



**GSMA RESPONSE TO THE '5G MOBILE SERVICES
AND NETWORKS' CONSULTATION FROM THE
INFO-COMMUNICATIONS MEDIA DEVELOPMENT
AUTHORITY OF SINGAPORE**

19th July 2017



About the GSMA

The GSMA represents the interests of mobile operators worldwide, uniting nearly 800 operators with more than 300 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces industry-leading events such as Mobile World Congress, Mobile World Congress Shanghai, Mobile World Congress Americas and the Mobile 360 Series of conferences.

For more information, please visit the GSMA corporate website at www.gsma.com.



- 1. IMDA would like to seek views and comments on the estimated timeline for the deployment of 5G. Besides ensuring that spectrum is made available in a timely manner, what other regulatory measures could assist in facilitating the deployment of 5G technology and applications? What other use cases should IMDA take note of when developing the regulatory framework?**

The ability to support 5G services depends on new mobile broadband (i.e. IMT) spectrum being licenced and the ability to use existing licensed mobile spectrum (ie. through refarming). New spectrum should include new bands that can be made available at WRC-19 (e.g. under Agenda Item 1.13 and potentially joining existing IMT identifications in region 3 such as 3.5-3.6 GHz) as well as new bands which were made available at WRC-15 (e.g. which included 3.4-3.5 GHz in Singapore). IMDA should ensure existing mobile licences are all technology & service neutral so that operators can quickly and cost-effectively refarm current bands for 5G. IMDA is also encouraged to provide flexible framework for the deployment and upgrade of sites to suit 5G, such as in rights of way, access to street-side furniture, environmental management, fibre and microwave backhaul just to name a few.

In the Asia Pacific region, China, Japan and Korea have announced plans to deploy large-scale pilots from 2018 and to commercialise starting from 2020. From a standardisation perspective, the 3GPP has brought forward the timeline for the IMT-2020 standard Release-15 to mid-2018, paving the way for commercial deployments soon after.

- 2. To facilitate and understand potential spectrum requirements for IoT deployments in Singapore, IMDA would like to seek views on the following: i) Based on the current spectrum allocated for mobile services in the sub-1 GHz frequency bands, are there further suitable spectrum resources that could be released to support both IoT and LTE services?**

It is essential that IMDA support a technology and service neutral regulatory framework for licensed spectrum that facilitates the development and growth of IoT, and does not impose service or technological restrictions that hold back innovation. Operators should not be prevented from deploying the latest cellular IoT technologies in their licensed spectrum bands due to technological restrictions. For example, the latest cellular standard (3GPP Release 13) allows GSM and LTE networks to support LPWA IoT applications in almost all licensed mobile bands. This includes the ability to support personal and IoT connectivity in the same frequency band at the same time. The regulatory environment should be designed to nurture this evolution in the capabilities of mobile networks and allow the market to decide which solutions thrive. As such, within sub-1GHz spectrum, operators should be free to use the 700 MHz and 900 MHz bands as they wish for new cellular IoT technologies.

- 3. IMDA would like to seek views and comments from industry on what they consider will be the key technologies for 5G and whether current regulatory frameworks sufficiently facilitate the deployment of such technologies.**

Technology development for 5G services is happening within 3GPP and will appear initially in Release 15. The 5G visions come to broadly three main scenarios, namely enhanced mobile broadband, massive machine type communications, and ultra-reliable & low latency communications. These different scenarios demand different and complex spectrum and regulatory enablers. In the above context, it is critical that IMDA supports technology and service neutral spectrum licences so that they will be adequately supporting 5G technology developments to fulfil all three visions.

- 4. IMDA would like to seek views and comments on whether going forward, there is a need for further spectrum below 1 GHz to be identified and release for mobile services?**

5G will require spectrum in three key frequency ranges: Sub-1 GHz, 1-6 GHz and above 6 GHz. Mobile operators will use the newly available 700 MHz band in Singapore for LTE deployments, and likely 5G in the near future, especially as Europe placing this band as a priority for 5G. Also, the incentive auction in the US paved way for the 600MHz band to be an important band for 5G deployment. A few administrations in Asia Pacific, such as New Zealand and India, are actively planning this band for 5G and have initiated work at the APT and ITU to harmonise its frequency arrangement. IMDA should



consider using WRC-19 to join the ITU Region 3 IMT identification in either the 470-698 MHz band or the 610-698 MHz band.

5. **IMDA would like to seek views and comments on the following: i) The frequency arrangement that is better suited for adoption in Singapore for the L band (i.e. SDL, TDD or FDD) and the supporting reasons; and ii) The timeline for access to the L band and the availability of the equipment (specifically whether it will be available earlier or later than 2020).**
6. **Considering the spectrum bands within the range of 1-6 GHz to support the deployment of enhanced mobile broadband services, IMDA would like to seek views on whether all of the 91 MHz of spectrum in the L-band should be allocated for IMT to address Singapore's data demand and growth.**

Yes, the full 91 MHz should be made available for mobile broadband to meet rapidly growing mobile data traffic.

7. **If it is only the extended C-band that is considered for IMT, would the migration of existing satellite users to the other parts of the C-band (i.e. 3.7- 4.2 GHz) impact their service provisioning?**

The amount of spectrum available for mobile broadband in the C-band varies around the world according to the ITU Radio Regulations (e.g. 3.3-3.4 GHz, 3.3-3.6 GHz, 3.3-3.7 GHz and 3.4-3.6 GHz). In Europe there are plans to use 3.4-3.8 GHz. However, we understand in the context of this consultation that the extended C-band refers to 3.4-3.6 GHz. We are not in the position to comment on specific satellite users and how their services will be impacted. However, we note the IMDA has said that 3.4-3.6 GHz is lightly used and there is the option to migrate users to 3.7-4.2 GHz. The GSMA's position is that the spectrum in the 3.3-3.8 GHz range is likely for form the basis of many 5G services around the world and that IMDA should endeavour to make as much spectrum as possible available within this range. These frequencies will enable 5G services to reach further than the bands being considered under Agenda Item 1.13 at WRC-19 so more consumers and businesses will benefits from the services. Furthermore, the widespread use of this band means that significant equipment will be built for the band so consumers will benefit from lower cost devices.

8. **Considering the challenges of co-channel deployment of FSS and IMT services in the extended C-band, IMDA would like to seek views and comments on the coexistence measures for adjacent bands and cross border operations.**

As part of the ITU process, IMT use of the C-band has already been the subject of significant deliberations. There are ITU-agreed measures designed to ensure coexistence with existing services in country and with neighbouring countries. Adjacent band compatibility between IMT and FSS is a national issue and each Administration must decide how best to address it in their country. It has been thoroughly studied by the ITU and administrations can make use of their studies when deciding the appropriate sharing criteria to adopt in terms of what guard band and power limitations, among other options. The ITU studies can be found in Report ITU-R S.2368.

For cross-border issues, administrations wishing to implement IMT must comply with the limits set out in the ITU Radio Regulations unless otherwise agreed by the neighbouring administration. This approach is designed to facilitate cross-border coordination and ensure coexistence between the services. The relevant Radio Regulations are footnotes 5.430A, 5.431B, 5.432A, 5.432B, 5.433A and 5.434.

9. **IMDA would like to seek views and comments on whether there are other frequency bands in the 1-6 GHz frequency band that IMDA should consider for IMT / 5G.**

As discussed previously, IMDA should ensure that all existing licences are technology and service neutral - so mobile operators can refarm existing mobile bands for 5G. IMDA should also license as much spectrum available as possible in 3.3-3.8 GHz as this will likely be a key range for 5G globally. IMDA should also consider the 4.8-4.99 GHz band which is identified for mobile broadband in parts of



Asia. Portions of the 4.8-4.99 GHz range are available in the Americas and China so there is likely to be a healthy equipment ecosystem.

- 10. IMDA would like to seek your views and comments on the following: i) The role mmWave bands will play in delivering the vision of 5G, in particular, what services could not be delivered by alternative frequency bands and / or technologies; ii) The amount of spectrum required in the mm Wave spectrum bands to meet 5G applications that will require higher bandwidths; and iii) The specific mm Wave bands that you consider should be a priority in Singapore for IMT services and why?**

Spectrum in millimetre waves will be vital to support ultra-high speed mobile broadband as well as rapidly rising traffic in hotspot locations. These high frequencies are well recognised worldwide as being the key component for the fastest 5G services. Without them, 5G will not be able to deliver significantly faster data speeds or support projected extensive mobile traffic growth. Some 5G mobile bands in this range should be agreed at WRC-19, under Agenda Item 1.13, which is considering the following bands for 5G1: 24.25-27.5 GHz, 31.8-33.4 GHz, 37-43.5 GHz, 45.5-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz. However, some countries are also investigating other mobile bands above 6 GHz for 5G services, which are not being considered at WRC-19. The 28 GHz band is of particular interest as it has been permitted for 5G use in the United States and is being closely examined by Japan and Korea. This would complement the 26 GHz band, which is being studied at WRC-19 and is supported in the European Union, because the same equipment could easily support both bands thus helping to lower device costs.

- 11. Considering that there are 11 candidate bands under consideration at WRC-19, how would making available the 28 GHz band help in the deployment of 5G services in Singapore? Would this band play a significant role in achieving the targets set out for 5G (i.e. higher throughput, ultra-low latency)?**

Agenda Item 1.13 is looking at a significant amount of spectrum for 5G (i.e. IMT-2020) use, however not all bands will be identified. The virtue of the 28 GHz band is that it already has support from major mobile markets with early 5G deployment plans, such as the United States, Japan and Korea, so it can be expected that low cost devices will be made available early (e.g. even before WRC-19). Other bands may have less support around the world so equipment may be more expensive or only become available later.

- 12. If the 28 GHz band is opened for IMT services in Singapore, would there be any future competing services that may be deployed in this band which may cause interference issues?**

Coexistence studies are being performed at the moment but it is envisaged that the band could be potentially shared with satellite services in those parts used for feeder links, which are usually placed in the lower part of the band up to 28.35 GHz.

- 13. IMDA seeks views and comments on the estimated spectrum demand of 3360 MHz by 2025 and whether this estimate is realistic?**

- 14. Noting that several regulators have made available mmWave bands for IMT services, IMDA would like your views and comments on whether access to the mmWave spectrum should be provided earlier than 2022 for commercial network deployment?**

It is essential that IMDA consults directly with mobile operators in the country on this issue to verify their future plans. However it is worth noting that operators in the United States are planning to deploy early 5G services in mmWave bands in late 2018 so some operators see a business case for earlier deployment.

- 15. Considering the current regulations/policies for licence-exempt use and the possibility of LTE-U interfering with Wi-Fi users, IMDA would like to seek views and comments on the**

¹ 5G is a market term but the ITU officially refers to this as IMT-2020



following: i) The adoption of LBT to facilitate sharing of licence-exempt spectrum and whether there would be any implication arising from such a requirement; ii) The need for further technical requirements and regulatory measures to facilitate the sharing of licence-exempt spectrum in an efficient and fair manner; and iii) The need for companies with commercial LTE-U networks to upgrade to LAA once the software/hardware products are commercially available.

16. During the interim period before regulations are finalised, IMDA plans to facilitate industry trials for LAA/LTE-U technologies. As such IMDA would like to seek views and comments on the following: i) Besides the information listed in Para 80, should MNOs/MVNOs interested in conducting LTE-U trials submit any further information for IMDA's assessment; and ii) To minimise impact to Wi-Fi users, should IMDA limit LAA/LTE-U trials to parts of the 5 GHz licence-exempt spectrum?

17. IMDA would like to seek views and comments on the following: i) The possibility of deploying LAA and / or MuLTEfire in other frequency bands besides the licence-exempt 5 GHz band; and ii) The regulatory and coexistence measures that should be adopted for MuLTEfire

18. Considering that the LWA approach would not create coexistence issue with Wi-Fi users, would this approach be better suited for countries with extensive Wi-Fi usage?

The GSMA supports technology neutrality so would not recommend prescribing one technology above others. It is notable that the US and Europe have heavy Wi-Fi usage but still have plans to allow LTE in unlicensed spectrum.

19. IMDA would like to seek views on how the above approaches (i.e. LAA, MuLTEfire and LWA) would enhance the capacity of the mobile network in ways that Wi-Fi offloading is not able to achieve.

These alternative approaches could provide superior service delivery including the ability to better aggregate licensed and unlicensed spectrum to support faster speeds.