



**MOTOROLA SOLUTIONS**

March 22, 2018

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**Subject: Comments to Consultation Paper on “Method of allocation of spectrum for Public Mobile Radio Trunking Service (PMRTS), including auction, as a transparent mechanism”.**

Dear Sir,

Motorola Solutions is a global leader in mission-critical communications products, services and solutions. Motorola Solutions connects people through technology. Public safety and commercial customers around the world turn to Motorola Solutions’ innovations when they want highly connected teams that have the information they need throughout their workdays and in the moments that matter most to them.

Our customers rely on us for the expertise, services and solutions we provide, trusting our years of invention and innovation experience. By partnering with customers and observing how our products can help in their specific industries, we are able to enhance our customers’ experience every day.

Motorola Solutions serves more than 100,000 public safety and commercial customers in more than 100 countries. Our wide-ranging product portfolio has the tools needed to get the job done in any business.

As an industry leader, we design and develop devices including radios and the infrastructure that supports them. Our mission-critical design philosophy led to our new High Velocity Human Factors investigation, an area of cognitive research that helps us develop products for first responders by working with them in crisis situations to study their communication needs. We take what we learn in the field and bring it back to the lab to create products

that will function under extreme conditions and networks that will reliably support those products.

Working with our global channel partner community, Motorola Solutions reaches an extensive customer base, from small businesses to Fortune 500 companies. Our focus is on developing integrated end-to-end solutions that deliver a clear return on investment, and our products empower individuals through seamless connectivity.

Our response to the Consultation Paper on “Method of allocation of spectrum for Public Mobile Radio Trunking Service (PMRTS) including auction, as a transparent mechanism” is enclosed for your consideration.

We will be happy to provide any further information or details as may be required by the Authority.

Sincerely,



**Subodh Vardhan**

Managing Director

Motorola Solutions India Pvt. Ltd.

## Motorola Solutions Response to TRAI PMRTS Consultation

### CHAPTER V: ISSUES FOR CONSULTATION

*Q1. Do you agree that existing License Service Area (LSA) based authorization criteria for PMRT service license is appropriate? If not, should there be a city/district based authorization aligned with spectrum allocations?*

#### **Answer to Q1:**

With migration of PMRTS to Unified License (UL), PMRTS licenses are also being issued for the Telecom Circle/Metro Area. We think this is appropriate considering the expanding geographical boundaries of cities and need for PMRTS services to be offered to customers in several areas within the LSA.

While we agree that PMRTS networks are different from cellular and may not be rolled out seamlessly across the entire LSA, but we expect that with a simpler regulatory framework, we could see these networks growing to cover several cities within one LSA, as well as industrial areas like mines, factories, refineries etc. within the LSA.

We recommend that once a set of frequencies are allotted to an operator for a city within an LSA, the operator should be allowed to reuse those frequencies anywhere in the LSA (subject to additional payment, based on the number of places they are reusing the spectrum). This will speed up the spectrum allocation process and enable faster deployment of networks, as well as additional revenue for DoT. The current system of applying for spectrum city wide is cumbersome and time consuming.

Also, for metro LSAs like Delhi NCR, spectrum should be allotted for the entire LSA.

The current policy of starting with only 5 channels and getting additional channels on achieving a loading of 450 users should be removed. The initial allocation of channels should be made based on the operator's rollout plans and legitimate requirement. Also, operators should be allowed to import trunking radios freely so that they can load the maximum number of radios on their networks. The current restriction of only allowing them to import (90 + 10%) radios per channel should be removed.

*Q2. Do you suggest any other criteria/change in license/ area of authorization for PMRT service? Elaborate your suggestions with supporting facts.*

**Answer to Q2:**

The current system of LSA based license allocation for PMRTS services is adequate. Once an operator has taken a license for the LSA, they should be free to rollout service anywhere within the LSA. As requested above, spectrum allocation in additional cities/coverage areas should be automatic. So if an operator in LSA1 has 5 channels in city A, he should be free to reuse those channels in cities B, C etc within the same LSA, on payment of additional charges. This process should be simplified to encourage faster rollout.

As stated above, the current policy of starting with only 5 channels and getting additional channels on achieving a loading of 450 users should be removed. The initial allocation of channels should be made based on the operator's rollout plans and legitimate requirement. Also, operators should be allowed to import trunking radios freely so that they can load the maximum number of radios on their networks. The current restriction of only allowing them to import (90 + 10%) radios per channel should be removed.

*Q3. Do you suggest any change in the duration of license from the present duration of 20 years? Please provide supporting justification.*

**Answer to Q3:**

PMRTS services are meant for a niche set of customers looking for one-to-many critical group radio communications across a wide geography. This requires PMRTS operators to deploy large infrastructure to cover the entire geographical coverage area by putting multiple repeater sites, backhaul connectivity, procuring spectrum from WPC and maintaining these sites. The customers that use PMRTS services only pay a nominal rental per month. The duration of assignment of license and spectrum should be such that a PMRTS service provider is able to recover the costs and able to sustain for long in the market. The present duration of 20 years for the PMRTS license is adequate. However, there should also be an option to extend the license at end of the 20 year period.

*Q4. Keeping in view the existing PMRT services market size and growth potential, which methodology of allocation of spectrum will be most suitable for PMRT services?*

*(a) Auction (or)*

*(b) Administrative allocation*

*Kindly provide supporting arguments for your choice.*

**Answer to Q4:**

The market for PMRTS is relatively small. As per Table 3.2, the total number of PMRTS subscriber users is barely 53,000 as compared to 1,200 million for cellular. Besides, PMRTS

services are also limited to certain cities/LSA service areas where there is demand for such services. Unlike cellular services, it is not intended for general public, but is mainly meant to provide communications among a group/organization. It is mainly meant for one-to-many group based radio communication and has a limited customer base in areas like Logistics companies, Ambulance services, Manufacturing, Oil & Gas, Taxi Fleet Services, Utility services, Transportation (Highways, Ports) etc. However, based on new policy, PMRTS has been clubbed alongside Cellular services as part of the UL (Unified License) regime. PMRTS services are targeted at a niche customer base and hence the PMRTS services have witnessed almost stagnant growth in past 5 years as evident from Chart 2.1 and 2.2 of the paper. Even TRAI's own previous recommendations highlight the same. In view of the above, Administrative allocation should be considered for allocation of spectrum for PMRTS services.

*Q5. Do you propose any other methodology other than the options provided in Q4 above for allocation of spectrum for PMRTS? Please provide detailed justifications.*

**Answer to Q5:**

No. We believe Administrative Allocation is the correct methodology for this.

*Q6. If you have opted for auction as the methodology for allocation of spectrum for PMRTS, (a) What criteria/norms should be there for auction of spectrum so that efficient utilization of the spectrum is ensured? Should there be preference for Digital PMRTS networks? (b) Should the spectrum auction be held on LSA basis or city basis? (c) What should be the effective date of allocation of spectrum (if won through the process of auction)? (d) What should be the rollout obligations for PMRT service providers? (e) What should be the penalty to be imposed in case of non-compliance of roll out obligation? Please provide detailed justifications?*

**Answer to Q6:**

Not applicable.

*Q7. If you feel administrative allocation is the best methodology, then (a) Are the existing criteria of assignment of RF carriers sufficient or should there be different criteria/norms for assignment of spectrum? If existing criteria is not sufficient, what are the proposed criteria for such assignments so that efficient utilization of the spectrum is ensured?*

*(b) Should administrative price of spectrum be calculated LSA wise? If yes, what should be the basis and formula for determination of administrative price? Suggest alternate calculations, if any.*

**Answer to Q7:**

a) As per current license conditions for PMRTS, not more than five channels (frequency pairs) are allotted initially for Analog system and for Digital systems up to 30 frequency channels (25 kHz each) depending on the availability and justification. Any additional RF frequency pair is allocated only when 90% of capacity is reached. The capacity calculations are driven by the consideration of loading of 90 radios per channel.

Most of the current PMRTS networks are Analog and hence have very limited frequency allotted. There are two key parameters that determine the requirement of frequencies or number of RF carriers i.e. Coverage and Capacity. Typically a PMRTS service provider will need to rollout a network to cover the entire city or service area from the very beginning in order to provide services to its customers. Given that these PMRTS networks are deployed using high power repeater sites so as to cover maximum area with minimum number of sites, the frequency reuse is also limited. Lastly, in terms of capacity, the PMRTS service provider would aim to garner maximum possible users across its network. However, the repeater sites within main city area would always have higher loading as compared to repeater sites on the periphery.

The framework of considering 90 radios per channel is only a guiding factor. It should not form the basis of allocation of spectrum. Allocation of frequency should not be limited to 5 pairs. It should be based on the technical evaluation and justification based on coverage and capacity calculations.

PMRTS service providers should be encouraged to migrate to Digital from currently mostly Analog networks. They should be incentivized to do so and no new licenses or extension of licenses should be permitted in Analog. Contemporary digital technologies like TETRA (4 voice paths in 25 kHz), P25 Phase 2 (2 voice paths in 12.5 kHz) and DMR (2 voice paths in 12.5 kHz) all provide 6.25 kHz equivalent voice paths. These are four times more spectrally efficient than legacy analog systems that offer one voice path in 25 kHz.

If the PMRTS operator can load more users per channel, then they should be incentivised. Limiting number of users per channel is limiting revenue of DoT & PMRTS operator. Adding more subscribers per channel will not only enable the operator to generate more revenue, it will also generate more revenue for DoT.

In order to promote migration to Digital, there should be technology standardisation based on open standards like TETRA, APCO P25 and DMR which are globally recognised truly open standard technologies as also adopted by ITU.

b) We recommend no change to the current method of administrative pricing for spectrum.

*Q8. Out of the bands discussed in Table 3.2 above, which are the preferable bands for the PMRT services in India? List out in the order of priority. Are the bands suggested by DoT as mentioned in the Table 3.3 will be adequate to cater for the spectrum requirements of PMRTS?*

**Answer to Q8:**

Currently, 811-814 MHz paired with 856-859 MHz is being used for Digital and 814-819 MHz paired with 859-864 MHz is being used for analog PMRTS networks. In our view, this much spectrum is sufficient for PMRTS. The analog networks should be migrated to digital, for deriving significantly better spectrum efficiency.

*Q9. Taking into consideration the existing allocation by DoT and Authority's latest recommendation for delicensing spectrum for M2M, would it be feasible to consider the band 819-824 MHz/ 864-869 MHz for allocation to PMRTS licensees?*

**Answer to Q9:**

8+8 MHz spectrum as identified in response to Q8 above is sufficient.

PMRTS-PSTN Interconnect as well as PMRTS-PMRTS Interconnect at network level should be permitted.

There should be a mandate to migrate to Digital technologies and suitable incentives should be provided to encourage the migration. For example certain extra number of channels (e.g. 25 channels) can be reserved and allotted to PMRTS operators migrating from Analog to Digital.

Q10. Which other candidate band will be most suitable for PMRTS if the band 819-824 MHz/ 864-869 MHz (5 MHz) is not to be considered for allocation to PMRT services? Please support your answer with facts.

**Answer to Q10:**

Considering the availability of equipment for open technology standards like TETRA, APCO P25 and DMR, the other candidate band could be IND 29 wherein up to 3 MHz spectrum could be allotted for PMRTS services.

*Q11. What should be the minimum block size of spectrum to be put for auction? How contiguity of spectrum can be ensured.*

**Answer to Q11:**

We do not support spectrum auctions for PMRTS.

*Q12. In case spectrum is to be auctioned, which methodology / approach(s) should be adopted for valuation and associated reserve price of Spectrum for PMRTS and why? Please justify your answer.*

**Answer to Q12:**

We do not support spectrum auctions for PMRTS.

*Q13. In case spectrum is to be auctioned, which methodology/approach(s) should be adopted for calculation of spectrum usage charge? Please justify your answer.*

**Answer to Q13:**

We do not support spectrum auctions for PMRTS.

*Q14. Whether the concept of spectrum cap shall be applicable on assignment of spectrum to the licensees for PMRTS? Justify your answer.*

**Answer to Q14:**

The concept of spectrum cap is typically considered to prevent the various service providers from hoarding large chunks of spectrum and working in an anti-competitive manner. Such spectrum cap makes sense for critical Cellular access spectrum. However, in this case of PMRTS, there are very few service providers and there is no lack of spectrum. Hence there should not be any spectrum cap applicable on assignment of spectrum to licensees for PMRTS at this stage.



*Q15. In case you are of the view that provision of spectrum cap should be there, what should be the mechanism for applicable spectrum cap?*

*(a) Whether any one of the spectrum cap i.e. intra-band or overall shall suffice the requirement as of now or*

*(b) both caps should be made applicable simultaneously?*

*(c) What should be the appropriate criteria for spectrum cap?*

**Answer to Q15:**

As there is no shortage of spectrum for PMRTS, there is no reason for any spectrum caps.

*Q16. What should be the duration/validity of assignment of spectrum to PMRT service provider? Should it be with the same duration as that of the license (20 Years)? Please support your answer with facts.*

**Answer to Q16:**

The duration of validity of the allocation of spectrum should be aligned to the validity of the PMRTS license i.e. 20 years. The assignment of spectrum needs to be administered on long term basis to boost confidence of PMRTS service providers and the industry as they invest large CAPEX for rollout of such PMRTS networks and need adequate time duration to recover their costs and sustain.

*Q17. If the duration of validity of spectrum is to be made lesser than the validity of license, should there be an option with the licensee to renew? What should be the specific conditions for such renewal?*

**Answer to Q17:**

The duration of validity of spectrum should be aligned to the validity of the PMRTS license.

**In addition to the questions above we also provide some additional information relating to Prevailing Mobile Digital Radio Trunking Technologies covered under CHAPTER I: INTRODUCTION**

**iv. DMR (Digital Mobile Radio)**

Details mentioned in the consultation paper do not provide important features and capabilities of DMR technology, we provide below mentioned details for DMR technology for information. Further details are available on the ETSI website

<http://www.etsi.org/website/document/technologies/leaflets/digitalmobilradio.pdf>

Digital Mobile Radio (DMR) is a standard that has been developed by ETSI which sets out a digital radio specification for professional, commercial and private radio users. In practice, DMR manufacturers have focussed on building products for the professional and commercial markets for both licensed conventional mode operation (known as DMR Tier II) and licensed trunked mode operation (known as DMR Tier III).

DMR is a two slot Time-Division Multiple Access (TDMA) system offering low cost and flexible digital voice and data solutions, and uses a well established 4FSK modulation scheme. The TDMA implementation in DMR offers a spectrum-efficiency of 6.25 kHz per channel whilst also giving the ability to deliver the advanced features that professional users require. DMR TDMA also brings low infrastructure costs as one repeater can deliver two communication paths. DMR also offers great power efficiency.

The standard is designed to operate within the existing 12.5 kHz channel spacing used in licensed land mobile frequency bands around the world so making user migration from analogue to digital seamless. Today, products designed to DMR are sold in all regions of the world and a wide group of leading manufacturers are producing or have declared an intention to produce DMR products, giving users a high degree of supplier choice. The modulation is 4-state FSK, which creates four possible symbols over the air at a rate of 4,800 symbols/s, corresponding to 9,600 bit/s.