



Telecom Regulatory Authority of India



Recommendations

on

**“Method of allocation of spectrum for
Public Mobile Radio Trunking Service (PMRTS)
including auction, as a transparent mechanism”**

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CHAPTER I: INTRODUCTION

- 1.1 Public Mobile Radio Trunking Service (PMRTS) is a two-way mobile radio service in which users communicate amongst themselves in a designated group, talk through a pair of radio frequencies which get assigned out of a common pool of frequencies in a designated frequency band.
- 1.2 PMRTS is a well proven niche market service having its unique capability of communication instantly within the closed user group (CUG). The service has found its growing prominence in all critical infrastructure sectors such as Manufacturing, Oil & Gas, Mining, Construction, Courier, Emergency Medical Services, Utilities, Transportation (Road, Airports, Harbours), Energy & Communication, Fire & Safety department of public utilities. The market for the trunking services is growing slowly but steadily in the country and has been particularly driven by the development and deployment of infrastructure such as sea ports, airports, metro rail projects, industrial plants, hubs, etc.
- 1.3 The demand for better performance and reliable system has shifted the strategic direction of service providers and users worldwide towards migration to digital technology. Digital Trunking Radio Systems are available in various proprietary standards. Advanced digital technologies provide spectrum efficient and reliable communication by offering and managing a pool of radio channels for use by radio subscribers automatically.
- 1.4 As of March 2018, the total number of subscribers of PMRTS in India is 56,660 showing a growth of about 2.4% over the previous year. Presently, 8 service providers are providing services in 34 cities which fall in 11 Licensed Service Areas (LSAs).

Background

- 1.5 Department of Telecommunications (DoT) opened up PMRTS as value-added service in the year 1995. Initial PMRTS license was issued in the country in 1995 and 1996. Licenses were issued to all applicants administratively.
- 1.6 Subsequent to the introduction of NTP 1999, the Authority on the basis of a reference from DoT, issued its recommendations in December 2000 on the following-
 - entry of additional PMRTS providers,
 - extended period of license in respect of the existing licensees,
 - transition from analog to digital technologies, etc.
- 1.7 Pursuant to the Authority's recommendations, DoT in November 2001, issued detailed guidelines for migration of existing PMRTS licenses to digital technology and issue of fresh licenses.
- 1.8 In November 2002, DoT requested the Authority for recommendations on issues concerning PMRTS raised by Mobile Trunked Radio Operators Association (MTROA). In January 2003, the Authority issued its recommendations covering the following issues:
 - Increase in quantum of PSTN connectivity
 - Separate numbering scheme for PMRTS
 - Extension of the service area to cover Local Charging Area.
 - License Fee
 - Choice of technology for new Licenses
 - Service Area
- 1.9 In 2006, DoT issued an amendment to the clause B(ii) and clause B(iii) of the guidelines dated 1st November 2001. Vide circular No.311-80/2001-VAS (Vol.II) dated 14th July 2006, DoT issued amendment to the license agreements for PMRTS consequent to migration to new licencing regime under NTP-99, superseding earlier amendments to the PMRTS licence agreement issued vide letter No.311-80/2002-VAS dated 30th October 2002.

- 1.10 DoT through its letter no. L-14027/08/2016-NTG dated 13th July 2017 (Annexure-I), has sought the recommendations of the Authority under the terms of clause 11 (1) (a) of TRAI Act, 1997 (as amended) on the following points-
- a) Method of allocation of spectrum for PMRTS
 - b) Appropriate frequency bands for PMRTS
 - c) Block size for PMRTS
 - d) Duration/Validity period of spectrum for PMRTS
 - e) Area of service
 - f) Reserve price and applicable SUC for PMRTS in different bands
 - g) Applicable spectrum cap for PMRTS
- 1.11 Upon examining the reference, the Authority realised that other methods of allocation of spectrum such as administrative allocations etc. apart from the auction mechanism were also open for consideration. Consequently, through the letter dated 8th August 2017, TRAI sought clarity from DoT as to whether it is legally tenable to allocate spectrum by any mechanism (viz. administrative) other than auction and informed DoT to take a policy decision in consultation with the Ministry of Law.
- 1.12 In response, DoT through letter dated 6th February 2018, informed the Authority that-
- “Regarding the methodology of spectrum allocation (and its legality) - auction or otherwise -a policy decision will be taken by DoT, as advised by TRAI. Notwithstanding that, TRAI may provide its considered recommendations as requested by DoT.”*
- 1.13 The Authority issued the Consultation Paper (CP) on 8th February 2018. In the CP, the specific issues like the aspects of methodology of allocation of spectrum, duration of license, assignment of spectrum (throughout the license area or city wise), preferable frequency bands for PMRTS, block size, reserve price, spectrum cap etc. were raised. Comments on the Consultation

Paper were invited from the stakeholders by 22nd March 2018 and counter-comments by 5th April 2018.

- 1.14 In response to the CP, the Authority received 09 comments and 03 counter comments from the stakeholders. These were placed on the TRAI website <http://www.trai.gov.in/>. An Open House Discussion (OHD) was conducted on 16th May 2018 at Delhi. After analyzing various issues involved and also considering the comments received from stakeholders in their written responses and during the OHDs, the Authority has finalized these recommendations.
- 1.15 For drafting this recommendation, various documents available in the public domain, published by government agencies/departments, telecom regulators in many countries, research agencies/institutions, academic institutions, telecom vendors, operators and international agencies/forums etc. were referred with the purpose to make the recommendation balanced and comprehensive. Excerpts from certain documents, which had domain relevance, are also included in this recommendation.
- 1.16 The recommendations comprise of four chapters. Chapter-II discusses the licensing criteria for PMRTS. Chapter-III covers the allocation of spectrum, spectrum charges and spectrum bands for PMRTS. Chapter-IV lists the summary of the recommendations.

CHAPTER II: LICENSING CRITERIA FOR PMRTS LICENSE

A. LSA based authorization criteria for PMRTS license

- 2.1 Under the Unified License (UL) regime, license is granted for providing PMRTS on Licensed Service Area (LSA) basis instead of earlier practice of city/district wise. However, spectrum is allotted for PMRTS on city basis. The Authority raised the issue in the CP for comments of the stakeholders on whether the existing LSA based authorization criteria for PMRTS license is appropriate or there should be a city/district based authorization aligned with spectrum assignments.
- 2.2 In response, all stakeholders opined that in view of the expanding geographical boundaries of cities and need for PMRTS to be offered to customers across large areas outside the city, current LSA based authorization criteria is appropriate.
- 2.3 One of the stakeholders further submitted that for any spectrum based service, the service area should continue to be defined on LSA basis as otherwise there is a possibility of misuse.

Analysis

- 2.4 As per existing condition under UL, the Service Area of PMRTS shall be the Telecom Circle/Metro Area similar to as defined for Access Service authorization with duration of 20 years. All the stakeholders are also in favor of LSA based authorization criteria for PMRTS License. The Authority concurs with the views of the stakeholders that the existing LSA based authorization criteria for PMRTS license should be continued.
- 2.5 **Accordingly, the Authority recommends that the existing Licensed Service Area (LSA) based authorization criteria for PMRTS license should continue.**

B. Duration of PMRTS license

- 2.6 The Authority further sought comments of stakeholders on requirement of any change in the duration of license from the present duration of 20 years.
- 2.7 In response, all the stakeholders were of the view that the present duration of 20 years for PMRTS license is adequate and no change is required because the PMRTS infrastructure is very expensive and life of the PMRTS infrastructure is 15-20 years, further extendable to another 5-7 years. There is a need to safeguard the huge investment of the PMRTS licensee as well as end users' investment in terminals, based on the life of equipment. However, there should also be an option to extend the license at end of the 20 year period.
- 2.8 The stakeholders further submitted that PMRTS is meant for a niche set of customers looking for 'one-to-many' critical group radio communications across a wide geography. This requires PMRTS providers 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 only pay a nominal rental per month. The duration of assignment of license and spectrum should be such that a PMRTS provider is able to recover the costs and able to sustain for long in the market.

Analysis

- 2.9 Considering the investments made by PMRTS providers in the sector and in alignment with UL regime, the Authority is of the view that the existing duration of 20 years for PMRTS license should continue.
- 2.10 **Accordingly, the Authority recommends that the existing provision of duration of 20 years for PMRTS license should continue.**

C. Methodology of allocation of spectrum

- 2.11 As highlighted in the CP, DoT in the year 2014 had informed the Authority that spectrum assignments were being made administratively at administrative spectrum charges on formula basis to certain category of public / commercial service providers such as Internet Service Providers (ISPs) and PMRTS and had, inter-alia, sought the recommendations of the Authority on the methodology of allotment of spectrum and spectrum pricing to such public / commercial service providers. In view of the DoT reference, the Authority requested DoT to take a policy decision as to whether it is legally tenable to allocate spectrum by a mechanism (viz. administratively) other than auction in consultation with Ministry of Law. Accordingly, DoT reference was returned to take appropriate decision in the matter and seek fresh recommendations.
- 2.12 DoT vide its Office Memorandum O.M. No. R-11014/15/2012-NT dated 9th January 2014, as an interim measure, for a period upto 31st March 2014, allowed to continue spectrum allotment on administrative basis at administrative prices for PMRTS. However, in subsequent O.M. dated 8th June 2015, DoT didn't continue with provisional assignment of spectrum to PMRTS providers whereas the interim assignment of the spectrum to the Government, PSU and Private users for captive usages, satellite networks of broadcasting and captive VSATs, commercial satellite usages (DSNG / Commercial VSATs / teleport / DTH / NLD / ILD / HITS / INMARSAT) etc were continued for a period of six months.
- 2.13 The concerns of PMRTS providers regarding allotment of fresh spectrum and continuation of services on expiry of their licenses, which were set to expire in October 2015 and May 2016, were referred to DoT by the Authority vide letter dated 14th October 2015. Accordingly, DoT vide O.M. dated 12th May 2016 decided, as an interim measure, for a period upto 28th June 2016, to continue the allotment of spectrum administratively at administrative pricing to PMRTS providers on conditional basis.

- 2.14 DoT has mentioned in its reference that spectrum allotted to PMRTS providers is provisional and can be taken back before the assignment of spectrum through auction. Further, as per the title of the letter under reference, DoT has sought recommendations of the Authority on method of allocation of spectrum for PMRTS including auction, as a transparent mechanism. This implies that other methods of allocation of spectrum such as administrative allocations etc. apart from the auction mechanism are also open for consideration.
- 2.15 Keeping in view of the above, the Authority raised the issue in the CP and sought stakeholder's view on appropriate methodology of allocation of spectrum for PMRTS, considering the factors such as the existing PMRTS market size, demand and supply of spectrum, competition in the market and growth potential.
- 2.16 In response, most of the stakeholders were of the view that the allocation of spectrum for PMRTS should be done administratively. The stakeholders mentioned that unlike cellular access services, PMRTS is a relatively small industry and hence methodology of spectrum allocation could be different. Assignment of spectrum through auction can only be considered if there is a clear cut demarcation of spectrum for PMRTS. In the current analog PMRTS band of 814-819 MHz/859-864 MHz, there are 200 channels with 25 KHz channel spacing. In this band of 5 MHz, if PMRTS is deployed using spectrally efficient digital technologies, it would result in 800 channels with a channel spacing of 6.25 KHz. This shows that there is no scarcity of spectrum.
- 2.17 One stakeholder argued that the Hon'ble Supreme Court guidelines of 2012 on method of spectrum allocation do not preclude consideration of other methods of allocation of spectrum other than auction. Few stakeholders submitted that DoT has been allowing/assigning spectrum on administrative basis to similar services called Captive Mobile Radio Trunking Service (CMRTS) which uses same technology and has same end use.

- 2.18 One stakeholder was of the view that the spectrum allocation should be continued to be done administratively until at least 25% of the available spectrum is consumed.
- 2.19 Most of the stakeholders were of the view that since there is no need for contiguous spectrum to be assigned to the operator in the PMRTS industry, the current process of allocation for spectrum i.e., administratively on the first come first serve basis is appropriate.
- 2.20 On the contrary, one stakeholder was of the view that the allocation of spectrum for PMRTS should be done through auction. The stakeholder argued that the steady growth of the service and the demands being placed by existing operators as highlighted in the consultation paper is testimony to the growth potential of the service. Moreover, the entire access spectrum must be allocated only through auctions. However, the auction methodology, reserve price, rollout obligations etc. may be defined keeping in mind the nature of the service.
- 2.21 Another stakeholder submitted that auction is not the appropriate method for allocating PMRTS spectrum. However, in case the Authority chooses to allocate spectrum through auction, there should be no roll-out obligations. In either case, the effective date of allocation of spectrum should be the date on which assignment is made and the service providers should be charged from the date of allocation of spectrum. Further, geographically, the allocation shouldn't be LSA or city-based. Instead, a geographical allocation on the basis of radial distance would be the way forward.

Analysis

- 2.22 Upon seeking certain clarifications on the subject, DoT had informed the Authority that-

“Regarding the methodology of spectrum allocation (and its legality) - auction or otherwise - a policy decision will be taken by DoT, as advised by TRAI.

Notwithstanding that, TRAI may provide its considered recommendations as requested by DoT.”

2.23 In the cellular industry there are millions of subscribers and high usage of voice, video and data results in constant demand for additional spectrum. On the contrary, PMRTS is a niche service used only by limited institutional clients in certain pockets with a total PMRTS subscriber base of approximately 56 thousand radio users nationally. Moreover, the spectrum requirement is relatively low. In the financial year 2017-18, the revenue generated by the PMRTS providers was only about Rs.35 (Thirty Five) crore¹ and the Royalty and Spectrum Fee charges paid by the PMRTS providers was less than Rs.1 (One) crore. PMRTS cannot be equated and compared with wireless access service provided by licensees under the licensing framework of CMTS, UASL and UL in terms of business potential, subscriber base, spectrum requirement and revenue.

2.24 With technological advancements, the channel size for a voice path has shrunk from 25 KHz to 6.25 KHz, thus making available the spectrum four times to the existing assignments. For example - the current PMRTS band of 811-814 MHz (3 MHz) has 120 channels of 25 KHz carrier bandwidth (as per Channeling Plan 6 of NFAP 2011), which if allocated for deployment with latest spectrum efficient digital technologies, would result in an availability of 480 Channels, which shall provide adequate room for the future expansion of existing licensees as well as entry of new PMRTS licensees. Since the spectrum is being assigned on city basis to the licensee, the factor of re-use of the spectrum beyond city boundaries provides for ample supply of number of channels within the LSA that in most cases can cater to the additional spectrum requirements for rolling out services in new as well as existing areas.

¹ As per the information provided by the operators

2.25 In total 38.9 MHz of spectrum has been identified for Radio Trunking Service (PMRTS and CMRTS) in NFAP-2011. Out of this, presently, assignments of spectrum for PMRTS are done in 3 bands viz 811-814 MHz/856-859 MHz, 814-819 MHz/859-864 MHz & 338-340 MHz/348-350 MHz, which is a total of 10 MHz. According to the data supplied along with the reference from DoT, in the band 811-814 MHz/856-859 MHz, 120 channels of 25 kHz are available in each city. Out of this, as per demand, maximum only 5 channels have been assigned in a city. Similarly, in band 814-819 MHz/859-864 MHz & 338-340 MHz/348-350 MHz, the demand for the no. of channels is very less compared to the availability.

2.26 As detailed in CP, 85.76% of existing RF assignments is in the 814-819 /859-864 MHz band followed by 9% and 5.24% in 338-340 /348-350 MHz and 811-814/856-859 MHz bands respectively. The existing channel assignments and future demand as received from DoT on LSA basis has been shown in table 2.1 below-

Table 2.1: LSA wise existing channel assignments and future demand²

	Existing networks			Demand / Upcoming networks				
LSA	Number of cities having RF Channels assignments	Maximum Number of service providers in a city	Total number of RF Channels assigned (a)	Number of cities seeking additional/ fresh RF Channels assignments		Number of RF Channels requested for assignment city-wise (b)		Total number of channels c=(a)+(b)
				Already assigned cities	Addl. Cities	Already assigned	Addl. Req.	
Andhra Pradesh	02	1	50	02	01	12	05	67
Bihar					01		1	01
Delhi	03	2	90	03		47		137
Gujarat	08	02	66	08	15	30	23	119

² As per the data supplied by DoT along with reference

	Existing networks			Demand / Upcoming networks				
LSA	Number of cities having RF Channels assignments	Maximum Number of service providers in a city	Total number of RF Channels assigned (a)	Number of cities seeking additional/ fresh RF Channels assignments		Number of RF Channels requested for assignment city-wise (b)		Total number of channels c=(a)+(b)
				Already assigned cities	Addl. Cities	Already assigned	Addl. Req.	
Haryana					01		1	01
Karnataka	01	02	45	01	02	15	32	92
Kerala	10	01	50	01		5		55
Kolkata	01	1	20	01		5		25
Madhya Pradesh	01	1	10	01		5		15
Maharashtra	02	02	30		02		2	32
Mumbai	04	03	80	03		105		185
Orissa					03		7	7
Rajasthan	01	2	10	01	01	5	1	16
Tamil Nadu (including Chennai)	01	2	45	01	01	36	5	86
West Bengal					01		1	01
Total	34	19	496	22	28	265	78	839

2.27 Taking into consideration the details tabulated above, it appears that the concentration of service providers in a city varies across LSAs. The number of service providers varies from one (1) service provider to maximum three (3) service providers operating in a city. Total numbers of carriers assigned as on date are 496 across all the bands and there is additional combined demand of 343 numbers of carriers by the service providers in existing and upcoming cities.

2.28 In view of the foregoing, it appears that there are adequate channels of spectrum available for assignment to the licensees. The supply is far

exceeding the demand of spectrum and due to niche type of service the future growth trajectory cannot be expected to be too large. The Authority is of the view that auction of spectrum for such a small industry in which the availability of spectrum is far in surplus is not worthwhile. Even if auction is chosen as the method of allocation of spectrum for PMRTS with reserve price determined in accordance to the nature of service, with this market scenario, the spectrum auction is very unlikely to be successful as in all likelihood the spectrum would be sold at reserve price only. Therefore, auction of spectrum does not appear to be the appropriate method for assignment of spectrum for PMRTS.

- 2.29 **Accordingly, the Authority recommends that taking into consideration factors viz. PMRTS market conditions; low spectrum demand and high spectrum availability; the assignment of spectrum for PMRTS should be made administratively on the basis of demand.**

CHAPTER III: ALLOCATION OF SPECTRUM, SPECTRUM CHARGES AND SPECTRUM BANDS FOR PMRTS

A. Criteria for assignment of channels and Import License for Mobile Stations

- 3.1 As per the PMRTS license condition, the existing criteria for the channels assignments and loading provides that:-
- *No interconnection among two separately licensed systems will be permissible.*
 - *Separate license will be required for operating in another frequency band irrespective of same base station / repeater station sites being used for the new system.*
 - *Initially, not exceeding five channels (frequency pairs) will be assigned for PMRTS analogue system and for Digital system upto 30 frequency channels (25 KHz each) depending on the availability, justification and actual usage of the same. Further additional channels will be considered subject to availability of frequency spectrum in the designated frequency bands in the particular service area and after taking into account growth of service. This will include the control channel also.*
 - *The mobile trunked radio channels must have a minimum numbers of mobiles on a per channel basis with 90 mobiles being considered as acceptable usage for analogue system. The loading per channel for digital system will be much higher in comparison to analogue system. The minimum numbers of mobiles on a per channel basis for digital system will be decided in consultation with TEC. The Licensor reserves the right to withdraw the assigned channels if subscriber based criteria is not met or the channels are not used as per the assigned technical parameters.*
- 3.2 In CP, the options of methodologies of allocation of spectrum either through auction or administrative assignments have been discussed in detail. Keeping in view the demand and supply aspects, submissions of

the stakeholders and market growth in the past, the Authority in para 2.29 above has recommended administrative assignment of the spectrum for PMRTS. A related issue was raised in the CP seeking stakeholder's view on whether the existing criteria of assignment of RF carriers is sufficient or should there be a different criteria/norms for assignment of spectrum, in the event of administrative assignment of the spectrum for PMRTS.

- 3.3 In response, many stakeholders have raised their concerns over the existing criteria of considering 90 radios per channel as benchmark for allotment of additional channels. Some stakeholders have suggested that since the criterion is only a guiding factor, it should not form the basis of allocation of spectrum. Taking into consideration the scenario of digital PMRT system having carrier size of 6.25 KHz number of radios supported by 25 KHz carrier becomes 4 times. One of the stakeholders submitted that considering the same loading norm of 90 subscribers per channel (voice path) for Digital Trunked Radio Technologies (single site) the capacity for the given Analog spectrum shall be quadrupled. Therefore, for a 5 MHz of spectrum (channeling plan no. 6), the capacity for the complete 5 MHz band operated with an Analog Trunked Radio technology shall be $200 \times 90 = 18,000$ subscribers whereas for a Digital Trunked Radio technology, the same shall be 72,000 subscribers/users. This however is an ideal scenario. In real life, Digital PMRTS providers may have to deploy extra sites within the Service Area which are interconnected for better in-building coverage and data applications. Taking this into account, the loading per site will get reduced to about 63 subscribers per 6.25 KHz channel, thus still providing for 50,000 subscribers in a 5 MHz Spectrum as compared to a capacity of 18,000 subscribers with Analog technology today.

- 3.4 Some stakeholders submitted that as per the current license conditions for PMRTS, not more than five channels (frequency pairs) are allotted initially for Analog system and for Digital systems upto 30 frequency channels (25 KHz each) are allotted depending on the availability and justification. Any additional RF frequency pair is allocated only when 90% of capacity is reached. There are two key parameters- Coverage & Capacity that determine the requirement of frequencies or number of RF carriers. A PMRTS 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. Also, given that these PMRT networks are deployed using high power repeater sites so as to cover maximum area with minimum number of sites, the frequency reuse is limited. In terms of capacity, the PMRTS 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.
- 3.5 These stakeholders further submitted that 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.
- 3.6 Some stakeholders requested the Authority to encourage the PMRTS providers by incentivizing the migration to Digital from currently mostly Analog networks. Also, further extension of current licenses after expiry of the same should perhaps not be permitted in the Analog domain. Only Digital technologies must be promoted for PMRTS due to spectrum efficiency and reusability.
- 3.7 One stakeholder suggested that there should be no limit to number of subscribers per RF carrier. It must simply be abolished as QoS and SLA is subjective on the basis of customer requirements and cannot be

determined by one single formula perhaps relevant for other telecom services. PMRT services are extremely specific, on demand and tailored services in terms of redundancy, availability, coverage and traffic volumes and therefore it is not possible to govern or pre-determine the maximum number of subscribers that can be loaded on a single RF carrier. The number also varies depending on Analog or Digital technology and the type of technology itself.

- 3.8 The stakeholder also submitted that for ease of deployment, the spectrum may be allocated with both options of either district wise use to cater to smaller deployments such as industries, airports, smart cities etc. or LSA wise for larger deployments such as highways, waterways and smart grids and service provider should be allowed to re-use spectrum within the LSA.
- 3.9 Some stakeholders submitted that the current system and criteria for allocation of spectrum is correct and sufficient. The current spectrum holding of the operator should be protected and they should be given a 5-7 year time frame within which the migration to Digital platform can be implemented. These stakeholders also submitted that in Analog technology the loading norm of 90 subscribers per channel would become quadrupled for Digital technology. Even with extra sites within the service area for better indoor coverage, the loading per site will come to about 63 subscribers per 6.25 KHz channel.
- 3.10 One stakeholder was of the view 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 city wise spectrum is cumbersome and time consuming. The stakeholder further submitted that in Metro LSAs like Delhi NCR, spectrum should be allotted for the entire LSA. Also, 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.

- 3.11 Many stakeholders submitted that the major challenge for the growth of PMRTS today is the requirement to obtain license for import of the PMRTS handsets. The current policy of Import License for radio terminals is restrictive for the operator as it restricts the growth of the business and does not encourage efficient use of spectrum by the operator. It does not take into account churn, wear and tear arising out of normal usage of the radio. While handsets for cellular mobile are freely allowed to be imported/ manufactured, the PMRTS handsets are restricted and strictly rationed by the DoT through Import Licenses. Few stakeholders proposed that the handsets for trunking services should be allowed freely for import and these should be removed from the restricted list under the import-export policy and delinked from spectrum allocation. One stakeholder in support of this view submitted that the Import License should be a part of the Spectrum Allocation (Decision Letter). Also, Import License for subscriber terminals must not be limited by numbers of RF carriers allocated as there is no logical relationship between number of subscriber terminals deployed and RF carriers. Another stakeholder suggested that Import license for additional infrastructure as spares should be allowed to be freely importable but capped to a reasonable extent.
- 3.12 During OHD, one stakeholder suggested that every licensee should be allocated minimum 5 numbers of carriers for the entire LSA. As per the

stakeholder, the initial assignment will help the service provider to roll out the services in any part of the LSA in minimum time.

Analysis

- 3.13 Current license conditions for PMRTS provides that initially, not more than 5 channels (frequency pairs) will be assigned for Analog system and for Digital systems upto 30 channels (25 KHz each) depending on the availability, justification and the actual usage of the same. Any additional channel is assigned once 90% loading is achieved. This means that minimum 90 users should be there per channel that has been assigned for Analog system in order to get additional channel.
- 3.14 On the contrary, the license condition on the import of number of handsets allows only 90+10% handsets to be imported per channel. This means an operator can import only 99 handsets per channel assigned to him. Even if the operator wants to efficiently use the spectrum by loading more users per channel, the restriction on the number of handsets that can be imported, limits the operator in doing so. This also restricts the service provider's ability to meet the sudden surge in demand for additional handsets. The decision of importing handsets is a techno-commercial in nature and should be left to the operator.
- 3.15 Digital technology available in PMRTS provides for loading more than 100 handsets per channel. With the evolution of technology these numbers are bound to increase which in turn will ensure more and more efficient use of available spectrum. Putting a cap on import of handsets will result in inefficient use of valuable spectrum.
- 3.16 In view of the forgoing, the Authority is of the view that in order to promote the efficient use of spectrum, there is a need to remove the existing restriction on the number of handsets that can be imported.

- 3.17 **Accordingly, the Authority recommends that in order to promote efficient use of spectrum, the cap on the number of PMRTS handsets per channel that can be imported, should be removed. However, while applying for import license, the PMRTS provider shall provide a justification for demand/ requirement of spares etc. of PMRTS handsets required to be imported.**

B. Minimum block size of spectrum

- 3.18 In the CP, the stakeholders were requested to provide their views specifically on preferred block size for auction and contiguity of spectrum in the event auction is recommended as method of assignment of spectrum. Since as per the Para 2.29 above, administrative assignment has been recommended by the Authority for PMRTS as method of assignment of spectrum, minimum block size to be determined for auction as such is not required. However, consideration of contiguity/minimum block size for administrative assignment is relevant since efficient utilization of spectrum can be achieved through it.
- 3.19 In response, some stakeholders stated that there is no need for contiguity of spectrum to be ensured in PMRTS. The spectrum required shall be determined by the geographical roll out plan foreseen by the PMRTS provider. The stakeholders recommended that for every 30 Km radius circle of coverage sought by the PMRTS licensee, the minimum block size of spectrum to be allocated should be 12 speech paths for Metro Cities and 8 speech paths for Non-Metro cities/towns, which for the various technologies available shall translate into 12 spots of 6.25 KHz Channel spacing, 6 spots of 12.5 KHz Channel spacing and 3 spots of 25 KHz spacing for Metro Cities and 8 spots of 6.25 KHz Channel spacing, 4 spots of 12.5 KHz Channel spacing and 2 spots of 25 KHz spacing for Non-Metro Cities respectively.

- 3.20 One stakeholder submitted that the administrative allocation of spectrum should be done with minimum spectrum block of 25 KHz. Also, contiguity of the band can be ensured as the separation between each carrier is proposed to be 200 KHz to each operator at each location. However, next carrier without any separation can be given to other operator in same location or same operator in other location.
- 3.21 Some stakeholders stated that PMRTS licensee shall only be provided a minimum start up spectrum barely sufficient to load 1,000 subscribers in a metro city and 700 subscribers in a non-metro city.
- 3.22 One stakeholder stated that the administrative allocation of spectrum should be done with minimum block size of 6.25 KHz as it will enable greater flexibility and efficient use of spectrum. Another stakeholder emphasized that with a move aimed towards Digital migration, the block size of spectrum should be reduced from 25 KHz to 12.5 KHz.

Analysis

- 3.23 As discussed in Para 3.1 above, the license conditions for PMRTS provides that initially, not more than five channels (frequency pairs) will be assigned for PMRTS Analog system and for Digital system upto 30 frequency channels (25 KHz each) will be assigned depending on the availability, justification and the actual usage of the same.
- 3.24 The market for trunking radio is relatively small with no direct competition from other services. Unlike cellular services, it is not intended for general public, but is mainly engineered to provide communications among a group/organization. PMRT services are in operation for over 20 years and many trunked radio systems today still operate in analog mode. During the course of time, the demand for better performance and reliable system has forced service providers and users

worldwide towards migration to digital mode. The technological obsolescence in Analog Trunked Radio Systems have raised several issues like cost of Operations & Maintenance (O&M), unavailability of equipment and inefficient use of spectrum as compared to new Digital Systems.

- 3.25 In past few years, different technologies have evolved and are available in the market. More efficient usage of the existing spectrum could be achieved with the systematic utilization of 12.5 KHz and 6.25 KHz channel spacing with digital technologies. The use of 12.5 or 6.25 KHz channels with digital technologies can provide from 2 to 4 times the capacity compared with traditional 25 KHz system. With the same infrastructure, digital PMRT systems can work as robust and stable as analog systems and also provide additional useful features as well as better communication quality.
- 3.26 The consolidated LSA wise breakup for the demand of RF channels for existing cities and new cities as mentioned in Annexure-IV of CP, shows that number of carrier assignments in metro cities are far exceeding in comparison to the other LSAs/cities. As per the details, the number of carriers assigned to service provider offering services in Metro or Tier-I cities are above the average of 20 carriers per service provider. This implies that there is substantial requirement of carriers in Metro and Tier-I cities to provide the services efficiently.
- 3.27 In case carrier size is reduced to $1/4^{\text{th}}$ of the existing, the number of carriers increases four times. In the present scenario also, there is no dearth of carriers in existing assignments. Moreover, once the channel of 6.25 KHz is available for assignment, there will be plenty of channels available for assignment to new operators as well as fresh assignments to existing operators. Making the carrier of 6.25 KHz available for

assignment will incentivize licensee migrating to digital PMRT systems since it will be more efficient and economically beneficial.

3.28 Keeping in view the exiting criteria of assignment of spectrum and upon analysis of comments of the stakeholders, it is evident that there is a need to promote efficient digital networks in place of analog networks. The operators should be encouraged to switch to digital networks. In this direction, the carrier size for assignment shall be kept multiple of 6.25 KHz i.e. 6.25 KHz, 12.5 KHz & 25 KHz, as required by digital technologies. Under such mechanism, number of carriers for assignment will also increase. WPC should build separate channeling plan for 6.25 KHz, 12.5 KHz & 25 KHz so as to cater to the spectrally efficient digital technologies.

3.29 **Accordingly, the Authority recommends that-**

- (a) Carrier size for assignment to PMRTS licensee (both for analog or digital) shall be 6.25 KHz and multiples thereof.**
- (b) Carriers (frequency pairs) of 25 KHz already assigned to the service providers should be allowed to be retained by the service providers.**
- (c) Additional assignment of carriers for the existing analogue system shall continue @ carrier size of 25 KHz (counted as 4 carriers of 6.25 KHz each);**
- (d) Assignment in new cities/ service areas shall be made for digital systems only.**
- (e) Initially for each city, twelve carriers (frequency pairs) of carrier size 6.25 KHz in metro licensed service area and eight carriers (frequency pairs) in non-metro license service area shall be assigned for PMRTS (Digital system) depending on the availability.**

C. Calculation of radio station License Fee (LF) and Spectrum related charges

- 3.30 With regard to the administrative allocation of spectrum, a question was raised in the CP for seeking comments of stakeholders on whether the administrative price of spectrum be calculated LSA wise. Further, suggestions were sought on alternative mechanism or formula for determination of administrative price on LSA basis in case the stakeholders seek changes in existing criteria and calculations.
- 3.31 In response, some stakeholders submitted that PMRT technologies are different from cellular technologies. While the cellular technologies work on the principle of interference limited coverage, the coverage in the trunking technologies are based on transmitter power and line of sight considerations. Therefore, the spectrum charges need to be levied on the basis of number of base or repeater stations.
- 3.32 One stakeholder stated that current administrative price of spectrum for PMRTS is extremely high. The price of the spectrum must be substantially reduced to ensure that there is at least a growth of 10-15% CAGR in the PMRTS industry every year.
- 3.33 Some stakeholders suggested that spectrum allocation be based on a service area of 30 Km radius. Therefore the price of the spectrum shall be calculated not on LSA basis but on new definition of service area proposed (with 30 Km radius) within the LSA. The stakeholders also suggested that there should be no restriction on number of service areas of 30 Km radius within LSA. These stakeholders suggested the following charges as mentioned in Table 3.1 for the Metro and Non-Metro LSAs.

Table 3.1: Royalty charges proposed by Stakeholders

Parameters	Today	Proposed (Metro)	Proposed (Non-Metro)
Minimum allocation per service area of 30 Km radius	5 RF carrier of 25 KHz each as per Channeling plan 6 of NFAP-2011	12 RF carriers of 6.25 KHz or 6.25 KHz equivalent as per channeling plan submitted by us	8 RF carriers of 6.25 KHz or 6.25 KHz equivalent as per channeling plan submitted by us
Spectrum Allocation	5*25 = 125 KHz	12*6.25=75* KHz	8*6.25=50* KHz
Royalty	48,000/- per annum	1,15,200/- per Annum	76,800/- per annum
Royalty fee per KHz per annum	384/- per KHz per annum	1536/- per KHz per annum	1536/- per KHz per Annum
Spectrum	100/- per subscriber per annum	100/- per subscriber per annum	100/- per subscriber per annum

** A Licensee may apply for one or more service areas of 30 Km radius within the Licensed Service Area and thus the minimum allocation in such a case shall be in multiples of the proposed minimum allocation, depending on whether the said 30 Km radius area are contiguous (requiring different frequencies to avoid interference) or separate (beyond safe distance of reuse). Roll out obligations shall also correspond to the number of 30 Km radius area applied for.*

***This also means allocating 6 carriers 12.5 KHz channels for 2 slot TDMA technologies and 3 carriers for 25 KHz TDMA technologies.*

- 3.34 One stakeholder submitted that the existing criterion of assignment of RF carriers is inefficient since this criterion does not take into account the abilities and characteristics of digital PMRT technology into account. Moreover, for administrative allocation, the ITU also believes that the imposition of fees associated with the frequency assignment process such as processing of applications for receipt and renewal of licences, as well as charges imposed on spectrum users for spectrum use should also be a part of the final price. The fact that the demand for PMRTS is not expected to grow by a large margin and the need for incentivizing service providers should also be kept in mind while setting the administrative price. Also, the use of base/repeater stations and frequency pairs should be considered. The stakeholder was of the opinion that the best would be to revisit the current methodology of spectrum charge, which though for

analogue systems, but could be fine-tuned for more efficient digital systems. In addition, the spectrum charges could be in radial distance slabs. The stakeholder further highlighted that they do not support LSA based allocation, unless for service provider who re-distributes the services.

- 3.35 Few stakeholders submitted that because the definition of AGR includes revenue from sale of handsets for the purpose of levy of 8% license fee, a PMRTS licensee has to isolate transactions for radio terminal sale/hire or lease in a separate company. Although the PMRTS license mandates no requirement of DPL to be taken by a PMRTS licensee, this becomes obligatory to be taken for above said separate company. This should be done away with as it adds a lot of cumbersome procedure unnecessarily to the PMRTS licensees, subject to this separate company engaging in sale/hire/lease of radio terminals only to customers of PMRTS licensee. Alternatively the definition of AGR for PMRTS should be amended, as recommended earlier also by the Authority vide its recommendation on PMRTS dated 7th January 2003 to specifically exclude revenue from sale or hire/purchase or renting of handsets, accessories.

Analysis

- 3.36 As per the provisions of existing licensing regime, the intending entity to provide the services has to pay one time Entry fee of Rs. 50,000/- (Fifty thousand), Performance Bank Guarantee (PBG) and Financial Bank Guarantee (FBG) of Rs. 1,00,000/- (One lakh) each to obtain the authorization from the licensor. Also PMRTS Licensee has to pay 8% of AGR as annual License Fee. Royalty and license fee for the grant of license to establish, maintain and work PMRTS stations are governed through the Office Memorandum No. L-14027/01/98-NTG issued by DoT dated 18th September, 2000. The table 3.2 lists various charges/fees payable by PMRTS provider.

Table 3.2: Royalty Charges and Station Fee

Entry Fee (One time) per license service area (Rs.)	PBG (Rs.)	FBG (Rs.)	License Fee (Annual)	PMRT Station fee and Royalty charges per year	Value of L& R for maximum radio link distance between 5 and 60 Km	Value of L& R for maximum radio link distance below 5 Km
50 thousand	1 Lakh	1 Lakh	8% of AGR	L+R	L= 100 X n R=4800 X f	L=100 X n R= 1200X f

* L = License Fee per PMRT station, R= Royalty

** Spectrum charges for PMRT service are levied on formula basis which include the number of assigned RF channels (f), the number of radio stations (n) (base and mobile stations) and coverage radius in kilometers (Km) for the purpose of calculations.

- 3.37 As mentioned in the above para, the existing criteria for calculation of PMRT Station fee and Royalty charges per year is based on the formula prescribed vide DoT O.M. dated 18th September, 2000. Royalty (R) calculations are based on the carrier distance of less than 5 Km, or between 5 to 60 Km, whatever is applicable. There is no intermediate distance slab in between 5 Km to 60 Km for determination of 'R'.
- 3.38 As submitted by some stakeholders, due to non-provision of the intermediate distance slab, PMRTS licensee has to pay in excess for the maximum distance of 60 Km whereas city limits are generally within the 30 Km of radius.
- 3.39 Some stakeholders have also suggested that criteria of initial allotment of 5 carriers of 25 KHz need to be looked into. The stakeholders have proposed 12 number of carriers for Metro LSA and 8 number of carriers for non-Metro LSAs with carrier size of 6.25 KHz each during initial assignment of spectrum. Reducing carrier size from existing 25 KHz to

6.25 KHz shall ensure efficient utilization of spectrum and generation of more revenue to the exchequer.

- 3.40 The comments of the stakeholders were sought on the aspects of spectrum assignment through auction i.e. adoption of appropriate methodology for valuation and associated reserve price of Spectrum for PMRTS in case spectrum is to be auctioned. Based on the scenario of spectrum assignment through auctions, another connected issue was raised regarding methodology/ approach(s) for determining calculation of spectrum usage charge.
- 3.41 On the issues raised for the comments, one stakeholder supporting the spectrum to be auctioned has submitted that the reserve price should be set at a modest level to ensure full market play and fair market discovery. The stakeholder also states that once the spectrum is auctioned, the SUC should be a nominal fixed fee to cover the charges for administration and allocation. However, this approach must be applicable to all access/auctioned spectrum. The stakeholder also stated that in the event that a revenue share approach is being continued with, then the extant SUC rate may also be extended to PMRTS spectrum also.
- 3.42 As suggested by the stakeholders, the Authority has taken note of the fact that Royalty charges and License Fee for radio equipment prescribed long back in year 2000 are now required to be made more realistic and rational in context of the changing time. In this regard, an intermediate slab in the formula applicable as per DoT O.M. 18th September, 2000 can be introduced. An intermediate slab at distance of 30 Km shall be inserted and should be priced at half of the pricing of 60 Km.
- 3.43 As per the extant DoT policy, the Royalty charge is Rs. 1200 (twelve hundred) for link distance below 5 (five) Km and Rs. 4800 (Rupees four

thousand eight hundred) for link distance between 5 (five) Km to 60 (sixty) Km in the city within the same LSA per year for 25 (twenty five) KHz spectrum. These charges were fixed in the year 2000 and since then there is no changes in these charges.

- 3.44 As already suggested by the Authority in Para 3.28, the operators should be encouraged to switch to digital networks. In this direction, the carrier size for assignment for PMRTS should be 6.25 KHz and multiples of 6.25 KHz. Considering an intermediate slab at distance of 30 Km and next slab at 60 Km, the Royalty charges should be modified as Rs. 1200 per year per 6.25 KHz channel for link distance upto 30 Km and Rs. 2400 per year per 6.25 KHz channel for link distance upto 60 Km.
- 3.45 Further, the license for the PMRTS is granted for 20 (twenty) years but formula based Royalty charges and Licence fee is charged and collected every year in advance. The Authority is of the view that an option should be provided to the PMRTS licensees to pay one time Royalty charges for entire period of 20 years besides the current practice of levying on yearly basis. Onetime upfront payment of Royalty charges for allocation of spectrum for 20 years for PMRT service shall not only incentivise the PMRTS operator but also help in reducing the administrative work of DoT for collecting payment every year from several PMRTS operators. This will also facilitate the Government initiative for 'ease of doing business' for the PMRTS operator by helping them for making payment of Royalty charges every year. Accordingly, a price for determination of onetime Royalty Charges for acquisition of Spectrum for 20 years has also been determined.
- 3.46 **Accordingly, the Authority recommends that the Royalty charges for PMRTS and the options for payment of Royalty charges shall be:**

(A) Option 1- Yearly Payment-

Rs. 1200 per year per 6.25 KHz channel for link distance upto 30 Km and Rs. 2400 per year per 6.25 KHz channel for link distance upto 60 Km.

(B) Option 2- Onetime Upfront Payment-

- 1. Onetime upfront payment of Rs. 20,000 (twenty thousand) for 6.25 KHz Spectrum for link distance upto 30 Km in the city within the same LSA for 20 years.**
- 2. Onetime upfront payment of Rs. 40,000 (forty thousand) for 6.25 KHz Spectrum for link distance upto 60 Km in the city within the same LSA for 20 years.**

D. Levy of Spectrum Usage Charges (SUC)

- 3.47 In the present regime of administrative assignment of spectrum for PMRTS, the formula based rates of annual Licence Fee (as SUC) charges are levied @ Rs.100 per fixed/vehicle Mobile/Handheld mobile wireless telegraph stations for the PMRTS, paid in advance by 15th January every year. The formula for calculation of such licence fee is as under:**

$$\mathbf{L = 100 \times n}$$

Where,

L = License Fee per PMRT station.

n = No. of stations (station includes fixed base station, Vehicle mounted mobile or hand held mobile stations).

- 3.48 As per extant license conditions, PMRTS providers are paying licence fee as percentage (at 8%) of AGR and PMRT Royalty charges and Station fee (Spectrum Usage Charges) per year on the formula basis as mentioned in para above. Since the assignment of spectrum is done on administrative basis, no upfront payment is being charged. In the case of access service authorization, the licensee is charged SUC in terms of percentage of AGR. Accordingly, in the event of auction of spectrum or otherwise, the**

issue arises whether the SUC to PMRTS licensee should be continued to be charged on formula basis as indicated above or should there be the provision of SUC in line with the provision for access service authorization. Accordingly, comments were sought from the stakeholders regarding the methodology/approach to be adopted for calculation of spectrum usage charges.

- 3.49 In response, one of the stakeholders was of the view that the SUC should be a nominal fixed fee to cover the charges for administration and allocation and further stated that if a revenue share approach is being continued with, then the extant SUC rate may also be extended to PMRTS spectrum also. With regard levy of formula based Spectrum Usage Charges (SUC) presently in vogue, no specific comments were received from the stakeholders.

Analysis

- 3.50 As per the extant practice of DoT, the Licence fee for spectrum (i.e. SUC) for PMRTS is charged @ Rs. 100 per station (station includes fixed base station, Vehicle mounted mobile or hand held mobile station) every year whereas in case of wireless access service, SUC is levied as Percentage (%) of AGR based on the slab system for spectrum allocated on Administrative price. Since the market size and business prospects for PMRTS licensees are not comparable with the access services and the revenue potential is also not so high, the Authority is of the view that the SUC for the spectrum allocated to PMRTS should not be very high so that PMRTS providers are not undue burdened.
- 3.51 In most countries, charges for spectrum are recovered through upfront payment in auctions and there are no supplementary charges. If at all there is such a charge, it is merely to cover the administrative cost of

managing spectrum. And, typically that fee is either a fixed amount or a very small ad valorem charge.

3.52 As in the case of access service authorization, the licensee is charged SUC as Percentage (%) of AGR and to bring the uniformity in the approach, the SUC for the spectrum allocated to PMRTS should also be levied as % of AGR for PMRTS. The Authority is of the considered view that instead of levying Licence Fee (as SUC) @ Rs. 100 per station (where station includes fixed base station, Vehicle mounted mobile or hand held mobile station) every year, the SUC should be levied as percentage of AGR and it should be in the nature of administrative charges for management of spectrum. Considering the present total subscriber base and the total revenues of the PMRTS, the Authority is of the opinion to keep the flat SUC charge at a nominal level of 1% of AGR for PMRTS.

3.53 **In view of above, the Authority recommends that the SUC for the spectrum allocated to PMRTS shall be levied @ 1% of AGR and while determining the AGR for the purpose of levy of license fee and SUC, the revenue from sale of handsets (the cost of which is separately identifiable) shall be allowed as deduction from the GR of PMRTS for the purpose of levy of license fee. The Authority is however not making any specific recommendation on license fee of PMRT Service.**

E. Preferable spectrum bands for the PMRTS

3.54 As discussed in CP, for Region 3, the 806-824 MHz band paired with 851-869 MHz has been retained as harmonized band for deployment of PMR/LMR trunking network. The existing sub-bands allocated for Mobile Radio Trunking Service in India as per NFAP-2011 is given in table 3.3.

Table 3.3: Allocation of frequencies as per National Frequency Allocation Plan (NFAP)-2011

Frequency band: 300 MHz and 400 MHz			
Frequency band (MHz)	Total Bandwidth	Uses	India remark in NFAP
336-338, 346-348	2x2 MHz	For both PMRTS and CMRTS	IND 27
338-340, 348-350	2x2 MHz		
351-356, 361-366	2x5 MHz	Digital CMRTS	IND 28
356-358, 366-368	2x2 MHz		
380-389.9, 390-399.9	2x9.9 MHz	Digital PMRTS and CMRTS	IND 29
Frequency band: 800 MHz			
Frequency band (MHz)	Total bandwidth	Uses	India remark in NFAP
806-811, 851-856	2x5 MHz	Predominantly for CMRTS	IND 40
811-814, 856-859	2x3 MHz	For spectrum efficient digital PMRTS and CMRTS	IND 41
814-819, 859-864	2x5 MHz	Predominantly for CMRTS	IND 42
819-824, 864-869	2x5 MHz	For both PMRTS and CMRTS	IND 43

3.55 Trunking service licensees (PMRTS and CMRTS) in India are assigned 814-819/859-864 MHz band for Analog and 811-814/856-859 MHz band for Digital networks. DoT in its reference has stated that it would be preferable to consider the following bands (Table 3.4) for PMRTS in the following order of priority-

Table 3.4: Preferable frequency bands as per DoT

Sl. No.	Frequency Band Total (in MHz)	Total Bandwidth
1.	816 - 819 / 861- 864	3.0 MHz
2.	819 - 824 / 864 – 869	5.0 MHz
3.	336 - 340 / 346 – 350	4.0 MHz

- 3.56 In view of the forgoing, issue was raised in the CP seeking comments of the stakeholders on adequacy of the bands suggested by DoT and preferable bands for the PMRTS in India in the order of priority.
- 3.57 In response, one stakeholder submitted that currently, 811-814/856-859 MHz is being used for Digital and 814-819/859-864 MHz is being used for analog PMRT networks. According to the stakeholder, this much spectrum is sufficient for digital PMRTS.
- 3.58 Some stakeholders submitted that since the PMRTS are more viable and prevalent in the Metros and mini-Metro cities where there is high building density, the band chosen for PMRTS should have a very good in-building penetration. For meeting this requirement the 800 MHz band is the most appropriate band for PMRTS. Keeping the future need of the industry in mind as well as complying with DoT's requirement to not allocate more than 8 MHz for PMRTS in the 800 MHz band, the stakeholder suggested the following bands are to be considered for PMRTS.
- 811-814/856-859 MHz
 - 814-819/859-864 MHz
- 3.59 Some stakeholders suggested the spectrum bands in the order of priority as given in Table 3.5 below.

Table 3.5: Spectrum bands suggested by Stakeholders

Priority	Stakeholder A	Stakeholder B
I	819-824/864-869 MHz	811-814/856-859 MHz
II	814-819/859-864 MHz	814-819/859-864 MHz
III	811-814/856-859 MHz	819-824/864-869 MHz
IV	336-340/346-350 MHz	336-340/346-350 MHz
V	380-389.9/390-399.9 MHz	--

3.60 As per the provisions of NFAP-11, the sub-band 336-340/346-350 MHz has been allocated for CMRTS and PMRTS. In this regard, one stakeholder submitted that 2 MHz in 336-338/346-348 MHz is already assigned for the Defence, hence it cannot be assigned for the other purposes. Taking this into consideration, only 2 MHz is left for assignment for CMRTS and PMRTS.

F. Allocation of the band 819-824/864-869 MHz

3.61 In India, one chunk of 2 MHz in Sub-GHz band range 865-867 MHz has been made license exempt for indoor applications with Maximum Transmitted power of 1W, Maximum Effective Radiated Power of 4W and Maximum Channel Bandwidth of 200 KHz. Globally, this band has been recognized for M2M communication application and is having substantial ecosystem for low power devices. Moreover, a lot of technological development in this band is taking place in several countries. Considering the fact that global ecosystem for M2M communication has developed robustly in this band, the Authority in its recommendations on “Spectrum, Roaming and QoS related requirements in Machine-to-Machine (M2M) Communications” dated 5th September, 2017 has recommended additional delicensing of 1 MHz spectrum from 867-868 MHz to de-clutter this delicensed band.

3.62 Taking into consideration the development and deployment of low power device ecosystem specially in Machine-to-Machine communication segment and taking into consideration the existing allocation by DoT and Authority’s latest recommendation for delicensing spectrum for M2M, the comments of the stakeholders were invited on the feasibility of considering the band 819-824/864-869 MHz for allocation to PMRTS licensees. The Authority further sought stakeholders view on alternative choices in the event of non-availability the band 819-824/864-869 MHz (5 MHz) for allocation to PMRTS.

- 3.63 In response, many stakeholders submitted that allocation of the band 819-824/864-869 MHz for PMRTS should not be considered if part of the band is delicensed for low power devices. Some stakeholders also submitted that if the entire bandwidth of 12 MHz was made available then that would have been adequate. But now the available bandwidth is 7 MHz only. Hence there is a need to identify new candidate bands to supplement the spectrum need for serving the growing demands of this sector.
- 3.64 One stakeholder while submitting the options stated that 814-819 MHz paired with 859-864 MHz (IND 42) or 811-814 MHz paired with 856-859 MHz (IND 41) or 380-389.9 MHz paired with 390-399.9 MHz (2x9.9 MHz) (IND 29) or a combination of all the above may be considered for PMRTS .
- 3.65 Another stakeholder submitted that 811-814/856-859 MHz is appropriate as this is already allocated for PMRTS while yet another stakeholder submitted that IND 29 would be appropriate wherein up to 3 MHz spectrum could be allotted for PMRTS.

Analysis

- 3.66 Out of the 9 sub-bands allocated for PMRTS & CMRTS, assignments to existing PMRT networks have been made in 3 sub-bands only (namely 338-340/348-350 MHz, 811-814/856-859 MHz, 814-819/859-864 MHz).
- 3.67 As per the details provided by DoT, there are total 8 PMRTS providers operating in 11 license service areas providing services in 34 service/city areas. Out of the 11 LSAs, additional spectrum in 22 cities is sought by the service providers for expansion. Further, spectrum in 22 cities (new) falling in jurisdictions of 11 LSAs has also been sought by the services providers. In addition to this, spectrum in 4 LSAs service areas viz. Bihar

(Jamshedpur), Haryana (Rohtak), Orissa (Angul, Jagatsinghpur, Jaipur) and West Bengal (Haldia) has been demanded by some of the service providers. LSA wise data of existing spectrum assignments and additional demand is given in the Table 3.6.

Table 3.6: Existing band-wise and city-wise assignments vis-a-vis additional (pending) demand

Name of the Service Provider	338-340 MHz/ 348-350MHz band		811-814 MHz/ 856-859 MHz band		814-819 MHz/ 859-864 MHz band	
	Assigned carriers (city-wise)	Addl. Demand (city-wise)	Assigned carriers (city-wise)	Additional demand (city-wise)	Assigned carriers (city-wise)	Additional demand (city-wise)
Andhra Pradesh	Nil	Nil	Nil	12	50	05
Bihar	Nil	Nil	Nil	01	Nil	Nil
Delhi	Nil	Nil	Nil	27	90	20
Gujarat	Nil	Nil	21	38	45	15
Haryana	Nil	Nil	Nil	1	Nil	Nil
Karnataka	Nil	Nil	Nil	22	45	25
Kerala	45	Nil	5	5	Nil	Nil
Kolkata	Nil	Nil	Nil	5	20	Nil
Madhya Pradesh	Nil	Nil	Nil	Nil	10	5
Maharashtra	Nil	Nil	Nil	2	30	Nil
Mumbai	Nil	Nil	Nil	30	80	75
Orissa	Nil	Nil	Nil	7	Nil	Nil
Rajasthan	Nil	Nil	Nil	6	10	Nil
Tamil Nadu (including Chennai)	Nil	Nil	Nil	26	45	15
West Bengal	Nil	Nil	Nil	1	Nil	Nil
Total	45	Nil	26	183	425	160

3.68 From the table above, it is clear that maximum carriers have been assigned in the band 814-819/859-864 MHz. There is no demand for additional carriers in 338-340/348-350 MHz band, whereas, the demand for additional carriers is comparatively more in 811-814/856-859 MHz band in comparison to the demand in 814-819/859-864 MHz band.

- 3.69 On aspects of de-licensing of the band 865-867 MHz, DoT clarified that since de-licensing is effected on a shared basis for low power applications (Maximum power 1 Watt in 200 KHz bandwidth), it does not preclude the use of this band for various radio-communications services, as per provisions made in NFAP. The clarification of DoT implies that the band 819-824/864-869 MHz can be assigned for the services as per provision of NFAP.
- 3.70 Keeping in view the need to have a robust policy framework for the introduction of an advanced, reliable, robust and responsive PPDR communication system in the country, the Authority, on 9th October 2017, *suo-motu* issued a paper titled “Next Generation PPDR Communication Networks” for public consultation. The Authority has issued its recommendations on the same on 4th June 2018. In which it has recommended to setup a pan-India integrated Broadband PPDR (BB-PPDR) communication network (to be called as “National BB-PPDR Network”) based on 3GPP PS-LTE technology. Through the recommendations, the Authority has also recommended that 2x10 MHz of the dedicated spectrum, 814-824/859-869 MHz, should be assigned for nationwide BB-PPDR services as per APT Frequency Arrangement number G 3-1-4.
- 3.71 In view of the recent recommendations by the Authority as discussed in para above, the issue of continuation of services as per existing carrier assignments and future demand for the PMRTS arises.
- 3.72 As per existing channeling plan of 25 KHz carrier size, there are 120 numbers of channels available for assignment in 811-814/856-859 MHz band at a geographical location. According to the Table 3.6 above, there are total 425 number of carriers assigned in 814-819/859-864 MHz out of which maximum number of carriers have been assigned in Delhi (90

carriers) and Mumbai (80 carriers) cities only. Also, maximum additional demand in this band is in Mumbai city (75 carriers) only.

- 3.73 Based on the deliberations above, it can be concluded that in order to make the spectrum available for BB-PPDR networks, existing assignments to PMRTS in the band 814-819/859-864 MHz can be refarmed and further accommodated in the 811-814/856-859 MHz band. One time exercise of RF tuning shall be required by the service provider without any additional changes or investment in network elements.
- 3.74 As per the information available, there are very few assignments in some cities for CMRT services in 814-819/859-864 MHz band. There are certain assignments to PPDR agencies as well as other organizations/private entities having operations of their Captive networks under CMRT service license in the band 806-811/851-856 MHz. In the event of implementation of the recommendations on next generation BB-PPDR, most of the existing PPDR networks operating as CMRTS licensees can also be refarmed and assigned spectrum in 814-824/859-869 MHz band. Refarming will pave the way to vacate certain carriers in the band 806-811/851-856 MHz and additional demand for PMRTS if any, can be offset by this process. In order to make the spectrum available for BB-PPDR, the refarming process should be completed within a period of two years. Keeping in view the proposals discussed above, DoT shall accordingly incorporate necessary changes in NFAP. In the proposed process, the band 806-811/851-856 MHz (IND 40) shall be notified both for PMRTS and CMRTS and band 811-814/856-859 MHz (IND-41) should be utilised for spectrum efficient digital PMRT and CMRT services. The proposed changes to the provision as per NFAP-2011 in 800 MHz band is given in table 3.7.

Table 3.7: Proposed changes to the provision as per National Frequency Allocation Plan (NFAP)-2011 in 800 MHz frequency band

Frequency band (MHz)	Total bandwidth	Proposed Uses	India remark in NFAP
806-811, 851-856	2x5 MHz	For both PMRTS and CMRTS	IND 40
811-814, 856-859	2x3 MHz	For spectrally efficient digital PMRTS and CMRTS	IND 41
814-819, 859-864	2x5 MHz	For CMRTS Networks (BB-PPDR)	IND 42
819-824, 864-869	2x5 MHz	For CMRTS Networks (BB-PPDR)	IND 43

3.75 Accordingly, the Authority recommends that:-

- (a) In order to make the spectrum available for BB-PPDR networks, existing PMRTS assignments in the band 814-819/859-864 MHz should be refarmed and further accommodated in the 811-814/856-859 MHz band. The refarming process should be completed within a period of two years.**
- (b) The agencies handling PPDR networks that have been operating in the band 806-824 MHz paired with 851-869 MHz should be confined to and accommodated in the proposed PPDR network for which the assignment of spectrum is proposed in 814-824/859-869 MHz sub-band.**
- (c) Upon refarming the bands mentioned in the sub-para (a) and (b) above, the sub-band 806-811/851-856 MHz should be made available both for PMRTS and CMRTS on need and justification basis.**
- (d) DoT shall incorporate the necessary changes in NFAP as proposed in the Table 3.7 in Para 3.74**
- (e) Allocations of the frequencies in the sub-band 338-340/348-350 MHz shall be predominantly considered for PMRTS. Provisions for allocation in sub-band 351-358/361-368 MHz and 380-389.9/390-399.9 MHz shall remain unchanged.**

G. Spectrum Cap

- 3.76 As discussed in the CP, the spectrum cap in mobile access services have been introduced in several countries at various times and seen as a measure to ensure competition in mobile communications markets.
- 3.77 The Authority is aware of the fact that PMRTS is basically a niche segment where market opportunities are not omnipresent. Further, growth pattern of the industry does not indicate disruptive changes in near future on the demand side. If at all required, in order to prevent the anti-competitiveness of the market, the option of intra-band cap and overall cap have been discussed in CP for the comments of the stakeholders.
- 3.78 In response, one stakeholder advocating assignment of spectrum through auction has suggested that spectrum cap rules must be the same for all.
- 3.79 Many stakeholders submitted that 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 Service access spectrum. However, in this case of PMRTS, there are very few service providers and there is no scarcity of spectrum. Hence there should not be any spectrum cap applicable on assignment of spectrum to licensees for PMRTS at this stage.
- 3.80 Some stakeholders opined that intra-band Spectrum cap is applicable where market size is very big as compared to the spectrum available. In case of PMRTS industry the situation is entirely different where market size is small as compared to spectrum available. However, in order to ensure no dominance of single large service provider, spectrum cap should be proposed.

- 3.81 One stakeholder suggested that intra-band and overall cap should be able to suffice. No single operator should be able to hold more than 25% of the spectrum within each band and of all bands.
- 3.82 Some stakeholders submitted that there doesn't seem to be any concern for spectrum for PMRTS in the near future. However to prevent any situation of monopoly in the future a spectrum cap of 50% across bands for any given service area should be fixed.

Analysis

- 3.83 It was highlighted in the CP, the market leader M/s Arya Omnitalk Radio Trunking Services Pvt. Ltd holds 61.50% of the total carriers assigned to PMRTS provider followed by M/s Procall Ltd. at 13.10%. In terms of number of subscribers, M/s Arya Omnitalk has 83.58% market share followed at huge gap by M/s Procall Ltd. at 2nd position with a market share of 5.69%.
- 3.84 As mentioned in the Para 2.28 above, in the current scenario there is no dearth of the spectrum for assignment even if current demand and refarming of the spectrum is taken into account. Keeping in view the present status of number of service providers operating per city and growth rate for the past few years, and taking into consideration the future requirements it appears that adequate number of carriers can be made available to the licensee during initial assignments.
- 3.85 It is worth to mention that in view of the ongoing consolidation of telecom sector the spectrum caps in mobile access services in the country have been revised recently based on the TRAI recommendations on a reference from DoT. Overall access spectrum that can be held by an operator in a LSA has been raised to 35% from the earlier 25%. The intra-band spectrum holding cap of 50% has also been removed and alternatively a

cap of 50% on the combined spectrum holding in the sub-1 GHz bands (700 MHz, 800 MHz and 900 MHz bands) has been put in place by the government. In a nutshell, spectrum caps have been eased in mobile access service segment in view of ongoing consolidation.

3.86 Many stakeholders submitted that since there is substantial number of carriers available for assignment hence no need arises for applying spectrum cap at this moment. Some stakeholders however have opined that spectrum cap of 50% across all the bands in a licensed service area can be kept as precautionary measure to avoid dominance of one player. It is worth to reiterate that administrative assignment of spectrum is recommended by the Authority as per para 2.29. Accordingly, the Authority is convinced with the fact that in order to avoid the dominance of one player, some reasonable cap should be applied for spectrum assignment through administrative process to PMRTS licensees.

3.87 **Accordingly, the Authority recommends an overall combined spectrum cap of 35% in a LSA on the spectrum identified and available for assignment to PMRTS/CMRTS, as per provision of NFAP-2011, shall be applicable to PMRTS licensee.**

H. Duration/validity period of spectrum assigned

3.88 DoT through the reference requested the Authority to consider the possibility of keeping validity period of spectrum assigned for PMRTS less than 20 years i.e. 5 years or 10 years, notwithstanding that Unified License for PMRTS is issued for 20 years period. The Authority in CP deliberated that the duration of assignment of spectrum should be such that a service provider is able to recover the costs and able to sustain for long in the market and accordingly, raised the issue in the CP to sought stakeholders view on appropriate duration/validity of assignment of spectrum to PMRTS provider. Options of renewal were also sought in

case validity of spectrum is to be made lesser than the validity of license (20 years).

3.89 In response, most of the stakeholders submitted that the duration of validity of the allocation of spectrum should be aligned to the validity of the PMRTS license i.e. 20 years.

3.90 Some stakeholders submitted that though the PMRTS licensee shall have the right to retain the minimum spectrum as well as secure administratively allocated additional spectrum for the entire duration of the validity of the license, the licensing body should retain the right to withdraw the spectrum if the licensee fail to establish any of the following-

- a) Meeting the loading criteria consistently for a period of 6 months based on which the additional spectrum was issued to the licensee.
- b) Failure to roll out the PMRT network within 12 months of allocation of the minimum start up spectrum.
- c) Surrender of PMRTS license.

Analysis

3.91 Keeping the spectrum assignment for shorter terms e.g. 5 year, 10 year or 15 years as suggested by DoT merely add to administrative work on part of the licensee as well as licensor. There are certain license conditions already in place those would not allow a licensee hording the spectrum. The conditions e.g. roll out of network within one year and per carrier loading criteria appears to suffice the purpose.

3.92 Taking into consideration the above facts the Authority is of the view that in order to accelerate the growth of PMRTS, the validity of spectrum assignment should be for 20 years in line with the license validity, however, assignment should be co-terminus with the validity of the

license (expiry, surrender or license conditions such as rollout obligations or loading criteria are not fulfilled).

- 3.93 **Accordingly, the Authority recommends that the validity of spectrum assignment should be for 20 years in line with the license validity, however, assignment should be co-terminus with the validity of the license (in case the validity of the license expires or surrender of the license or non-conformity to the license conditions such as rollout obligations, loading criteria).**

CHAPTER IV: SUMMARY OF RECOMMENDATIONS

- 4.1 The Authority recommends that the existing Licensed Service Area (LSA) based authorization criteria for PMRTS license should continue.**
[Para. 2.5]
- 4.2 The Authority recommends that the existing provision of duration of 20 years for PMRTS license should continue.**
[Para. 2.10]
- 4.3 The Authority recommends that taking into consideration factors viz. PMRTS market conditions; low spectrum demand and high spectrum availability; the assignment of spectrum for PMRTS should be made administratively on the basis of demand.**
[Para. 2.29]
- 4.4 The Authority recommends that in order to promote efficient use of spectrum, the cap on the number of PMRTS handsets per channel that can be imported, should be removed. However, while applying for import license, the PMRTS provider shall provide a justification for demand/ requirement of spares etc. of PMRTS handsets required to be imported.**
[Para. 3.17]
- 4.5 The Authority recommends that-**
- (a) Carrier size for assignment to PMRTS licensee (both for analog or digital) shall be 6.25 KHz and multiples thereof.**
 - (b) Carriers (frequency pairs) of 25 KHz already assigned to the service providers should be allowed to be retained by the service providers.**
 - (c) Additional assignment of carriers for the existing analogue system shall continue @ carrier size of 25 KHz (counted as 4 carriers of 6.25 KHz each);**

- (d) Assignment in new cities/ service areas shall be made for digital systems only.
- (e) Initially for each city, twelve carriers (frequency pairs) of carrier size 6.25 KHz in metro licensed service area and eight carriers (frequency pairs) in non-metro license service area shall be assigned for PMRTS (Digital system) depending on the availability.

[Para. 3.29]

4.6 The Authority recommends that the Royalty charges for PMRTS and the options for payment of Royalty charges shall be:

(A) Option 1- Yearly Payment-

Rs. 1200 per year per 6.25 KHz channel for link distance upto 30 Km and Rs. 2400 per year per 6.25 KHz channel for link distance upto 60 Km.

(B) Option 2- Onetime Upfront Payment-

1. Onetime upfront payment of Rs. 20,000 (twenty thousand) for 6.25 KHz Spectrum for link distance upto 30 Km in the city within the same LSA for 20 years.
2. Onetime upfront payment of Rs. 40,000 (forty thousand) for 6.25 KHz Spectrum for link distance upto 60 Km in the city within the same LSA for 20 years.

[Para. 3.46]

4.7 The Authority recommends that the SUC for the spectrum allocated to PMRTS shall be levied @ 1% of AGR and while determining the AGR for the purpose of levy of license fee and SUC, the revenue from sale of handsets (the cost of which is separately identifiable) shall be allowed as deduction from the GR of PMRTS for the purpose of levy of license fee. The Authority is however not making any specific recommendation on license fee of PMRT Service.

[Para. 3.53]

4.8 The Authority recommends that:-

- (a) In order to make the spectrum available for BB-PPDR networks, existing PMRTS assignments in the band 814-819/859-864 MHz should be refarmed and further accommodated in the 811-814/856-859 MHz band. The refarming process should be completed within a period of two years.**
- (b) The agencies handling PPDR networks that have been operating in the band 806-824 MHz paired with 851-869 MHz should be confined to and accommodated in the proposed PPDR network for which the assignment of spectrum is proposed in 814-824/859-869 MHz sub-band.**
- (c) Upon refarming the bands mentioned in the sub-para (a) and (b) above, the sub-band 806-811/851-856 MHz should be made available both for PMRTS and CMRTS on need and justification basis.**
- (d) DoT shall incorporate the necessary changes in NFAP as proposed in the Table 3.7 in Para 3.74**
- (e) Allocations of the frequencies in the sub-band 338-340/348-350 MHz shall be predominantly considered for PMRTS. Provisions for allocation in sub-band 351-358/361-368 MHz and 380-389.9/390-399.9 MHz shall remain unchanged.**

[Para. 3.75]

4.9 The Authority recommends an overall combined spectrum cap of 35% in a LSA on the spectrum identified and available for assignment to PMRTS/CMRTS, as per provision of NFAP-2011, shall be applicable to PMRTS licensee.

[Para. 3.87]

4.10 The Authority recommends that the validity of spectrum assignment should be for 20 years in line with the license validity, however, assignment should be co-terminus with the validity of the license (in case the validity of the license expires or surrender of the license or

non-conformity to the license conditions such as rollout obligations, loading criteria).

[Para. 3.93]

LIST OF ACRONYMS

3GPP	3 RD GENERATION PARTNERSHIP PROJECT
AGR	ADJUSTED GROSS REVENUE
APT	ASIA-PACIFIC TELECOMMUNITY
BB-PPDR	BROADBAND PPDR
CAGR	COMPOUND ANNUAL GROWTH RATE
CMRTS	CAPTIVE MOBILE RADIO TRUNKING SERVICE
CMTS	CELLULAR MOBILE TELEPHONE SERVICE
CP	CONSULTATION PAPER
CUG	CLOSED USER GROUP
DoT	DEPARTMENT OF TELECOMMUNICATIONS
DPL	DEALER POSSESSION LICENSE
DSNG	DIGITAL SATELLITE NEWS GATHERING
DTH	DIRECT TO HOME
FBG	FINANCIAL BANK GUARANTEE
HITS	HEADEND IN THE SKY
ILD	INTERNATIONAL LONG DISTANCE
ISP	INTERNET SERVICE PROVIDER
ITU	INTERNATIONAL TELECOMMUNICATION UNION
LF	LICENSE FEE
LMR	LAND MOBILE RADIO
LSA	LICENSED SERVICE AREA
M2M	MACHINE-TO-MACHINE
MTROA	MOBILE TRUNKED RADIO OPERATORS ASSOCIATION
NCR	NATIONAL CAPITAL REGION
NFAP	NATIONAL FREQUENCY ALLOCATION PLAN
NLD	NATIONAL LONG DISTANCE
NTP	NATIONAL TELECOM POLICY
O&M	OPERATIONS & MAINTENANCE
OHD	OPEN HOUSE DISCUSSION
O.M.	OFFICE MEMORANDUM
PBG	PERFORMANCE BANK GUARANTEE
PMR	PROFESSIONAL MOBILE RADIO
PMRTS	PUBLIC MOBILE RADIO TRUNKING SERVICE
PPDR	PUBLIC PROTECTION AND DISASTER RESPONSE
PS-LTE	PUBLIC SAFETY-LTE
PSTN	PUBLIC SWITCHED TELEPHONE NETWORK
PSU	PUBLIC SECTOR UNITS
QoS	QUALITY OF SERVICE
RF	RADIO FREQUENCY
SC	SUPREME COURT
SLA	SERVICE LEVEL AGREEMENT
SUC	SPECTRUM USAGE CHARGE

TDMA	TIME DIVISION MULTIPLE ACCESS
TEC	TELECOM ENGINEERING CENTRE
TRAI	TELECOM REGULATORY AUTHORITY OF INDIA
UASL	UNIFIED ACCESS SERVICE LICENSE
UL	UNIFIED LICENSE
VAS	VALUE-ADDED SERVICE
VSAT	VERY SMALL APERTURE TERMINAL
WPC	WIRELESS PLANNING & COORDINATION
WPI	WHOLESALE PRICE INDEX

Government of India
Ministry of Communications & Information Technology
Department of Telecommunications
Wireless Planning & Coordination Wing

6th floor, Sanchar Bhawan,
20, Ashoka Road, New Delhi-110001.

No.: L-14027/08/2016-NTG

Date: 13.07.2017

To,

The Secretary
Telecom Regulatory Authority of India
Mahanagar Doorsanchar Bhawan, Jawahar Lal Nehru Marg (Old Minto Road)
New Delhi-110002.

Subject: TRAI recommendations on method of allocation of spectrum for Public Mobile Radio Trunking Service (PMRTS), including auction, as a transparent mechanism.

Sir,

Mobile Radio Trunking Service has been growing steadily since its introduction in India over two decades ago. As a result, Commercial Mobile Trunking Radio Service Providers has been asking for more spectrum to cater to their growing subscriber base. In addition, they are also asking spectrum for new cities/locations (mining area, power plant and refinery etc.). The growth pattern of Captive (non-commercial) Mobile Radio Trunking Services (CMRTS) as used by Police Organization and public Sector Units (PSUs) etc. is also following the same trend.

2. Distinct sub-bands have been identified for Radio Trunking Services in National Frequency Allocation Plan - 2011, and there is no strict demarcation in those sub-bands between the usage by commercial and non-commercial radio trunking services. As of now, the sub-bands for Mobile Radio Trunking Service and their usage pattern is given in table 1 below:

Table 1				
S. No.	Frequency Band (in MHz)	Total Bandwidth	India remark in NFAP-2011	Applicability
1	336 - 338 / 346 - 348	2.0 MHz	IND27	For both PMRTS and CMRTS
2	338 - 340 / 348 - 350	2.0 MHz		
3	351 - 356 / 361 - 366	5.0 MHz	IND28	Digital CMRTS
4	356 - 358 / 366 - 368	2.0 MHz		
5	380 - 389.9 / 390 - 399.9	9.9 MHz	IND29	Digital PMRTS and CMRTS
6	806 - 811 / 851 - 856	5.0 MHz	IND40	Predominantly for CMRTS
7	811 - 814 / 856 - 859	3.0 MHz	IND41	For spectrum efficient digital PMRTS and CMRTS
8	814 - 819 / 859 - 864	5.0 MHz	IND42	Predominantly for PMRTS
9	819 - 824 / 864 - 869	5.0 MHz	IND43	For both PMRTS and CMRTS

Relevant India remarks in NFAP-2011, as mentioned above, are at Annexure-I.

3. Prior to Unified License (UL) regime, RF spectrum was allotted administratively city wise to the PMRTS licensees, having valid license agreement for providing PMRT Services in a that particular city. Under the Unified License regime, UL agreement is granted with authorization for providing PMRT Services on service area basis instead of earlier practice of city wise. However, spectrum is still allotted administratively for PMRT services on city basis. With such allotment of spectrum, service provider shall provide services only in the cities of the service area for which spectrum has been assigned.

4. Presently, a total of 8 service providers are providing PMRT service in 34 cities which fall in 11 Licensed Service Areas (the LSAs being the same as in cellular mobile service). A summary of the existing assignments made to PMRTS networks in various cities is enclosed as per Annexure II. Further, requests from these service providers for allotment of initial spectrum in 28 new cities as well as for allotment of additional spectrum for expansion of existing PMRTS networks have also been received. Spectrum for these new requests has not yet been allotted. If the existing network and the proposed new network in different cities are taken together, the number of such cities will become 62 which fall in 16 LSAs. Service area and city wise detailed information for demand of spectrum for PMRT services is at Annexure III.

5. All RF assignments made to existing PMRTS networks are conditional and made under the provisions of the Office Memorandums (O.M.s) issued from time to time in this regard with the following undertaking from the service providers:

- i. The allotment of spectrum is provisional and subject to Government's decision on allotment and pricing of spectrum;
- ii. In the event of final decision to allot spectrum through auction process, the provisional allotment of spectrum shall be withdrawn;
- iii. In case the provisional allotment of spectrum is withdrawn, payment made towards spectrum charges or part thereof shall not be refunded;
- iv. In case the provisional allotment of spectrum is withdrawn, respective wireless users would obtain Non Dealer Possession License (NDPL) for possessing the wireless equipment or return the equipment to a Dealer Possession License (DPL) holder or shall be disposed off as per procedure.
- v. Licensees would pay the revised spectrum charges, as finally determined through market related mechanism or otherwise, as may be applicable, from the date of LoI for provisional allotment of spectrum.

5.2 In this context, it may be mentioned that spectrum allotted to PMRT service providers is provisional and can be taken back before the assignment of spectrum through auction.

6. At present, spectrum charges for PMRT service are levied on formula basis which include the number of assigned RF channels, the number of radio stations (base and mobile stations) and coverage radius in kilometers (kms) for the purpose of calculation. The latest spectrum charging order applicable for PMRT services is at Annexure-IV.

7. Issues to be addressed:

7.1 Preferable frequency bands for PMRT services:

7.1.1 Radio trunking service on technological and regulatory landscape has undergone considerably changes since the publication of NFAP – 2011, it is therefore, important to take note of these changes. Further, steady efforts at the international fora to harmonise the spectrum bands for radio trunking service has necessitated that a holistic view of PMRTS and CMRTS should be taken in respect of their spectrum requirements.

7.1.2 In view of the preceding paras, it would be preferable to consider the bands for PMRT services in the following order of priority:

S. No.	Frequency Band (in MHz)	Total Bandwidth
1	816 - 819 / 861 - 864	3.0 MHz
2	819 - 824 / 864 - 869	5.0 MHz
3	336 - 340 / 346 - 350	4.0 MHz
	Total	12.0 MHz

7.1.3 TRAI may consider and give recommendation on appropriate frequency bands for PMRT services.

7.2 Block Size:

7.2.1 In past few years, different technologies have evolved and are available in market such as TETRA (Terrestrial Trunked Radio), APCO25 (Association of Public safety Communications Officials International Inc.), iDEN (Integrated Digital Enhanced Network), dPMR (Digital PMR and Go Ta CDMA (Global open Trunking Architecture CDMA), etc. These technologies demand varying emission bandwidths of 25 kHz, 12.5 kHz and 6.25 kHz.

7.2.2 In order to have flexibility with allotment of spectrum, it would be preferable to consider block size of 6.25 KHz. With this block size future growth plan for PMR services can also be met easily. It may also be ensured that user may bid for even number of blocks.

7.2.3 TRAI may consider and give recommendation on block size for PMRT service.

7.3 Duration/Validity Period:

7.3.1 Presently, spectrum for access services is auctioned for a validity period of 20 years. PMRT services cannot be matched with access services in terms of scale of services and revenue generation. Moreover, PMRT services are expected to be limited to few cities only.

7.3.2 TRAI may consider whether validity period for PMRT can be kept less than 20 years such as 5 years, 10 years, notwithstanding that Unified License for PMRT services is issued for 20 years period, and give recommendation accordingly.

7.4 Area of service:

7.4.1 At present, PMRT services are being provided over a city, even though UL agreement authorizes service providers for providing services in entire service area. Auctioning spectrum on service area basis may not be financially viable considering the scale of PMRT services and it

would also not lead to efficient spectrum utilization as PMRT services are unlikely to be deployed over the entire service area.

7.4.2 TRAI may consider exploring the feasibility for allotment of spectrum for PMRTS on city basis unlike service area basis as for cellular mobile services and give recommendation accordingly.

7.5 Reserve Price and Spectrum Usage Charges (SUC):

7.5.1 At present, assignment of spectrum for PMRTS is done on administrative basis and no upfront payment is charged. PMRT service providers are paying License Fee on percentage of AGR basis and spectrum usage charges on formula basis which include the number of assigned RF channels, the number of radio stations (base and mobile stations) and coverage radius in kilometers (kms) for the purpose of calculation. The latest spectrum charging order applicable for PMRT services is at Annexure-IV.

7.5.2 It may be noted that there is no strict distinction between CMRT and PMRT services except that the latter is a commercial service whereas CMRT services are non commercial and its area of operation is normally limited to mining area or factory premises.

7.5.3 TRAI may consider and give recommendation on reserve price and applicable SUC for PMRT services in different bands.

7.6 Spectrum Cap:

7.6.1 At present, allotment to spectrum for providing PMRT Services is done on administrative basis and there is no provision for spectrum cap. However, spectrum cap may be fixed so as to prevent market dominance by one operator.

7.6.2 TRAI may consider and give recommendation on applicable spectrum cap for PMRT services.

8. Besides above issues, any other issue which TRAI may think appropriate in respect of auction of spectrum for PMRT services may be included.

9. TRAI is, therefore, requested to:

9.1 Provide recommendations on applicable reserve price, and other associated conditions for auction of spectrum for PMRT services under the terms of clause 11 (1)(a) of TRAI Act, 1997 as amended by TRAI Amendment Act 2000.

9.2 Any other recommendations deemed fit for the purpose of auction of spectrum for PMRT services.

This issues with the approval of the competent authority.



(R. B. Prasad)
Joint Wireless Adviser

India Remarks in the National Frequency Allocation Table

	10.1.2007 and GSR 532 (E) dated 12.8.2005
IND20	The requirement of onsite radio paging systems and talkback facility will be considered in the frequency band 150.05-151.5 MHz. The frequency spots 150.3, 150.9 and 151.07 MHz are earmarked for onsite paging and 151.15, 151.55 and 150.6 MHz for talkback facility for such systems.
IND21	The frequency spots 150.525, 151.250 and 166.950 MHz are earmarked for purposes such as O.B. Vans & film shooting.
IND22	Requirement of fixed and mobile services including those of wireless telemetry seismic systems will be considered in the frequency band 174-230 MHz on a case-by-case basis. Specific requirement of wind profiler radars in the frequency band 200-220 MHz may also be coordinated on a case-by-case basis.
IND23	<u>Digital Audio Broadcasting (DAB)</u> may be considered in the frequency band 174-230 MHz initially in the four Metro cities and further introduction of DAB could be considered on a case-by-case basis taking into account interference potentiality aspects.
IND24	Protection requirements of radio astronomy service in the frequency band 230-235 MHz within the appropriate coordination zone around GMRT, Pune may be borne in mind while considering spot frequencies for other services.
IND25	The requirement for wide area Radio Paging systems, two way radio systems including voice paging systems may be considered in the frequency band 276-280 MHz with talk back in the frequency band 917-921 MHz up to a maximum of 1 MHz in each band.
IND26	The requirement of short-range radio may be considered in the frequency band 350-351 MHz. The frequency spots 350.1625, 350.1750; 350.1875, 350.2000, 350.2125, 350.2250, 350.2375, 350.2500, 350.2625, 350.2750, 350.2875, 350.3000, 350.3125, 350.3250, 350.3375, 350.3500, 350.3625, 350.3750, 350.3875, 350.4000, 350.4125, 350.4250, 350.4375, 350.45, 350.4625, 350.4750, 350.4875, 350.5000, 350.5125, 350.5250 and 350.5375 MHz are earmarked for this purpose
<u>IND27</u>	Requirements of public mobile radio trunked systems (PMRTS) and Captive mobile radio trunked systems will be considered in the frequency band 338-340 MHz paired with 348-350 MHz and its additional requirements may be considered in the frequency bands <u>336-338 MHz</u> paired with <u>346-348 MHz</u> on a case-by-case basis.
<u>IND28</u>	The requirement of digital radio trunked service for captive networks will also be considered in the frequency band 351-356 MHz paired with 361-366 MHz and 356-358 MHz paired with 366-368 MHz on case-by-case basis.
<u>IND29</u>	Requirements for digital radio trunked systems may be considered in the frequency bands 380-389.9 MHz paired with 390-399.9 MHz as also in 410-430

India Remarks in the National Frequency Allocation Table

	MHz on a case-by-case basis.
IND30	Requirement of rural communications may be considered for coordination in the frequency band 368-380 MHz on case-by-case basis.
IND31	Use of very low power remote cardiac monitoring RF wireless medical devices, medical implant communication/ telemetry systems and other such medical RF wireless devices in frequency band 402-405 MHz using a maximum radiated power of 25 micro watt or less with channel emission band width with in 300 kHz has been exempted from licensing requirement. (See also GSR no 673 (E) dated 23.9.2008)
IND32	Requirements of digital seismic telemetry upto 1.5 MHz bandwidth may be met in the frequency band 406.1-450 MHz on case-by-case basis.
IND33	Low power short range devices may be considered in the frequency band 433-434 MHz with a power output of 10 mW with a channel bandwidth of 10 kHz on non-interference, non protection and non- exclusive basis.
IND34	The frequency spots 441.6 and 466.8 MHz may be considered for Anti Collision Device (ACD) applications on case-by-case basis.
IND35	The requirement of IMT applications in the frequency band 450.5-457.5 MHz paired with 460.5-467.5 MHz may be considered for coordination on a case-by-case basis subject to its availability.
IND36	Requirements of fixed and mobile services will be considered in the frequency band 470-520 MHz and 520-585 MHz on case-by-case basis.
IND37	The requirement of Digital Broadcasting Services including Mobile TV may be considered in the frequency band 585-698 MHz subject to coordination on case-by-case basis.
IND38	The requirement for IMT and Broadband Wireless Access may be considered in the frequency band 698-806 MHz subject to coordination on a case-by-case basis.
IND39	Requirements of broadcasting and mobile satellite services except aeronautical mobile satellite(R) service in the frequency band 806-890 MHz may be considered for co-ordination on case-by-case basis.
<u>IND40</u>	Frequency band 806-811 MHz paired with 851-856 MHz has been earmarked for mobile trunked radio system to be used predominantly for captive networks. The requirements for public mobile radio trunked systems (PMRTS), which cannot be met in other bands, may also be considered in this band.
<u>IND41</u>	Frequency bands 811-814 MHz paired with 856-859 MHz has been earmarked for spectrum efficient digital public mobile radio trunked systems (PMRTS) and captive mobile radio trunked systems.
<u>IND42</u>	Frequency band 814-819 MHz paired with 859-864 MHz has been earmarked

India Remarks in the National Frequency Allocation Table

- for mobile radio trunked systems to be used predominantly for public mobile radio trunked systems (PMRTS).
- IND43 Requirement of public mobile radio trunked systems (PMRTS) and captive mobile radio trunked systems may also be considered, as appropriate, in the frequency bands 819-824 MHz paired with 864-869 MHz.
- IND44 Use of low power RFID equipments or any other low power wireless devices or equipments in the frequency band 865-867 MHz with a maximum transmitter power of 1 Watt (4 Watts Effective Radiated Power) with 200 kHz carrier band width has been exempted from licensing requirement. (see also GSR 564 (E) dated 30 July 2008)
- IND45 Frequency spots 849.0125/933.0125, 849.0250/933.0250, 849.0375/933.0375, 849.0500/933.0500, 849.0625/933.0625, 849.0750/933.0750, 849.0875/933.0875, 849.1000/933.1000, 849.1125/933.1125, 849.1250/933.1250 MHz have been earmarked for supervisory control and data acquisition system (SCADA) except in a few specific locations.
- IND46 Frequency band 824-844 MHz paired with 869-889 MHz has been earmarked for cellular telecommunication systems, including WLL
- IND47 Frequency band 890-902.5MHz paired with 935-947.5MHz has been earmarked for cellular telecom systems.
- IND48 Additional requirements for cellular telecom systems in the frequency band 902.5-915 MHz paired with 947.5-960 MHz may be coordinated on case-by-case basis.
- IND49 Certain frequency spots in the frequency bands 902.5-915 MHz and 947.5-960 MHz may be considered for train control& mobile train radio systems for specific locations on a case-by-case basis.
- IND 50 Requirements for Micro cellular low powered, telecommunication systems with maximum EIRP up to 4 Watts, FDD access techniques may be considered at specific locations for indigenously developed systems and technology, in a small chunk, in the frequency band 900 MHz presently used by existing wireless users of captive systems subject to co-ordination on case-by-case basis.
- IND51 In relation to specific problem of harmful interference from wireless access systems (fixed/mobile) for telecommunication services into cellular based networks, appropriate measures of incorporating filters in the wireless access systems (fixed/mobile) for telecommunication services shall be taken. Appropriate measures of incorporating filters in cellular based networks for blocking signals leaking through the extended cellular frequency bands shall also be taken.

ANNEXURE - II

City-wise Allotment of RF Spectrum for PMRTS to TSPs

Service Area	Location (City/Town)	Service Provider	No. of RF Channels Allotted at present			
			338 - 340 MHz / 348 - 350 MHz	814 - 819 MHz / 859 - 864 MHz	811 - 814 MHz / 856 - 859 MHz	Total
Andhra Pradesh	Hyderabad	Arya Omnitalk Radio Trunking Services Private Limited		5		5
		Quickcalls Private Limited		15		15
	Visakhapatnam	Arya Omnitalk Radio Trunking Services Private Limited		30		30
Delhi	Delhi	Arya Omnitalk Radio Trunking Services Private Limited		30		30
		Procall Private Limited		40		40
	Faridabad	Procall Private Limited		5		5
	Gurgaon	Procall Private Limited		15		15
Gujarat	Ahmedabad	Arya Omnitalk Radio Trunking Services Private Limited		10		10
		Inative Networks Private Limited			5	5
	Amreli	Inative Networks Private Limited			1	1
	Bharuch	Arya Omnitalk Radio Trunking Services Private Limited		5		5
		Inative Networks Private Limited			1	1
	Dahej	Arya Omnitalk Radio Trunking Services Private Limited		5		5
	Jamnagar	Inative Networks Private Limited			2	2
	Kutch	Inative Networks Private Limited			5	5
		Arya Omnitalk Radio Trunking Services Private Limited		15		15
		Inative Networks Private Limited			5	5
	Vadodra	Arya Omnitalk Radio Trunking Services Private Limited		10		10

City-wise Allotment of RF Spectrum for PMRTS to TSPs

Service Area	Location (City/Town)	Service Provider	No. of RF Channels Allotted at present			
			338 - 340 MHz / 348 - 350 MHz	814 - 819 MHz / 859 - 864 MHz	811 - 814 MHz / 856 - 859 MHz	Total
	Varanasi	Inative Networks Private Limited			2	2
Karnataka	Bangalore	Arya Omnitalk Radio Trunking Services Private Limited		40		40
		Quickcalls Private Limited		5		5
Kerala	Alappuzha	WiWaNet Private Limited	5			5
	Cochin	Arya Omnitalk Radio Trunking Services Private Limited			5	5
	Ernakulam	WiWaNet Private Limited	5			5
	Kollam	WiWaNet Private Limited	5			5
	Munnar	WiWaNet Private Limited	5			5
	Panniankara	WiWaNet Private Limited	5			5
	Payyanur	WiWaNet Private Limited	5			5
	Tirur	WiWaNet Private Limited	5			5
	Trichur	WiWaNet Private Limited	5			5
	Trivandrum	WiWaNet Private Limited	5			5
Kolkata	Kolkata	Arya Omnitalk Radio Trunking Services Private Limited		20		20
Madhya Pradesh	Indore	Arya Omnitalk Radio Trunking Services Private Limited		10		10
	Khandala	Arya Omnitalk Radio Trunking Services Private Limited		5		5
	Bhopal	Arya Omnitalk Radio Trunking Services Private Limited		15		15

City-wise Allotment of RF Spectrum for PMRTS to TSPs

Service Area	Location (City/Town)	Service Provider	No. of RF Channels Allotted at present			
			338 - 340 MHz / 348 - 350 MHz	814 - 819 MHz / 859 - 864 MHz	811 - 814 MHz / 856 - 859 MHz	Total
	Pune	Smart Talk Private Limited		10		10
Mumbai	Belapur	Arya Omnitalk Radio Trunking Services Private Limited		5		5
	Mumbai	Arya Omnitalk Radio Trunking Services Private Limited		40		40
		Bhilwara Telenet Services Private Limited		10		10
		Smart Talk Private Limited		10		10
	Navi Mumbai	Airtalk Solutions & Services Private Limited		5		5
	Vashi	Arya Omnitalk Radio Trunking Services Private Limited		10		10
	Jaipur	Arya Omnitalk Radio Trunking Services Private Limited		5		5
		Procall Private Limited		5		5
	Tamilnadu	Chennai	Arya Omnitalk Radio Trunking Services Private Limited		40	
Quickcalls Private Limited				5		5
Total			45	425	26	496

ANNEXURE - III

Data i.r.o. demand of RF Channels for PMRTS in various cities

Service Area	Location (City/Town)	338 - 340 MHz / 348 - 350 MHz				811 - 814 MHz / 856 - 859 MHz				814 - 819 MHz / 859 - 864 MHz				Total demand of RF Channels for PMRTS in all the bands
		No. of RF Channels available (@ Channel Spacing of 25 kHz) for assignment	No. of RF Channels, assigned to existing networks	No. of RF Channels, requested for assignment	Total demand	No. of RF Channels available (@ Channel Spacing of 25 kHz) for assignment	No. of RF Channels, assigned to existing networks	No. of RF Channels, requested for assignment	Total demand	No. of RF Channels available (@ Channel Spacing of 25 kHz) for assignment	No. of RF Channels, assigned to existing networks	No. of RF Channels, requested for assignment	Total demand	
Andhra Pradesh	Hyderabad	80			0	120		5	5	200	20		20	25
	Nellore	80			0	120		1	1	200			0	1
	Visakhapatnam	80			0	120		6	6	200	30	5	35	41
Bihar	Jamshedpur	80			0	120		1	1	200			0	1
Delhi	Delhi	80			0	120		27	27	200	70	20	90	117
	Faridabad	80			0	120			0	200	5		5	5
	Gurgaon	80			0	120			0	200	15		15	15
Gujarat	Ahmedabad	80			0	120	5		5	200	10	5	15	20
	Amreli	80			0	120	1		1	200			0	1
	Anand	80			0	120		1	1	200			0	1
	Bharuch	80			0	120	1	5	6	200	5	5	10	16
	Bhavnagar	80			0	120		1	1	200			0	1
	Chhota Udaipur	80			0	120		1	1	200			0	1
	Dahej	80			0	120		5	5	200	5		5	10
	Gandhinagar	80			0	120		1	1	200			0	1
	Halol	80			0	120		5	5	200			0	5
	Jamnagar	80			0	120	2		2	200			0	2
	Junagarh	80			0	120		1	1	200			0	1

Data i.r.o. demand of RF Channels for PMRTS in various cities

Service Area	Location (City/Town)	338 - 340 MHz / 348 - 350 MHz				811 - 814 MHz / 856 - 859 MHz				814 - 819 MHz / 859 - 864 MHz				Total demand of RF Channels for PMRTS in all the bands
		No. of RF Channels available (@ Channel Spacing of 25 kHz) for assignment	No. of RF Channels, assigned to existing networks	No. of RF Channels, requested for assignment	Total demand	No. of RF Channels available (@ Channel Spacing of 25 kHz) for assignment	No. of RF Channels, assigned to existing networks	No. of RF Channels, requested for assignment	Total demand	No. of RF Channels available (@ Channel Spacing of 25 kHz) for assignment	No. of RF Channels, assigned to existing networks	No. of RF Channels, requested for assignment	Total demand	
	Kheda	80			0	120		1	1	200			0	1
	Kutch	80			0	120	5		5	200			0	5
	Navsari	80			0	120		1	1	200			0	1
	Porbandar	80			0	120		1	1	200			0	1
	Rajkot	80			0	120		1	1	200			0	1
	Sabarkatha	80			0	120		1	1	200			0	1
	Shidpur	80			0	120		1	1	200			0	1
	Sitapur	80			0	120		5	5	200			0	5
	Surat	80			0	120	5	5	10	200	15		15	25
	Surendranagar	80			0	120		1	1	200			0	1
	Vadodara	80			0	120	2		2	200	10	5	15	17
	Valsad	80			0	120		1	1	200			0	1
Haryana	Rohtak	80			0	120		1	1	200			0	1
Karnataka	Bangalore	80			0	120		15	15	200	45	25	70	85
	Bellari	80			0	120		2	2	200			0	2
	Mangalore	80			0	120		5	5	200			0	5
Kerala	Alappuzha	80	5		5	120			0	200			0	5
	Cochin	80			0	120	5	5	10	200			0	10

Data i.r.o. demand of RF Channels for PMRTS in various cities

Service Area	Location (City/Town)	338 - 340 MHz / 348 - 350 MHz				811 - 814 MHz / 856 - 859 MHz				814 - 819 MHz / 859 - 864 MHz				Total demand of RF Channels for PMRTS in all the bands
		No. of RF Channels available (@ Channel Spacing of 25 kHz) for assignment	No. of RF Channels, assigned to existing networks	No. of RF Channels, requested for assignment	Total demand	No. of RF Channels available (@ Channel Spacing of 25 kHz) for assignment	No. of RF Channels, assigned to existing networks	No. of RF Channels, requested for assignment	Total demand	No. of RF Channels available (@ Channel Spacing of 25 kHz) for assignment	No. of RF Channels, assigned to existing networks	No. of RF Channels, requested for assignment	Total demand	
	Ernakulam	80	5		5	120			0	200			0	5
	Kollam	80	5		5	120			0	200			0	5
	Munnar	80	5		5	120			0	200			0	5
	Panniankara	80	5		5	120			0	200			0	5
	Payyanur	80	5		5	120			0	200			0	5
	Tirur	80	5		5	120			0	200			0	5
	Trichur	80	5		5	120			0	200			0	5
	Trivandrum	80	5		5	120			0	200			0	5
Kolkata	Kolkata	80			0	120		5	5	200	20		20	25
Madhya Pradesh	Indore	80			0	120			0	200	10	5	15	15
Maharashtra	Chandrapur	80			0	120		1	1	200			0	1
	Khandala	80			0	120			0	200	5		5	5
	Pune	80			0	120			0	200	25		25	25
	South Goa	80			0	120		1	1	200			0	1
Mumbai	Belapur	80			0	120		10	10	200	5	25	30	40
	Mumbai	80			0	120		10	10	200	60	25	85	95
	Navi Mumbai	80			0	120			0	200	5		5	5

Data i.r.o. demand of RF Channels for PMRTS in various cities

Service Area	Location (City/Town)	338 - 340 MHz / 348 - 350 MHz				811 - 814 MHz / 856 - 859 MHz				814 - 819 MHz / 859 - 864 MHz				Total demand of RF Channels for PMRTS in all the bands
		No. of RF Channels available (@ Channel Spacing of 25 kHz) for assignment	No. of RF Channels, assigned to existing networks	No. of RF Channels, requested for assignment	Total demand	No. of RF Channels available (@ Channel Spacing of 25 kHz) for assignment	No. of RF Channels, assigned to existing networks	No. of RF Channels, requested for assignment	Total demand	No. of RF Channels available (@ Channel Spacing of 25 kHz) for assignment	No. of RF Channels, assigned to existing networks	No. of RF Channels, requested for assignment	Total demand	
	Vashi	80			0	120		10	10	200	10	25	35	45
Orissa	Angul	80			0	120		5	5	200			0	5
	Jagatsinghpur	80			0	120		1	1	200			0	1
	Jaipur	80			0	120		1	1	200			0	1
	Barmer	80			0	120		1	1	200			0	1
Tamilnadu	Chennai	80			0	120		21	21	200	45	15	60	81
	Coimbatore	80			0	120		5	5	200			0	5
West Bengal	Haldia	80			0	120		1	1	200			0	1

(8)

Government of India
Ministry of Communications
(WPC Wing)

Parliament Street, Dak Bhavan
New Delhi - 110 001

No. L-14027/01/98-NTG

Dated: Sep 18, 2000

ORDER

Subject: Royalty and licence fee charges for the grant of licence to establish, maintain and work Public Mobile Radio Trunked Service (PMRTS) stations under the provisions of the Indian Telegraph Act, 1885.

In pursuance of powers conferred by section 4 of the Indian Telegraph Act, 1885 (13 of 1885), the Central Government hereby prescribes the following rates of royalty and licence fee charges for the grant of the licence to establish, maintain and work fixed/vehicle mobile/handheld mobile wireless telegraph stations in the Public Mobile Radio Trunked service (PMRTS):-

2. The formula for calculation of royalty and licence fee is given below:-

Total fee per year = L + R
where,

L = Licence fee

R = Royalty

- 2.1 Total fee per year is payable in advance for the whole year (year may start in any month in the first year and January, in the subsequent year. For the first year the royalty on pro-rata quarterly year basis is to be paid and licence fee is to be paid on annual basis)
- 2.2 Royalty and licence fee will have to be paid annually in advance by 15th January. The number of stations as on 1st January and 1st July shall be certified by the licensee by way of an affidavit. Balance of licence fee for additional number of stations based on 1st July and 1st January of the following year should be paid by 15th July and 15th January respectively.

- i) L & R for maximum radio link distance between 5 & 60 kms are to be calculated as follows :

$$L = 100 \times n$$
$$R = 4800 \times f$$

- ii) L & R for maximum link distance below 5 kms, R & L will be expressed as :-

$$L = 100 \times n$$
$$R = 1200 \times f$$

where,

n = No. of stations (station includes fixed base station,
Vehicle mounted mobile or hand held mobile stations)

f = No. of frequency spots used. (This corresponds to
f/2 frequency pairs).

3. The order shall come into force from July 20, 1995.
4. This issues with the concurrence of Finance Advice IV Branch, DoT vide their UO No.616/DFIV/2000 dated 14.09.2000.



(Dr. Ashok Chandra)

Deputy Wireless Adviser to the Government of India

Copy to :-

1. All concerned
2. Wireless Monitoring Organisation
3. Department of Telecommunications (Finance Advice IV Branch),
New Delhi.