 vision.

Huawei has established more than 11 5G research centers globally and will invest more than US$ 600 million by 2018. Since 2009, Huawei has achieved significant breakthroughs in end-to-end 5G system innovation. This includes the first verification of 5G candidate air interface technology, the first high-low frequency hybrid network verification with China Mobile, the world's first 5G end-to-end network slicing prototype with Deutsche Telekom, and completed the verification of ultra-low latency in air interface with Vodafone. In 2017, Huawei has cooperated with DLR (Deutsches Zentrum für Luft-und Raumfahrt) and successfully completed an Autonomous Driving test in Munich, Germany."

Mr Sandeep Girotra, Senior Vice President of Asia Pacific and Japan at Nokia

“Singapore’s efforts in facilitating the commercialization of 5G services is indeed commendable, and we are fully committed to support the country’s future digital economy and Smart Nation initiatives.

At Nokia, we are accelerating the development and standardization of 5G, and our technology innovations will enable the industry to move more rapidly towards commercial 5G systems.

As a leader in global connectivity, Nokia is providing the technological means for operators to prepare and unlock the full potential of their networks. Our partnerships with communication service providers, governments and large enterprises will help our customers in Singapore prepare for 5G-ready architectures that cover core, software-defined networking, cloud and more.

5G will also be an enabler of next-generation IoT applications such as autonomous vehicles and virtual or augmented reality, while intelligent IoT platforms will have essential roles to play in the evolution of smart cities – an area in which Nokia is deeply involved. We have already introduced 5G-ready technologies in our commercial solutions, which support today's LTE-Advanced and the upcoming LTE-Advanced Pro/Pro II, so that our customers can smartly bridge their networks to 5G. Our recent launch of 5G FIRST – a comprehensive, end-to-end technology and services solution – will enable communication service providers to accelerate the path to 5G and IoT.

Nokia will continue to work with our customers and make R&D efforts for innovative technologies in enabling IoT connectivity.”

Mr Denis Seek, Chief Technical Officer, M1

“M1 has conducted several lab trials and demos using latest wireless technology to achieve data speed far exceeding 1Gbps and has progressively densified our Heterogeneous Network with integrated Small Cell/WiFi that lays the foundation for future 5G dense cell grid architecture. We are keen and ready to participate in IMDA’s 5G consultation in identifying new higher-frequency spectrum bands to be used for 5G in Singapore and an opportunity to trial 5G services and applications.”

Mr Mark Chong, Group Chief Technology Officer, Singtel:

“In order to realise the full potential of 5G and IoT, Singtel embarked on our Journey to 5G early – making continued investments in 4G+ evolution, acquiring and managing spectrum, transforming our core network, driving standardisation as a key member of global bodies such as NGMN Alliance, and carrying out successful IoT and 4G+ network trials.

5G is a key enabling technology and essential building block of our Smart Nation. Singtel is excited to shape Singapore’s 5G future and we continue to focus on building future-proof networks and a robust mobile ecosystem that will serve our customers in today’s digital economy and tomorrow’s connected future."

Mr Chong Siew Loong, Chief Technology Officer, StarHub.

"The mobile network is an important infrastructure component of a Smart Nation, supporting a massive number of internet devices that constantly generates and transmits data. Future 5G networks will be capable of improving overall network capacity and spectrum efficiency as well as enable a wide range of connected services, both emerging and those yet to be defined. With Smart Nation deployment picking up steam, it is timely for us to look at how we can maximise the potential of 5G for our customers.”