



GSA¹ response to IMDA's Second Consultation on 5G Mobile Services and Networks

The GSA (Global mobile Suppliers Association) is an international organization of leading mobile communication suppliers. GSA welcomes the opportunity to make this submission to IMDA in response to the Second Consultation on 5G Mobile Services and Networks. GSA strongly supports IMDA's proposals to release the C-Band (3.4-3.6/3.7 GHz) and 26/28 GHz for 5G use.

In response to the questions raised in the consultation paper, we would like to provide following comments, where appropriate, for your kind consideration. If IMDA requires any clarification to our response, please do not hesitate to contact:

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Since 2017 when IMDA issued the first consultation paper on 5G mobile services and networks, we have observed strong accelerations of 5G eco-system development all over the world on every key aspects, including technologies, standards, equipment and devices, policy and regulations, spectrum availabilities, as well as 5G application and services. On device and network aspects:

- According to GSA data², as of May 2019, there were 64 announced 5G devices, 17 of which were phones / smartphones, based on chipsets from five silicon vendors.
- GSA has also reported infrastructure suppliers are supporting 235 Mobile Network Operators (MNO) in 93 countries where 5G networks have either been deployed, trialed, tested or licensed to deploy mobile 5G or home broadband 5G³.

C-band and the proposed Guard Band

GSA recommends IMDA to review the need for a large portion of unused spectrum between 3.6 GHz and 3.7 GHz to be devoted as a guardband.

¹ The [GSA \(Global mobile Suppliers Association, https://gsacom.com\)](https://gsacom.com) develops strategies and plans, and contributes studies and technical analysis to international, regional and individual country policy-makers and regulators to facilitate the timely availability of spectrum for use by mobile network operators. GSA has a focus group for spectrum topics for technical and regulatory matters of radio spectrum pertaining to the successful evolution of International Mobile Telecommunication (IMT) and associated radiocommunication systems and comprises a team made up of spectrum and regulatory affairs specialists from GSA Executive Member and GSA Member companies. The GSA Spectrum Group is participating in the study work leading up the World Radiocommunication Conference meeting in 2019 (WRC-19). In addition GSA reports regularly on global spectrum harmonisation efforts and developments including auctions, assignments, allocations, and re-farming activities.

² <https://gsacom.com/paper/new-5g-devices-ecosystem-may-update/>

³ <https://gsacom.com/paper/evolution-lte-5g-may2019/>



As an example, Nokia has developed several independent studies^{4,5,6} and filed these studies to the FCC when the US regulators started the proceeding of the C-band. The C-Band Alliance (FSS providers such as Intelsat / SES) has supported these studies⁷. The study demonstrates that 20 MHz guard band would be enough for a filter on the earth station receiver to provide the necessary rejection performance that would prevent 5G transmission from saturating the Low Noise Block converter (LNB) of the earth stations if that proves to be an issue.

Situation in Singapore needs further detailed analysis, taking into account the type of satellite earth stations receivers and their geographical distribution in Singapore as well as the associated FSS receiver specifications. Neighboring countries are planning to conduct C-band field trials to determine the technical and regulatory conditions for 5G usage in co-existence with satellite, and guard band is one of the conditions currently being studied. IMDA's consideration of conducting similar exercise is welcomed to better understand the guard band requirement between the 5G IMT and FSS systems based on Singapore's environment and actual spectrum use scenario.

Identifications of other 5G Bands

Regarding the expected availability of the next wave of 5G spectrum, GSA considers that IMDA should already start the feasibility study and potential migration of existing users especially for sub-700 MHz and 4.5 GHz (4.4-5.0 GHz).

The 600 MHz band is getting important in Americas and in some Asia-Pacific countries for IoT use in remote areas and for indoor penetration in urban areas. In the United States, following the Voluntary Incentive Auction of the 600 MHz band, T-Mobile completed the world's first 5G data transmission over "low-band" 600 MHz radio spectrum in November 2018. T-Mobile is looking for a broad and potentially fast rollout of 5G services across the United States on this band.

The 4.5 GHz could become a regional harmonized 5G band (e.g. in APAC and CIS) in near future, as complementary 5G band in sub-6 GHz spectrum. 3GPP has specified 5G NR Band n79 for 4400-5000 MHz in Rel-15, while China and Japan are deploying or testing 5G networks in this frequency band. Usage of this band for 5G in Singapore could benefit from the existing ecosystem developments and the economies of scale. As indicated in the IMDA paper, cross-border coordination and migration of existing users for this band may take time; therefore, we encourage IMDA to start the regulatory planning work for this band now in order to support next wave of 5G development.

GSA supports IMDA in its effort to make 700 MHz available in Singapore. We understand the challenge related to cross-border coordination and hope that a full use of this band will soon be possible as it is considered as a major band for 5G.

On 2.1 GHz, GSA welcomes IMDA decision for further consultation.

The 2.5 GHz spectrum band (based on 3GPP Band 7) is currently heavily used by MNOs and any refarming exercise will create uncertainty. GSA recognizes it is challenging to reform this band to 3GPP Band 41. We encourage IMDA to engage with MNOs on potential future use of this band for 5G.

⁴ <https://ecfsapi.fcc.gov/file/102976959340/Nokia%20Comments%20on%203.7%2010-29-2018%20FINAL.pdf>

⁵ <https://ecfsapi.fcc.gov/file/1203063247152/3%20GHz%20Correction%20Letter%20FINAL.pdf>

⁶ <https://ecfsapi.fcc.gov/file/12112324518278/Nokia%203%20GHz%20Reply%20Comments%20FINAL.pdf>

⁷ <http://www.intelsat.com/wp-content/uploads/2018/12/C-band-Reply-Technical-Annex-for-Reply-Comments-of-the-C-Band-Alliance-20181207.pdf>

Proposed spectrum allocation

GSA's view is that IMDA timeline for mmWave is justified, and GSA fully supports it. Nevertheless, the timeline for the 3.5 GHz band should be accelerated with an objective of making it available early 2020.

On technical level, GSA notes that SA architecture is already available with 3GPP Release 15; therefore, there is no need to couple SA with 3GPP Release 16.

Current IMDA proposal is not optimal with the 3400-3450 MHz left potentially unsold and a very conservative guard band of 100 MHz in 3600-3700 MHz. GSA encourages IMDA to create favorable conditions to enable releasing the 3400-3450 MHz spectrum.

Besides, GSA is of the view that it is feasible to reduce the guard band from the 100 MHz and it is possible to consider freeing up a portion of the guard band currently considered in the consultation paper for mobile service targeting for "unrestricted" use basis. We encourage IMDA to consider field trials to test the coexistence of IMT and FSS in order to reduce the guard band as currently considered for the 3.6-3.7 GHz; however, this should not delay the planned 5G spectrum releasing in Singapore.

GSA agrees that the portion of mmWave allocated is generous, with a preference for Option B.

License duration and coverage obligation

GSA considers that the coverage obligations within a 2 years period are fair and achievable. The spectrum right duration proposed by IMDA (between 12-15 years) is reasonable and it provides MNOs the necessary timeframe and incentives to continuously invest and upgrade their networks. In addition to the duration, transparent renewal conditions would justify continuing investments at near license end-dates, avoiding investments gaps until the license renewal.

Synchronisation of TDD networks

GSA's view is that more important than the spectrum allocation and bandwidth, is the need to define and agree on a common synchronisation and frame structure in place. This is key to maximise the utilisation of spectrum, due to eliminating the need for a guard band between networks.

Fixed Wireless Access

GSA welcomes IMDA position to *"allow MNOs to use existing and upcoming 5G spectrum rights for fixed-wireless services, as long as the spectrum is still primarily used for the intended mobile service"*.

Even if Singapore has an impressive fiber network penetration, IMDA should support all potential usage of 5G/FWA and support operators developing new usages and service.