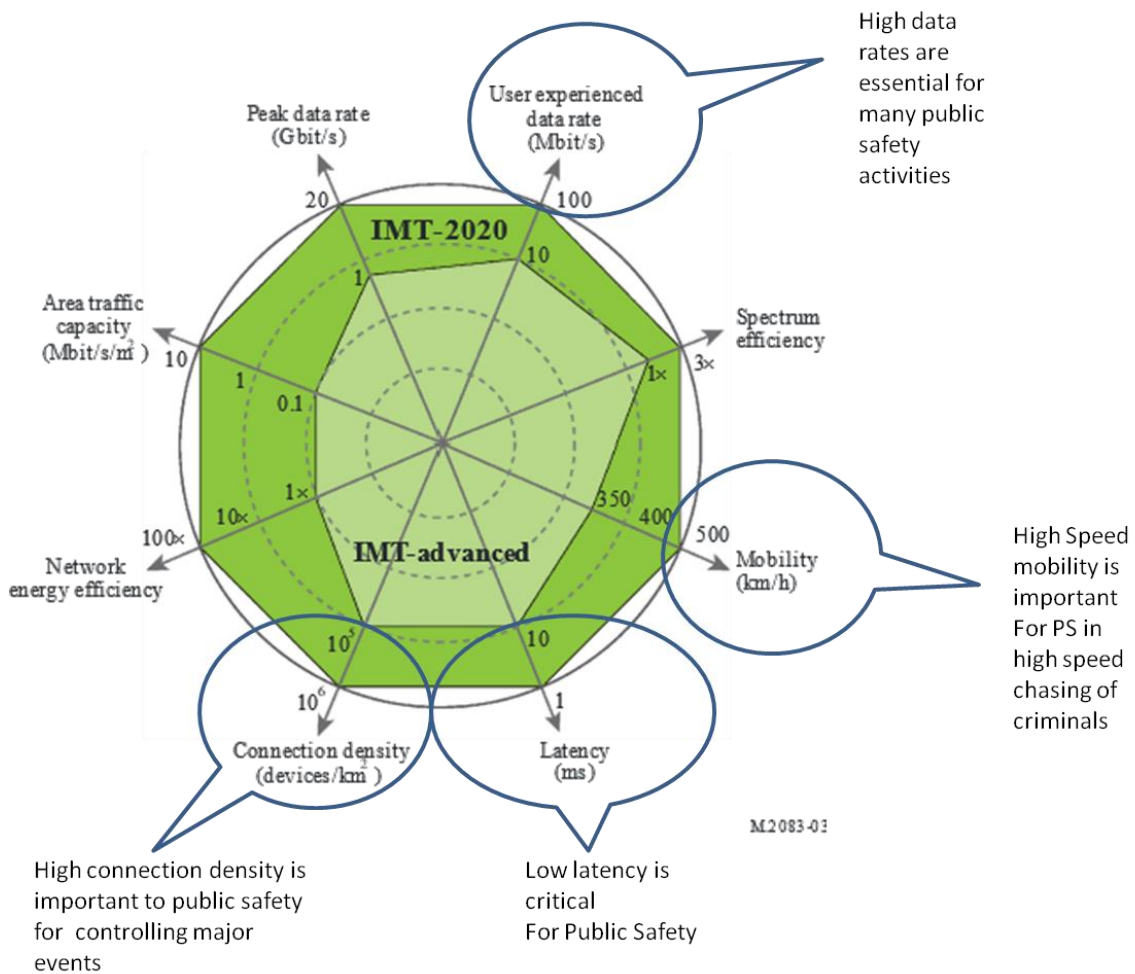


Question 1: IMDA would like to seek views and comments on the estimated timeline for the deployment of 5G. Besides ensuring that spectrum is made available in a timely manner, what other regulatory measures could assist in facilitating the deployment of 5G technology and applications? What other use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

Motorola Solution’s Views and Comments:

Ultra reliable and low latency communications, which is one of the three corners of the ITU-R IMT 2020 vision, are critical enablers of Public safety.

Motorola Solutions believe IMT-2020 will support many new features that are critical for public safety users. The figure below highlights some of these features.



Question 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?
- ii) How will future generations of mobile networks (e.g. high capacity, low latency) support the growth of IoT and what would be the spectrum requirements?

Motorola Solution's Views and Comments:

Motorola Solutions do not support any identification of dedicated spectrum for IoT/mMTC and believe that cellular based IoT should be able to use any spectrum that is identified for IMT in the ITU Radio Regulations. This will ensure that end users can benefit from the availability of commercial-off-the shelf products and from the economies of scale due to spectrum harmonization.

Question 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.

Motorola Solution's Views and Comments:

The low latency and high reliability communications of IMT 2020 are the most important enablers for the future development of new human centric applications in public safety such as Mission Critical video.

During high speed chase of criminals on highways and in the cities, public safety agencies need mission critical voice and video applications with high mobility. IMT 2020 is expected to offer robust and reliable connectivity solutions to such highly mobile users and communicating machine devices. Real time robotic devices to diffuse explosive devices or to handle dangerous substances or to devices that can control industrial fires need the design of new applications based on machine-to-machine (M2M) communication with real-time constraints. Such applications require much higher reliability and lower latency than what is envisaged in today's human centric communication systems. Real-time traffic control optimization, emergency and disaster response are other examples of where low latency and high reliability can support public safety agencies.

Question 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?

Motorola Solution's Views and Comments:

In the ITU Radio Regulations, some countries¹ in the Asia Pacific have identified the frequency range 470-698 MHz for IMT. In the AWG² work is underway to develop a report (or recommendation) for a harmonized frequency arrangement in the range 470-698 MHz.

However, Motorola Solutions note that the 470-698 MHz range is currently used for terrestrial digital television broadcast in Singapore and neighbouring countries.

Question 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).**

¹ Micronesia, the Solomon Islands, Tuvalu and Vanuatu have identified the frequency band 470-698 MHz for IMT and Bangladesh, Maldives and New Zealand, the frequency band 610-698 MHz.

² APT Wireless Group

Motorola Solution's Views and Comments: Motorola Solutions preference is for a all TDD or an FDD band plan we believe some countries in Asia have already adopted an FDD (Japan) or TDD (China). It is worthwhile to note that china has adopted a part of this band for PPDR using TDD mode.

Question 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.

Motorola Solution's Views and Comments:

We believe, there should be further allocation to 5G PPDR within 1-6 GHz

Question 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?

Motorola Solution's Views and Comments:

Motorola Solutions has no Comment and View on Question 7

Question 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.

Motorola Solution's Views and Comments:

Motorola Solutions has no Comment and View on Question 8

Question 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.

Motorola Solution's Views and Comments:

Motorola Solutions has no Comment and View on Question 9

Question 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 mmWave spectrum bands to meet 5G applications that will require higher bandwidths; and
- iii) The specific mmWave bands that you consider should be a priority in Singapore for IMT services and why?

Motorola Solution's Views and Comments:

Resolution 646 (Rev. WRC-15) has identified global and regional bands for PPDR³. In particular, the band 694-894 MHz is harmonized on a global basis for broadband PPDR. Public safety agencies will continue to depend on this band for IMT, IMT-Advanced and IMT-2020. However, additional spectrum in higher bands might be necessary for future implementation of IMT-2020 for some public safety applications.

Thus higher and lower frequencies are both needed to meet multiple public safety use case scenarios:

Spectrum below 6 GHz

- Wider coverage allowing cost effective delivery of mobile services
- Bandwidths considerably wider than those of today, providing a combination of capacity and coverage
- New bands below 6 GHz should be made available for 5G.

Spectrum above 6 GHz

- Needed for applications requiring extremely high data rates
- Accommodate wider channel bandwidths up to 1GHz within a coverage area that may reach 100s meters
- Propagation characteristics may lead to higher spectrum reuse and may facilitate sharing with existing services.

Question 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)?

Motorola Solution's Views and Comments:

Motorola Solutions believes that 30 and 40 GHz band groups would play an important part of 5G PPDR and allied services as a part of IMT services

Question 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?

Motorola Solution's Views and Comments:

Motorola Solutions believes that 30 and 40 GHz band groups would play an important part of 5G PPDR and allied services as a part of IMT services

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

Motorola Solution's Views and Comments:

Motorola Solutions believes that 30 and 40 GHz band groups would play an important part of 5G PPDR and allied services as a part of IMT services

³ Public Protection and Disaster Relieve

Question 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?

Motorola Solution's Views and Comments:

Motorola Solutions has no Comment and View on Question 14

Question 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 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.**

Motorola Solution's Views and Comments:

Motorola Solutions has no Comment and View on Question 15

Question 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?**

Motorola Solution's Views and Comments: Motorola Solutions has no Comment and View on Question 16

Question 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.**

Motorola Solution's Views and Comments:

Motorola Solutions has no Comment and View on Question 17

Question 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?

Motorola Solution's Views and Comments:

Motorola Solutions has no Comment and View on Question 18

Question 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.

Motorola Solution's Views and Comments:

Motorola Solutions has no Comment and View on Question 19

=====END OF RESPONSE=====