



**MOTOROLA SOLUTIONS**

05 July 2019

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Director-General (Telecoms & Post),  
Assistant Chief Executive (Connectivity & Competition Development)  
Infocomm Media Development Authority  
10 Pasir Panjang Road  
#10-01 Mapletree Business City  
Singapore 117438

Dear Ms. Chia

Motorola Solutions thanks IMDA for the opportunity to present our views on the public consultation 'Proposed Policy Frameworks for the Allocation of 800 MHz, TDD 1900 MHz and FDD 2100 MHz Spectrum Bands.

Spectrum is a scarce natural resource. There is increasing demand for new wireless applications in frequency bands already allocated to mobile services for provision of local private networks for manufacturing, enterprises, logistics, utilities, mining, oil exploration and extraction, etc. In particular, there is growing interest in the use of broadband mobile technologies such as LTE, 5G-NR (New Radio), CBRS, etc for wireless applications beyond consumer mobile broadband. This interest is further influenced by the availability of global harmonized standards for the development of radio chipsets that can be adapted for different wireless connectivity solutions.

Spectrum where commercial mobile broadband technology can be used has generally been licensed on a national basis to enable operators to offer mobile services to meet consumer demand for mobile broadband. However, in order to meet the needs of local private networks for manufacturing, enterprises, logistics, utilities, mining, oil exploration and extraction, etc, dedicated spectrum needs to be made available to support the rollout of new wireless applications addressing local broadband connectivity needs through localized access. We consider that this is the most efficient way to meet this requirement. We consider that access to certain spectrum bands, where standardized mobile technologies are supported, could offer important benefits to such industries and enterprises, complementing the benefits from the award of national cellular operator licences. Specifically, we consider that this could unlock opportunities for innovation and facilitate new investment models.

The proposed allocation in 800 MHz for industries and enterprises supports innovation by unlocking the benefits provided by 4G and 5G broadband wireless technologies for applications beyond consumer mobile broadband. This needs to be further facilitated by providing an alternative mechanism than the current spectrum auctions, to access necessary suitable spectrum. Additional spectrum for localized use could provide connectivity solutions for the deployment of private networks across a number of sectors including industrial undertakings, entertainment complexes, science parks, resorts, utilities, airports, etc. We consider that early signalling of spectrum availability and easy terms of access of such spectrum removes spectrum uncertainty for innovation and provides clarity in support of equipment development for new wireless applications in bands where there is currently limited equipment ecosystem. Such a mechanism to access spectrum would also support infrastructure investment by new users looking to deploy private wireless communications within their premises. Providing additional spectrum allocation and assignment options for new users may also support new investment models. In order to encourage innovation and investment and to support new investment models, the aim should be to provide such specialized users more certainty over access to



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spectrum at low cost and to support a more predictable quality of service for services than could be offered through licence exempt use of spectrum.

Our Response to the consultation paper is enclosed.

Please do not hesitate to contact the undersigned should you require additional information or clarification.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Bhatia', with a horizontal line underneath.

**Bharat Bhatia**

Head of International Spectrum & Regulatory, Motorola Solutions

President ITU-APT Foundation of India (IAFI)

Chair, APT Task Group on Public safety and Disaster Relief (PPDR)

Chair, ITU Study Group WP5D SWG on PPDR

President Core Group of Telecommunications Industries of India (CTIA)



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## 1. Summary of Major Points

- i. New regulations encouraging the adoption of mobile technology across verticals to stir innovation and digital transformation across industries is key to the success of Singapore's advanced manufacturing avatar "Industry 4.0"
- ii. Demand from public safety, emergency services, industrial, business and enterprise users for dedicated and shared trunked (TR) networks is growing at a fast pace as Singapore enters the next phase of Industrial growth.
- iii. Public safety agencies, emergency services, industrial, business and enterprise users will continue using and expanding their trunked radio networks.
- iv. LTE and 5G services are needed to complement the mission critical trunked mobile radio systems to meet the increasing Data, video and Internet needs of such users. 3GPP bands 14, 26 and 28 are being adopted around the world to meet such demand in line with ITU WRC-15 Resolution 646.
- v. Band 27, which was developed by the 3GPP to meet the needs of some Latin American countries, has not taken off and there is no device ecosystem for this band. It is unlikely that this band will get any traction in the coming decades. see [LTE deployment by regions](#)
- vi. The band 806-813 MHz paired with 851-858 MHz needs to be retained for trunked radio to meet the continuing mission critical communications needs of Singapore PSA, Changi airport, Marina Bay Sands and other critical users.
- vii. The bands 814-819 MHz paired with 859-864 MHz and 819-824 MHz paired with 864-869 MHz should be refarmed and made available for private LTE networks at a low administrative price to serve the enterprise and industrial users to spur the success of Singapore's advanced manufacturing avatar "Industry 4.0"

## 2. Statement of Interest

Motorola Solutions is a leading global provider of mission-critical communications. Our technology platforms in communications, software, video, and services make cities safer and help communities and businesses thrive.

At Motorola Solutions, we are ushering in a new era in public safety and security. Public safety and commercial customers globally depend on our solutions to keep them connected, from everyday to extreme moments. We serve more than 100,000 customers in more than 100 countries and have a rich heritage of innovation spanning more than 90 years.

We are incorporated in Singapore as Motorola Solutions Singapore Pte Ltd at 80 Pasir Panjang Road, #18-81 Maple Tree Business City II, Singapore 117372 and our Asia Pacific Regional Headquarters is located there.

Globally, we are incorporated under the laws of the State of Delaware in USA as the successor to an Illinois corporation, Motorola, Inc., organized in 1928. We changed our name from Motorola, Inc. to Motorola Solutions, Inc. on January 4, 2011. Our principal executive offices are located at 500 W. Monroe Street, Chicago, Illinois 60661.

### 3. Q1-Motorola Solution’s Views and Comments:

**Question 1: IMDA seeks views on the proposed allocation approach for the 800 MHz spectrum band, in particular:**

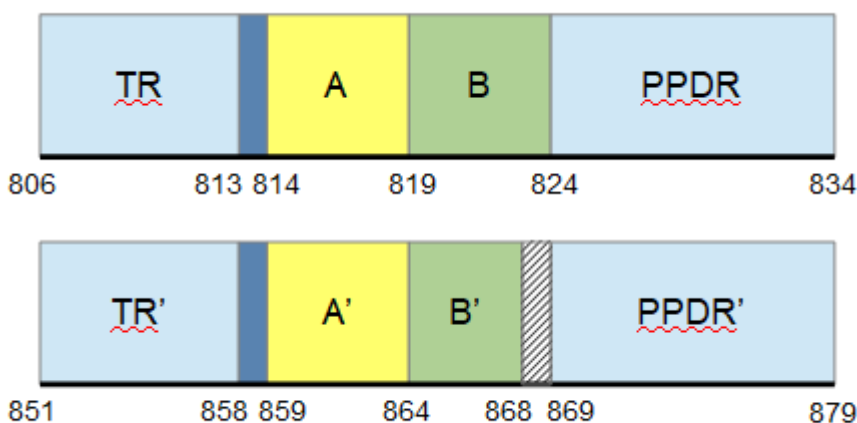
- (a) Whether the proposed lot sizes allow for meaningful use of the spectrum or if there are other alternative combinations of spectrum lot sizes that should be considered for efficiency reasons;**
- (b) Whether the proposed spectrum right duration is adequate from a business viability and investment perspective; and**
- (c) The reasons for your views on the above.**

Motorola Solution’s Views and Comments:

(1) We agree with the observation that the 3GPP LTE band 27 has so far not seen any deployment. 3GPP Band 26 already has a number of deployments and is expected to grow further. However; we do not expect any development of ecosystem for band 27, as this band was developed by 3GPP only for Latin America market and there are no operators in Latin America or anywhere else supporting band 27.

We further expect growing demand from public safety, emergency services, industrial, business and enterprise users for dedicated trunked (TR) networks. These users will continue using and expanding their TR networks. We propose that the band plan proposed in the consultation paper be slightly modified based on 3GPP Band 26.

We therefore propose that the band 806-813 MHz paired with 851-858 MHz be designated for TR; 813-814 MHz as guard band between narrowband and broadband terminals; 814-819 MHz paired with 859-864 MHz as Block A/A’, as the FROR block for Grid as a shared public trunked LTE network and 819-824 MHz paired with 864-869 MHz as Block B/B’ for a shared private LTE network to serve enterprise and industrial customers. This provides an option for users of private TR networks to upgrade to a shared broadband network in Block B/B’. The proposed band plan is illustrated below:





**4. Q2- Motorola Solution's Views and Comments:**

**Question 2: IMDA seeks views on the proposed allocation approach for the TDD1900 MHz spectrum band, in particular:**

- (a) Whether there is a need for additional filters if the guard band between FDD and TDD systems is 5 MHz, and the specifications of the required band-pass filter;**
- (b) Whether there are known technical frameworks for the co-existence of LTE-based networks operating in 3GPP band 1 and band 33/39;**
- (c) Whether the proposed lot sizes allow for meaningful use of the spectrum;**
- (d) Whether the proposed spectrum right duration is adequate from a business viability and investment perspective; and**
- (e) The reasons for your views on the above.**

Q2 – Our views and comments are summarised below:

(a) Motorola Solution believes that new regulations encouraging the adoption of mobile technology across verticals to spur innovation and digital transformation is key to the success of Singapore industrial growth in the coming decades. To accelerate this process, we encourage a licensing framework that enables enterprises to access such mobile spectrum with a licensing framework to enable localised licensing of mobile spectrum to enterprise and industrial users on a shared basis. We therefore support the IMDA proposal to identify the band 1905-1915 MHz for the provision of enterprise mobile service. We propose that IMDA explore the possibility of using the spectrum for localised shared private network use by enterprises and industries on an unlicensed or a lightly licensed basis rather than through auctions. . In addition we encourage the adoption of rules to allow access to shared spectrum on technology neutral rules.

(b) The analysis of coexistence and interference to adjacent bands has been extensively studied in the EU, APT and ITU. CEPT, in its report 152 (To undertake studies on the harmonised technical conditions for the 1900-1920 MHz and 2010-2025 MHz frequency bands), had concluded that the 3GPP technology in the adjacent bands can co-exist with low power TDD use. There are also other studies done in ECC, ITU-R WP5D and APT

(c) In order not to cause any adjacent channel interference, it is essential that the channel size for the TDD LTE in 1900 MHz band be limited to 5MHz. Therefore the preferred lot size should be 5 MHz.

(d) We agree that a 10 year spectrum right with possibility of extension is appropriate for such industrial applications.

**5. Q3- Motorola Solution's Views and Comments:**

**Question 3: IMDA seeks views on the proposed allocation approach for the FDD2100 MHz spectrum band, in particular:**

- (a) Whether the proposed FROR allocation allows existing 3G mobile network operators to serve the needs of their customers or if there are other alternative combinations of FROR allocations that should be considered; and**
- (b) Whether the proposed spectrum right duration is adequate from a business viability and investment perspective; and**



**(c) The reasons for your views on the above.**

Q3-Motorola Solution's has no comments

**6. Q4- Motorola Solution's Views and Comments:**

**Question 4: IMDA welcomes views and comments on the proposed allocation of the spectrum bands in the next allocation exercise, including on the proposed uses and spectrum right durations of the spectrum bands, the proposed "Clock Plus" auction format, the proposed reserve prices as well as the proposed spectrum caps and regulatory obligations to ensure the optimal use of spectrum.**

**Q4 Motorola Solution** applauds IMDA for their efforts to offer spectrum bands for localized Industrial and enterprise broadband systems at lower reserve prices. However, in our view, there is limited demand for such systems, even though they are essential for economic development and therefore such spectrum should be allocated by administrative pricing. We believe that such an approach will greatly improve enterprise, industrial broadband availability and productivity levels. The allocation of 800 MHz proposals put forth in the consultation nicely complement the existing public safety LTE spectrum allocation in 824-834/869-879 MHz which are made available through administrative allotment. Indeed, many LTE-Advanced and NR (4G as well as 5G) services can be offered in the proposed bands for Enterprise use. One only has to look at the success of the VHF, UHF and 800 MHz in supporting Singapore's industry and services sector in earlier days to point the way forward in the proposals for 800 MHz.

For the proposed 10 MHz block in 1900 MHz, it is recommended that the preferred approach should be unlicensed or a lightly licensed regime with a nil or a small administrative fees. This approach will support Singapore economic development.

We therefore believe that the spectrum pricing for the bands covered by questions 1 and 2 should be based on administrative allocation basis and not through auctions.

For the bands covered by Question 3, we have no comments.

**7. Conclusion**

Spectrum is a scarce natural resource. There is increasing demand for new wireless applications in frequency bands already allocated to mobile services for provision of local private networks for manufacturing, enterprises, logistics, utilities, mining, oil exploration and extraction, etc. In particular, there is growing interest in the use of mobile technologies such as LTE, 5G New Radio, CBRS, etc for wireless applications beyond consumer mobile broadband. This interest is further influenced by the availability of global harmonized standards for the development of radio chipsets that can be adapted for different wireless connectivity solutions.

Spectrum where commercial mobile broadband technology can be used has generally been licensed on a national basis to enable operators to offer mobile services to meet consumer demand for mobile broadband. However, in order to meet the needs of local private networks for manufacturing, enterprises, logistics, utilities, mining, oil exploration and extraction, etc, dedicated spectrum needs to be made available to support the rollout of new wireless applications addressing local broadband connectivity needs through localized access. We consider that this is the most efficient way to meet this requirement. We consider that access to spectrum in bands where mobile technology is supported could offer important benefits to such industries and enterprises, complementing the benefits from the award of national cellular operator licences. Specifically, we consider that this could unlock opportunities for innovation and facilitate new investment models.

The proposed allocation in 800 MHz for industries and enterprises supports innovation by unlocking the benefits provided by 4G and 5G broadband wireless technologies for applications



beyond consumer mobile broadband. This needs to be further facilitated by providing an alternative mechanism than the current spectrum auctions, to access necessary suitable spectrum. Additional spectrum for localized use could provide connectivity solutions for the deployment of private networks across a number of sectors including industrial undertakings, entertainment complexes, science parks, resorts, utilities, airports, etc. We consider that early signalling of spectrum availability and easy terms of access of such spectrum removes spectrum uncertainty for innovation and provides clarity in support of equipment development for new wireless applications in bands where there is currently limited equipment ecosystem. Such a mechanism to access spectrum would also support infrastructure investment by new users looking to deploy private wireless communications within their premises. Providing additional spectrum allocation and assignment options for new users may also support new investment models. In order to encourage innovation and investment and to support new investment models, the aim should be to provide such specialized users more certainty over access to spectrum at low cost and to support a more predictable quality of service for services than could be achieved through licence exempt use of spectrum.

New regulations encouraging the adoption of mobile technology across verticals to spur innovation and digital transformation across industries is key to the success of Singapore's advanced manufacturing avatar "Industry 4.0". Demand from public safety, emergency services, industrial, business and enterprise users for dedicated and shared trunked (TR) networks is growing at a fast pace as Singapore enters the next phase of Industrial growth. Public safety agencies, emergency services, industrial, business and enterprise users will continue using and expanding their trunked radio networks.

LTE and 5G services are needed to complement the mission critical trunked mobile radio systems to meet the increasing data, video and Internet needs of such users. 3GPP bands 14, 26 and 28 are being adopted around the world to meet such demand in line with ITU WRC-15 Resolution 646. Band 27, which was developed by the 3GPP to meet the needs of some Latin American countries, has not taken off and there is no device ecosystem for this band. It is unlikely that this band will get any traction in the coming decades. See [LTE deployment by regions](#)

The band 806-813 MHz paired with 851-858 MHz needs to be retained for trunked radio to meet the continuing mission critical communications needs of Singapore PSA, Changi airport, Marina Bay Sands and other critical users. The bands 814-819 MHz paired with 859-864 MHz and 819-824 MHz paired with 864-869 MHz should be refarmed and made available for private LTE networks at a low administrative price to serve the enterprise and industrial users to spur the success of Singapore's advanced manufacturing avatar "Industry 4.0"

\*\*\*\*\*End\*\*\*\*\*