CONSULTATION PAPER No. 2000/5

TELECOM REGULATORY AUTHORITY OF INDIA

CONSULTATION PAPER

ON

LICENSING ISSUES RELATING TO PUBLIC MOBILE RADIO TRUNKING SERVICE PROVIDERS

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TELECOM REGULATORY AUTHORITY OF INDIA
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ABSTRACT

Giving the context of NTP-99, the Department of Telecommunications (DOT), as a licensor, has sought by their letter dated 28.4.99 (Annexure I), recommendations from the Telecom Regulatory Authority of India (TRAI) on the following issues related to PMRTS;

?? **The basis for determining the entry fee.**

?? **Percentage of Revenue to be shared with the licensor and defining revenue for the purpose.**

?? **The basis of selection of additional operators.**

?? **The appropriate level of licence fee for the extended period of the licence in respect of existing licences.**

?? **Any other issue as considered relevant.**

In the above said letter, DOT has also indicated its intension to extend the licence period from the existing five years to 20 years in terms of NTP-99.

This consultation paper is intended to raise public debate on the issues relevant for formulating TRAI's recommendations in the matter. This paper provides the information on the PMRTS in India. It also addresses the financial position of PMRTS companies and their problems and demands.

Chapter 5 shortlists the issues that should be kept in view while considering recommendations related to licencing. Chapter 6 consolidates the issues for public debate.

CHAPTER-1

BACKGROUND

1.1 Background

1.1.1 The New Telecom Policy (NTP) 1999 envisages creation of world-class telecommunications and information infrastructure for rapid socio-economic development of the country. The country has of late witnessed growth in the service sector. The share of Services sector in GDP has increased sharply from 43.69 per cent in 1990-91 to 51.16 per cent in 1998-99. The surge in the share of the Services sector was due to the fact that the economy did not have to pass through the incremental process of improving technology in stages. The economy has leap-frogged from the stage of lower order of value addition in the agricultural sector to the higher level of value addition in the service sector. Within the Services sector, the share of trade, hotels and restaurants increased from 12.52 per cent in 199-91 to 15,68 per cent in 1998-99, and that of transport, storage and communications from 5.26 per cent to 7.61 per cent. The other sub- sectors of service sector have also witnessed increase, he financing, the insurance, the real estate and business service rose from 10.22 per cent to 11.44 per cent. The important question in this regard for the communications sector is whether the growth in earnings from trade, hotels and restaurant or for that matter from financing, insurance, real estate and business service would be sustainable unless there is commensurate growth in appropriate communications tools to support the prosperity in service sectors. These growths are throwing immense potential for communications tool that has large intra-organizational communication needs. Radio Trunking is one of the ideal communications tool for an organization that has substantial communication needs such as that –

- ?? when it is necessary to contact people who are in the field;
- ?? when it is necessary to constantly stay in touch with the offices across the city;
- ?? when delivery operations and delivery schedules are constantly changing;
- ?? when there is need to respond back quickly in emergency situations, etc.

Unlike the basic and cellular services, PMRTS is not primarily meant to provide service to individuals. Instead, its' customers are members of closed user groups.

1.1.2 Commercial Trunked Radio Systems or Public Mobile Radio Trunking System (PMRTS) are useful in serving entities with need for one-to-many and many-to-one mobile communications primarily amongst its units. This need may be due to the requirement that large or small groups of employees are on the move, especially those in fleet, sales and service operations and they require the ability to communicate with each other. Commercial Trunked Radio technology can enable a company to simultaneously communicate with all units in a mobile and/ or portable fleet or to direct transmissions to

a single radio or subgroup of radios. With this device, a customer can configure his trunked radio system to allow him to press a button and talk with one individual, press the same button and talk with one or more groups of people, and then press that same button again and talk with everyone on the entire network. The facilities provided by this service are not very useful for personal communication requirements of an individual but they fulfill essential communication requirements of the members of a closed user group (CUG). The service thus facilitates the communication between the members of a CUG in a flexible manner even while they are on move. The facilities offered by PMRTS are essential to allow a company in certain types of operations to operate with flexibility and efficiency. The PMRTS has wide-spread application in sectors such as Public Safety (Ambulance, Fire Service, Police, Forest, Defense), Manufacturing (Logistics, Oil & Gas, Mining), Construction (new projects), Courier (picking and delivery of packages), Emergency Services (for logistics and fighting natural calamities), Utilities (like Municipal services, electricity, water etc.), Transportation (Road, Airports, Harbors), Energy & Communication (for efficient service & maintenance), and Service Industry (repair, delivery, financial services). This service is therefore having a niche market where it provides support to various public utility services, business activities and industrial activities primarily related to a CUG. This brings out an important difference between PMRTS and most of the other telecom services. Unlike cellular services, it is not intended for general public, but is mainly engineered to provide communications to a group who have a strong community of interest with each other.

1.1.3 **Closed user group (CUG)** is mentioned by DOT in the licence for VSAT as follows:

CUG is permissible for the following categories of business association:

a. Producer of goods and his trader/ agent.
b. Provider of service and his trader/agent.
c. Producer of same category of goods.
d. Provider of same category of service.
e. Among a holding company and its subsidiaries or among interconnected undertakings, these terms being defined as per the MRTP Act 1969.

ART, the Telecom Regulatory Authority of France defines CUG as a group with a common interest which is sufficiently stable to be identified and which existed prior to the provision of the telecommunication service. The term closed user group is also used by ART to define a virtual private network on a public network.

1.2 Policy Framework:

The New Telecom Policy (TNP) 1999 envisages the following framework for the Public Mobile Radio Trunking Service (PMRTS). The salient features of existing licences are dealt with in para 2.2 :

?? PMRTS providers shall provide mobile radio trunking services within their service area of operation. Separate licenses shall be granted on a non-exclusive basis for each service area of operation.

?? Direct interconnectivity between licensed PMRTS providers and any other type of service providers in their area of operation shall be permitted after examining the legal implications in view of the CMSP licenses.

?? Licenses would be awarded for an initial period of 20 years and will be extended by additional periods of 10 years thereafter.

?? The service area would be categorised as per the existing structure.

?? PMRTS providers shall be eligible to obtain licenses for any number of service areas.

?? PMRTS providers would pay one-time entry fee. In addition, they would also be required to pay licence fee based on a revenue share.

?? The basis for determining the entry fee, and the basis for selection of additional operators will be recommended by the TRAI.

?? Appropriate level of entry fee and percentage of revenue share arrangement for different service areas would be recommended by TRAI keeping in view the objectives of the New Telecom Policy.

The objectives of the New Telecom Policy 99 are as under:

?? Access to telecommunications is of utmost importance for achievement of the country's social and economic goals. Availability of affordable and effective communications for the citizens is at the core of the vision and goal of the telecom policy.

?? Strive to provide a balance between the provision of universal service to all uncovered areas, including the rural areas, and the provision of high-level services capable of meeting the needs of the country's economy;

?? Encourage development of telecommunication facilities in remote, hilly and tribal areas of the country;

?? Create a modern and efficient telecommunications infrastructure taking into account the convergence of IT, media, telecom and consumer electronics and thereby propel India into becoming an IT superpower;

?? Convert PCO's wherever justified, into Public Teleinfo centres having multimedia capability like ISDN services, remote database access, government and community information systems etc.

?? Transform in a time bound manner, the telecommunications sector to a greater competitive environment in both urban and rural areas providing equal opportunities and level playing field for all players;

?? Strengthen research and development efforts in the country and provide an impetus to build world-class manufacturing capabilities;

?? Achieve efficiency and transparency in spectrum management;

?? Protect defence and security interests of the country;

?? Enable Indian Telecom Companies to become truly global players.

Further, NTP-99 also states that the new policy framework, which seeks to significantly redefine the competitive nature of industry, would be applicable to new licences. It also states that it is Governments intention to satisfactorily

resolve the problems being faced by existing operators in a manner, which is consistent with their contractual obligations and is legally tenable.

1.3 Public Mobile Radio Trunking System

1.3.1 Commercial Trunked Radio is named and classified in different countries under different names. For example, commercial trunked radio is known as Specialized Mobile Radio ("SMR") in the United States, Trunked Radio Service ("TRS") in several countries in Asia, and Public Access Mobile Radio ("PAMR") throughout Europe. In India the service is known as Public Mobile Radio Trunking Service. The International Mobile Telecommunications Association (IMTA) has defined commercial trunked radio as Commercial trunked radio industry consisting of wireless radio communications systems, which employ either conventional or frequency-trunked technology.

1.3.2 Historically, these systems have provided one-to-many and many-to-one mobile wireless voice communications services, also known as mobile dispatch services. They are usually operated by commercial entities, commonly called service providers, who provide and resell their services to other entities for a profit. The usefulness of the trunking system is that it is a cost-effective, user-friendly communications tool that allows groups of people to communicate with each other, even when all or some of them are mobile. The most important characteristics of trunking systems are mobility, speed of communication, and the ability to communicate with a pre-designated group of people.

1.4 Technology

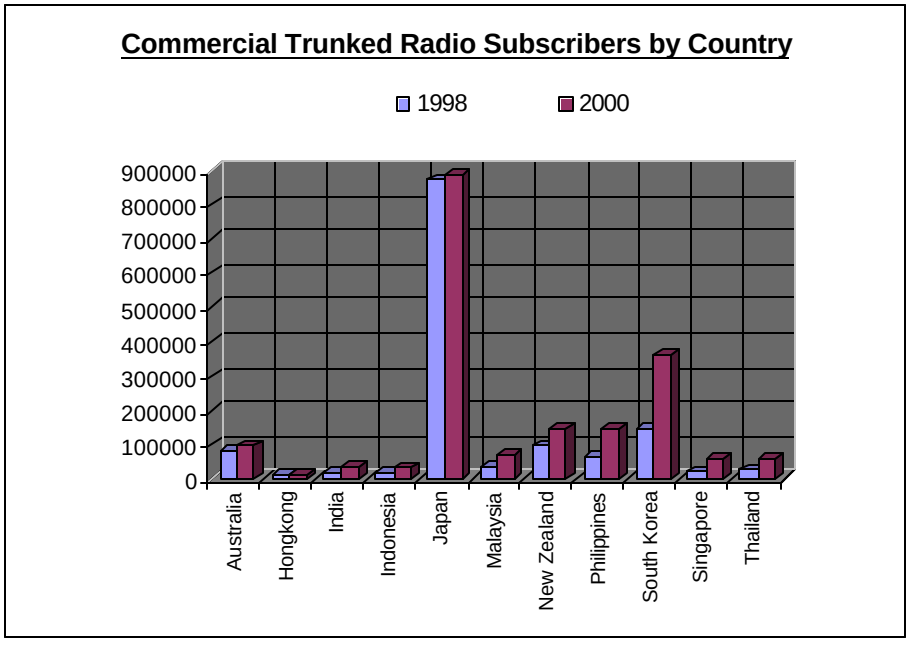
1.4.1 Trunking systems, using frequency-trunked technology, were developed to offer companies a more sophisticated, private and efficient way of communicating with their mobile workforce**.** Most conventional and traditional trunked systems are analog systems. Unlike cellular telephony, mobile radio trunking has several technical standards (trunking architecture and signalling protocol). The most widely used standard is Motorola's softnet protocol. Another standard, called the logic trunk radio (LTR) was pioneered by EF Johnson of the US. An enhanced version of this protocol is Multi-Net. The third standard widely used in Europe and Asia called the Mobile Public Trunking (MPT) 1327. Several companies, including Stanlite of Australia, Phillips of Holland and Nokia of Finland make system on this standard. However, with the sophisticated digital technology the radio capacity, call set up speed, security and reliability have increased. In India, digital trunking has not been able to make a mark as yet because digital equipment is very costly and the present subscriber base of the service providers does not allow them to switch over to digital trunking. The various technology standards available both under Analogue and Digital platforms are as under:

Analog Protocol Options	Digital Protocol Options
MPT 1327	TETRA
LTR	IDEN
SMARTRUNK	APCO 25
SMARTNET	
MULTI-NET	
EDACS	

1.5 World Scenario

1.5.1 Largest markets in the world for commercial trunked radio currently are Canada, Germany, Japan, the United States and the United Kingdom. China also represents one of the largest Trunking markets. However, all these systems are partly government-owned. Many subscribes are also found in Argentina, Australia, Brazil, France, Malaysia, Mexico, South Korea, Spain and Turkey. **IMTA** research shows that between 1994 to 1998, the worldwide commercial trunked radio market grew by approximately 4.5 million units. IMTA predicts that the market will grow by another 20 million subscribers by 2005. This tremendous growth can be attributed to the high loading levels that digital systems have achieved relatively quickly over the last few years and the anticipated growth of future digital systems throughout the world. In the United States alone, there are expected to be almost 2.5 million digital units in service by 2000, according to the American Mobile Telecommunications Association (AMTA) and The Strategies Group. In fact, IMTA estimates that 3.4 million of the 8.6 million subscribers recorded in 1998 were digital units. By 2000, IMTA anticipates that the number of digital subscribers will surpass analog subscribers for the first time on a worldwide basis, accounting for more than 8 million subscribers. But growth will not only be realized in the digital sector. There remains a great demand for conventional and trunked analog systems, in both large cities and rural areas. In fact, several manufacturers, such as A Communications, ComSpace Corp. SmartLink Development L.P., have developed technologies that allow analog systems to offer more sophisticated services, achieve greater capacity and provide coverage over wider areas through networking.

1.5.2 A Table showing Commercial Trunked Radio Subscribers by Country for Asia pacific region is given below:



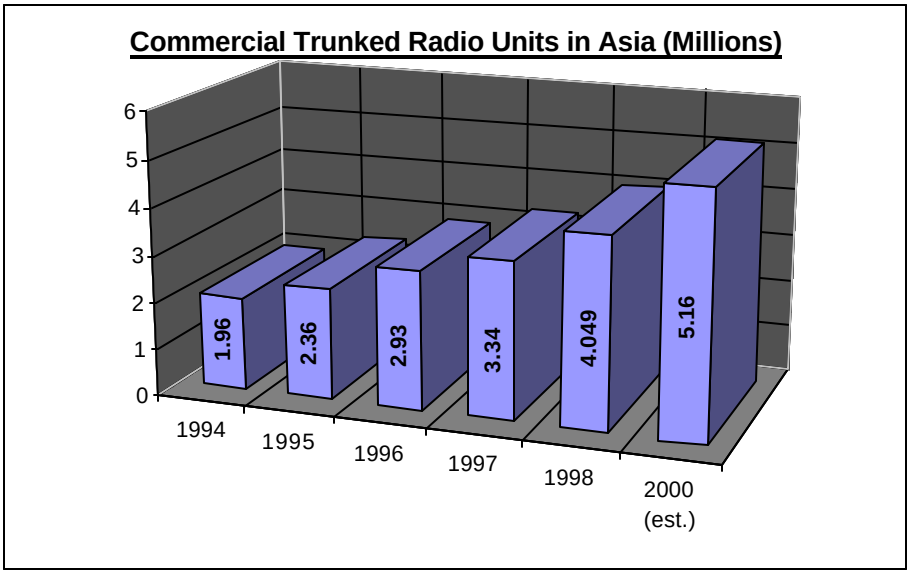
(Source: Radio Resource International Quarter 3 1999)

The Asia Pacific region represents the largest regional commercial trunked radio market, with more than 4.04 million units in service at the end of 1998. The United States is the single market that outpaces Asia with more than 4.6 million units. The number of commercial trunked radio units in Asia is expected to increase to more than 5 million by 2000. Approximately 2.4 million of Asian subscribers are in China, the largest market, followed by Japan. This is significant because most system operating in China are run by the Government agencies, with some private investment. In China, private companies typically participate in the industry by leasing equipment to provincial and municipal telecom companies/ authorities, in return for some future cash flow. More than 150 analog and digital systems currently operate in China using various types of equipment. Most of these equipment operate on 350 MHz band. In China, the industry faces numerous challenges, despite its large and growing market. The overall penetration is low. One reason may be that unlike in the U.S. and some other countries, commercial trunked radio came after cellular and paging. This might have resulted in a difficult marketing challenge for operators who are competing with these other wireless services. In addition, due to lack of resources,
operators may not be effective in promoting commercial trunked radio services and customers are unaware of their benefits.

1.5.3 In Japan, the trunked radio systems are known as **Multi-channel Access Systems (MCA)**. The service experienced tremendous growth since the service was first introduced in 1982. There has, however, been some decline in the growth since 1996.

1.5.4 Korea has seven trunked radio system (TRS) operators. Two are nation-wide operators, Korea TRS and Anam Telecom, and five provide regional service – Seoul TRS, Global Telecom, Taegu TRS, Cheju Tele Message and Kwangju TRS. The first company to launch a trunked radio system was Korea TRS in 1988. Although in 1998, operators estimated serving slightly less than 200,000 subscribers, by 2005 they expect to serve almost 1.6 million. Operators anticipate that most customers will be found in the wholesale, construction and overland transport industries.

1.5.5 A Table showing Commercial Trunked Radio Units in Asia (Millions) is given below:



(Source: Radio Resource International Quarter 3 1999)

1.5.6 Most operators charge a monthly flat fee, although some also charge per minute of use for dispatch and/or interconnect airtime minutes. The average flat fee in Asia is US$ 30 per month. The lowest fee of US$ 14.50 is found in Malaysia.

CHAPTER-2

RADIO TRUNKING INDUSTRY IN INDIA

2.1 Government of India, Department of Telecommunications, opened up Public Mobile Radio Trunked Services as value-added Services in the year 1995. Indian companies, registered under the Companies Act, were allowed to participate in the tender to bid for licenses all over the country. The terms and conditions of the proposed licence including the licence fee were specified in it. Intending service providers were free to propose for any number of areas in the country. Each area was to be limited to a radius of 30 kms from the base station transmitter with possibility to consider proposal for area beyond a radius of 30 kms as a special case subject to feasibility. In the licence, the service area has been defined as the geographical area covered within 30 Kms. radius from the base station site or city limits whichever is larger. No entry fee was envisaged for these licencees.

2.1.1 The document described Mobile radio trunk service as a two way land mobile service in which users communicate among themselves through a pair of radio frequencies in a designated frequency band assigned to the system. The pair of frequencies is allocated on placement of a call request and returned to the pool on completion of the call. This permits a number of closed user groups to efficiently share radio channels with greater privacy.

2.1.2 PMRTS licences have been issued on a non exclusive basis without any limit on number of operators in a service area as well as number of licences as can be obtained by any single operator. The response from the Indian companies was overwhelming and a record 77 companies bid for 802 service areas in 153 cities in India. 279 licenses were granted by DOT starting from October 1995 to about 41 companies for 91 cities. Some of the companies had tie-ups with trunking MNC majors. The prominent licensees were -

- ?? Arvind Mills with EF Johnson, USA – 14 licenses spread across India, including Delhi and Mumbai.
- ?? Arya Group with Teamcall, a Motorola JV – 22 licenses spread across India, including all Metro cities.
- ?? India Satcom Ltd. with Equitorial Satcom – 2 licenses in Bangalore and Hosur.
- ?? ITI – 22 licenses spread across the country.
- ?? Jasmine Telecom (now Mobilkom India Ltd.) with Rhode & Schwarz, Germany – 1- license spread across India, including Dhanbad, Delhi.
- ?? Procall – a JV between Punwire and Motorola – 15 licenses in North India, including in Delhi.

?? Punwire Trunking with Kenwood – 20 licenses, predominantly in West and South, including in Ahmedabad, Baroda, Surat, Bangalore and Hyderabad.
?? Quickcalls & Bhilwara Telenet – JV between LNJ Bhilwara Group and Motorola – 8 licenses collectively, including Mumbai, Chennai, Calcutta, Bangalore.

2.2 Salient features of the licence :

?? **The service refers to MOBILE RADIO TRUNKED SERVICE which is defined as,**

- ?? a two way land mobile service in which users communicate among themselves through a pair of radio frequencies out of a pool in a designated frequency band assigned to the system;
- ?? the pair of frequencies is allocated on placement of call request and returned to the pool on completion of call;
- ?? the communication usually takes place through repeater station (also called base station). Once user is assigned a channel (a pair of frequencies) by the system, no one else can interfere with the communication.

?? Service area: The service area has been defined as the geographical area covered within 30 Kms. radius from the base station site or city limits whichever is larger.

?? The **services should be operational within 12 months**. In case of default in commissioning of services within period prescribed, the authority shall be entitled to recover for each service area Rs 5,000/- for each week of delay subject to a maximum of Rs 25000/-. For delays of more than 20 weeks, the licence will be terminated.

?? **An annual licence fee** @ Rs 600/- per mobile/fixed terminal subject to a minimum of RS 50,000. This will be from the date of start of the service or from the next day of expiry of 12 months period whichever is earlier.

?? A separate licence will be required for utilisation of appropriate radio frequencies from WPC.

?? Initially five channels (frequency pairs) will be assigned. This will include control channel also. The mobile trunk radio channels must have a minimum number of mobiles on a per channel basis with 90 mobile being considered as acceptable usage. Additional channels can be considered for allotment only if use per channel has reached 90% in terms of Erlang traffic and continues to remain so for atleast a period of 3 months prior to the date of application. If at the end of initial six months of the validity of licence loading is less than 70%

in terms of Erlang traffic, the Telecom Authority may withdraw the radio channel assignment without any notice to the licencee.

?? **Royalty and licence fee for the use of Radio frequencies** will be paid by the licencee to wireless planning & coordination wing of WPC of Ministry of communication at prescribed rates as revised from time to time.

?? The licence fee for WPC wing is to be calculated as 100 x n p.a. where n = number of stations (Station includes fixed base stations, vehicle mounted mobile or hand held mobile stations.)

?? The Royalty R for WPC wing is calculated as follows,
R= 4800xf + 1200 (n - 2 x f) for maximum radio link distance between 5 and 60 kms. and R = 1200 x f + 300 (n – 2 x f) for a maximum link distance below 5 kms.
f = number of frequency spots used.

?? Good coverage should be provided inside the building also within the service area.

?? The **interface to PSTN is not permitted.**

?? **No interconnection among two separately licenced applicable systems** is permissible.

?? **Only the real time voice and message communication** among the users of the service is permissible.

?? Restrictions on maximum radio frequency (RF) power.

?? The primary purpose of providing the service is to cater to the needs of mobile subscribers. Total number of fixed stations in the network should not exceed 10% of the total number of subscribers at any time.

?? The licenses were issued **for a period of 5 years**. They are extendable by one year or more at a time.

2.3 Frequency Spectrum:

2.3.1 Each operator was given 5 frequency pairs at a time. DOT had specified a loading of 90 subscribers per channel. They had cleared three bands for PMRTS namely, 300, 400 and 800 MHz bands. While LTR and Softnet both operate primarily in the 800 MHz band, the MPT 1327 also operates in the other two allocated bands, that is, 400

MHz and 300 MHz. The availability of frequency spectrum (Annex II of Annex I) in the above bands is as follows:

- PMRTS Systems are available in the sub-bands of 806-821 MHz and 851-866 MHz in 800 MHz. Other than PMRTS, technologies like CT2 and other Voice/Data Communications Systems exploit the above sub-bands. Frequency spectrum of 6+6 MHz in the above sub-band i.e. 813-819 MHz and 858-864 MHz is allocated to PMRTS in India. The PMRTS Systems in 800 MHz Band operate with a duplex spacing i.e. TX-RX separation of 45 MHz, the adjacent channel spacing being 25 KHz. As such, 240 RX-TX frequency pairs are available presently for PMRTS in 800 MHz band.

- In the 300 MHz band, the PMRTS Systems operate in the sub-band 336-360 MHz. This band also caters to general users. Frequency spectrum of 2+2 MHz in the sub-band i.e. 348-350 MHz is allocated to PMRTS in India. The PMRTS Systems in 300 MHz Band operate with a duplex spacing i.e. TX-RX separation of 10 MHz, the adjacent channel spacing being 12.5 KHz. As such, 160 RX-TX frequency pairs are available presently for PMRTS in 300 MHz Band.

- In the case of 400 MHz band, the PMRTS systems have been considered for allocation of frequencies in 405-470 MHz sub-band subject to successful coordination on case by case basis. DOT is a major user in this band and DOT's UHF Systems in this band work in many cities. No clear frequency spots are available in this band throughout the country and it is subject to coordination in each city on case to case basis. The PMRTS Systems in 400 MHz Band operate with a duplex spacing i.e. TX-RX separation of 10 MHz, the adjacent channel spacing being 12.5 KHz. The availability of frequencies in 400 MHz has to be coordinated in each city.

2.3.2 From the foregoing, it may be seen that over 300 frequency pairs are available in 800 and 300 MHz band taken together in addition to certain spots that may be available in 400 MHz band in different cities. As per the existing PMRTS license agreement, a loading of 90 subscribers per channel has been envisaged. Thus, as many as 300 x 90 = 27,000 subscribers can be served by PMRTS operators in 800 and 300 MHz bands in each Service Area.

2.3.3 For PMRTS operations to be viable, a minimum of 1007 customer base is required in a single cell site area (annex. VII). Considering even an average customer base of say around 2000 per area per service provider, over ten operators can be licenced in any area using the available spectrum. This has been brought out to indicate the impact of spectrum availability on the possible number of service providers. It may be recalled that till now, only one company in only one area (metro) has exceeded the customer base of 2000.

2.4 Implementation of the licenses

2.4.1 The implementation of the licenses was very tardy. There had been a very high drop-out rate to implement the licenses. This led to several cancellations of the licences. Further, a large number of license holders surrendered their licenses. Most of the cases of cancellation and surrender (barring Punwire) were such that the companies had taken the licences but had not started the services. Table 2.1 indicates the latest position in this regard. (Source: DOT letter dated 19.6.2000). Only one LOI was granted to one company for the same service area.

Table No.2.1

	No. of companies	No. of cities	No. of LOI/ Licenses
Applied for tender	77	153	802
Granted LOI	77	153	640
Signed licenses	41	91	279
Licences cancelled	7	28	45
Licences surrendered	29	72	147

(Refer annex-III for details of licences existing as on 31.3.2000)

2.4.2 The main reasons attributed by the Industry for this debacle were –

- Non availability of indigenous technology.
- High tariffs of Customs Duty on the imported equipment.
- Stiff license fees payable to DOT and WPC for usage.
- No connectivity to other public networks.

2.4.3 In this context, it may be recalled that such licences were initially issued in 1995 which was the period of beginning of opening up of telecom services. The industry had a lot of enthusiasm to seek a licence as far as possible. Moreover, there was no entry fee to be paid upfront. Thus at that time there was no sizable deterrent (other than a licence fee of minimum of Rs 50,000 per annum) to discourage non-serious players from seeking a licence.

2.4.4 In addition, it may be observed that poor financial performance and low market penetration might also have discouraged the licence seekers from implementing their licences.

2.5 Present Status

In April 1999, 21 companies were having 96 licenses for 43 cities (Annexure I of Annexure I). It may be seen that the maximum number of licenses was for Delhi with 8 licenses. However, the services were started only in respect of 5 licenses. This was followed by Mumbai with 7 licences, of which services were started in respect of 4 licences only. It may be noted that subsequently one license each in Amritsar, Cochin, Coimbatore, Delhi, Guwahati, Patna and Trivandrum and two licenses in Bhubaneswar were cancelled. As on 31.3.2000 the number of licenses have come down to 87 in 39 cities, the details of which are given in **Annexure-III.**

2.6 Growth Trends:

2.6.1 After the initial implementation problems the serious players started business one after another across the country. The growth of the subscriber base for PMRTS is given area-wise in Annexure IV (Source DOT). The rate of growth has shown a declining pattern. Some of the operators have started registering negative growth rates.

2.6.2 The subscriber base for PMRTS is very low. The rate of growth is also decreasing. By the end of March, 2000, the subscriber base was reported as 18701 all over India. This may be viewed as against an installation base of over 90 systems with a capacity of around 70 x 350 +20 x 450 = 33500 customers. This is distributed in over 70 operator areas. Of the above as much as 19 systems are loaded with less than 100 customers. This is a very low figure for this useful industry to survive in an environment of severe competition from cellular operators and paging industry. We are also far behind other developing countries of South Asia. Radio Trunking has still a "niche market" in India. In a mature market a customer knows his communication needs, and is able to quickly decide which of the three would be best suited for him. In the Indian market, the awareness of trunking is low. Operators have to convince the users on the utility of this service. Hence, radio trunking is a 'push market' in India and it will take time when the customers themselves will approach the operators for their service. Price of the service, however plays a crucial role towards increasing spread of the service. The very small size of the market is adding to the difficulty in having enough resources for market making and modernization.

CHAPTER -3

PROBLEMS IN PMRTS OPERATION

3.1 The subscriber base of the PMRTS industry is very low. The major reasons for this low market penetration as apparent from discussions with service providers are the following:

?? Service not meeting customer expectations for quality of coverage and interconnect calls (for specific situations) due to the following regulatory restrictions:
   - ✍✍ Operators must provide primarily group communications;
   - ✍✍ Interconnectivity between sites is not permitted;
   - ✍✍ Initially only 5 channels are allotted per operator; and subsequent channel additions are also in multiples of 5 depending upon loading, traffic and blockage;
   - ✍✍ Interconnectivity between operators is not allowed;
   - ✍✍ Interface to the PSTN is not permitted.

?? Failure of industry to take off so far in user segments like construction, courier and Government due to inadequate features in available services.

?? Lack of investor's confidence for the service leading to non-availability of fresh investments for full featured, state of art services. There is no digital service available on date.

?? High price of subscriber units.

?? Lack of adequate marketing capability with the operators resulting in lack of clarity with the prospective customers regarding other Mobile services.

?? Inability to achieve financial closures due to non-bankability of projects. This has also constrained the industry to spend on customer awareness and education.

3.2 Views of Mobile Trunked Radio Operators Association (MTROA)

3.2.1 One of the important demands of MTROA from the Government was to consider it a core–infrastructure industry, given its importance to the service sector. The Government has accorded to PMRTS status of 'core infrastructure-telecom sector'. This has enabled PMRTS Providers tax holiday of five years and concessional import of radio trunking infrastructure. However, they argue that they are being denied the benefits as applicable to power and roads sector. The industry has been demanding this, as this will enable the PMRTS Operators to get cheaper finances, duty and tax benefits. The other important demands of the industry on the key issues, which remain unresolved, are -

?? PSTN connectivity
?? Inter-site connectivity
?? Highway connectivity
?? Frequency Spectrum allocation
?? Reduction of WPC Royalty
?? Reduction of customs duty on handsets
?? Captive Licenses
?? Store and Forward of Data

3.2.2 PSTN Connectivity

The industry had been demanding PSTN connectivity to PMRTS networks for quite some time. The arguments endorsed by the industry sources for PSTN connectivity are outlined below:

3.2.2.1 Need for PSTN Connectivity

?? In the absence of PSTN interconnect, many potential customers whose basic need could otherwise be served by radio trunking are not opting for this service. There may be an increase in demand of PMRTS service in case PSTN interconnect and revenue sharing is allowed.

?? Radio Trunking Industry serves the needs of customers like ambulance services, electricity departments, municipalities, fleet operators, small to medium business, etc. In emergency situations, due to non-availability of PSTN interconnect, the subscribers of PMRTS are not in a position to communicate outside the Closed User Group. For example, Ambulance Services using PMRTS may need to communicate with Hospitals etc. in case of emergencies and in such a situation without PSTN interconnect they will not be able to get in touch with the Hospitals. The Fire Service etc. also require such facility to get in touch with the police, local authorities etc. while moving. As regards business houses, for example, consider a Computer Maintenance Company that uses PMRTS for its field operations. During office hours, the field personnel are able to communicate with their office using their Radio Trunking sets and ask for non CUG related assistance via the operator at the office who in turn uses a land line to do the needful. However, after office hours, the field personnel have to rely upon a PCO to do the same job. There are several instance where finding a PCO may not only be time consuming but also not possible. PSTN connectivity to Radio Trunking would have solved this problem.

?? Also, if anyone outside the CUG, like Executives in an organisation or local authority who may not normally or routinely communicate with the Group, wants to contact anyone in the group by using a landline or other wireless service, they

would be unable to do so without PSTN connectivity. If PSTN is connectivity is made available, PMRTS customers will be able to contact the desired person even if he is available out of CUG during emergencies, without having to search for a PCO or having to carry a cellular phone in addition to a trunked radio.

This is indicative of the fact that providing the interconnectivity with PSTN adds value to the service provision. The PMRTS service user can be put to a lot of convenience by such interconnection being there. Further, in case of time critical users like fire, ambulance, police etc, non-provision of such interconnection can be disastrous also. In commercial users, providing such interconnection will definitely help in making individual's productivity to go up which is a very desirable feature. This will also result in increased value of the service to the customers. Adding PSTN interconnection will result in increasing the efficiency of operation and thus improved value for money for the customers. The resulting increased penetration of the service will result in improved viability. This in due course will result in increased level of investor's confidence and thus in deployment of state of art technology in this segment of Telecom services. Lack of PSTN connectivity together with limited bandwidth and very low subscriber base are preventing the PMRTS Operators from switching over from analog technology to digital trunking.

The following should also be kept in view while considering issue of PSTN connectivity. PMRTS is not for the same purpose as CMTS services. Primarily, whereas CMTS takes care of personal communication needs of any individual, PMRTS is basically designed to cater for communication needs of a closed user group. Accordingly, it allows use of 5 channels for say 450 customers. Such customers can be from one or more CUGs. It will be difficult for the service provider to have any control on their calling pattern. If excessive / long calls are made by some users for personal use using PSTN connectivity (either outgoing or incoming), the quality of service for others will deteriorate significantly. Other customers may even not be able to use the system in the hour of need. Unless there is a way to ensure the quality of service, such facility will always be affecting the performance of the system making it highly unreliable. Further, the distinction between CMTS and PMRTS services may also get blurred in terms of intended use by the customers.

3.2.2.2 International Experience

In support of their demand for PSTN connectivity, the MTROA has pointed out that majority of countries all over the world are giving PSTN connectivity to Radio Trunking operators. Despite this, the other mobile services, such as Cellular and Paging, are flourishing in these countries. The information regarding the current status of PSTN interconnects world over, is given at **Annexure-IV.** In some countries, like Australia, Guatemala, Latvia, Mexico, Peru etc., there is no restriction on interconnect to PSTN and the terms and conditions are left to the operators to negotiate and decide. In some

countries there are time restrictions, restrictions on number of subscribers per channel having access to PSTN and restrictions on the extent of traffic that could be carried through PSTN links, like in –

Brazil: Outgoing traffic to PSTN should not be more than 1/3 of the total intra-network and outgoing traffic. Further, the amount of public network numbers assigned to Commercial Trunked Radio Operators may be no more than 50 percent of all stations starting up in each of the stages planned in the service availability schedule.

Cambodia: Time restriction of 40%.

Honduras: Subscriber accesses to PSTN per channel limited to 20%.

Jordan: Maximum airtime used for interconnected traffic restricted to 20%.

Portugal: Incoming and outgoing calls to PSTN is limited to one minute.

Romania: Limited to 50% of the time in systems.

3.2.2.3 Restriction on PSTN Interconnect Traffic

In their representation to the Government, the MTROA had requested that up to a maximum of one-third of the total traffic should be allowed as PSTN interconnect traffic. The reason for requesting a restricted PSTN connectivity was that if a PMRTS operator were to provide PSTN connectivity indiscriminately, it would significantly degrade system capacity. This is so because a frequency channel is assigned for that conversation (serving just one user) at the expense of the same channel being shared by several users. This forces the PMRTS Operators to restrict the PSTN connectivity to their customers.

When linked to PSTN, the communication could be made in duplex more or in semi-duplex mode. However, generally duplex mode would be avoided as it takes twice as much of resources than semi-duplex mode. Further, duplex handsets are 3-4 times more expensive.

3.2.2.4 Objections of other Service Providers to granting PSTN connectivity to PMRTS and response of PMRTS industry:

Earlier, DOT had rejected the demand of the industry for PSTN interconnect on the ground that the license agreement does not provide for PSTN interconnectivity. The Cellular Operators Association of India had also raised their concern over this issue. The reason for their concern was that PSTN connectivity to PMRTS would provide unfair competition for their services as the capex involved in setting up a PMRTS network is significantly lower than that of cellular operators. Also PMRTS is considered a closed user group communication both as per international practice and as per the nature of the

service. However, the PMRTS industry disagrees with the objections of Cellular Operators on account of the following reasons:

- ✍✍ By being deprived of PSTN inter-connect, the customer is denied of choice of technologies, prices and suppliers for cost-effectively meeting his communication needs.
- ✍✍ PMRTS is normally configured for conveying short messages. Hence, the system is unlikely to be used for talking for longer periods. Further, carrying large interconnect traffic is detrimental to PMRTS operators since they have limited bandwidth and are governed by minimum loading restrictions. Interconnect traffic, which is between just two subscribers consumes the same spectrum as does a group 'dispatch' call which is normally for CUG communication. Switch to predominant interconnect usage will result in drop in loading from 90 to 6-8 users per channel. Also the operator viability will be in question.
- ✍✍ PMRTS is a semi-duplex service meaning that subscribers can either talk or listen at one time and hence it does not lend itself easily to telephone type of conversation and is likely to be utilized only in case of emergencies. Further, if duplex mode handsets are used, the cost of such handsets would be three to four times more expensive.
- ✍✍ Subscriber unit price is 2-3 times a Cellular phone. Further, it is heavier, bigger and have lesser talk-time (max. 1 min. at a time) as compared to cellular phones.
- ✍✍ The restriction on such interconnect traffic can always be put by regulator at any time if considered necessary by restricting quantum of interconnection with PSTN and by making calls through such interconnect inordinately expensive.

3.2.2.5 Interconnectivity of PMRTS with other services in NTP 99:

As per the New Telecom Policy (NTP) 1999, "the Public Mobile Radio Trunking Service Providers (PMRTSP) shall be permitted to provide mobile radio trunking services within their service area of operation. Direct interconnectivity between licensed PMRTSP's and any other type of service provider in their area of operation shall be permitted after examining the legal implications in view of the CMSP licenses".
In view of the above the following issues need to be addressed;

(i) Whether PSTN connectivity should be allowed?
(ii) If so, should there be any restrictions on interconnect traffic?
(iii) Whether a PMRTS Provider should be allowed direct interconnectivity with other PMRTS provider and/or any other type of service provider in its area of operation?
(iv) If such connectivity is allowed, how can the QOS of the services be ensured?

In the context of the present reference the above relates basically to viability of the operators as this is claimed to be one of the remedies for low customer base. It may thus be addressed as one of the means to improve the viability of the PMRTS operations. In final consolidation therefore it has been included in the issue, "What should be done to improve the viability of PMRTS operators?"

3.2.3 Inter-site/Inter-Operator Connectivity and increasing the Service area:

3.2.3.1 Presently, the PMRTS Operators are allowed to operate only from one site. However, PMRTS operators do not consider single stand-alone site capable of providing a good coverage of metro cities. Considering the large geographical areas in which the business and commerce is carried out in these metro cities, they require multiple sites to provide a good coverage. Site interconnect will make it possible to provide customers with seamless roaming across multiple stand alone systems. Also, digital trunking will require multiple sites to be linked to optimize spectrum utilisation, in addition to providing seamless roaming.

3.2.3.2 The PMRTS Operators have also been demanding inter-operator connectivity to improve coverage and choice for customers. For example in an emergency situation, civic authorities may require connectivity to ambulance services, fire services etc. Interconnectivity between the different operator's sites could enable instant communication link directly with these agencies in the field. Further, many Operators have licenses in areas close to each other. There is a lot of community of interest in such areas. Traditional Trunking users like trucking, industry, construction industry etc. want to avail the service in such adjacent areas. Without system interconnects such segments can not be served effectively.

3.2.3.3 Another request made by PMRTS Operators in Metro cities is that they be allowed to serve metros and sub-urban areas as one market. Currently satellite towns around Delhi and Mumbai, like Faridabad, Gurgaon and Ghaziabad around Delhi, have been given a separate PMRTS license. In the absence of interconnectivity with sites in satellite towns the PMRTS Operators are facing problems in meeting the needs of customers in Metro cities. For instance, if a taxi operator who needs to go to Gurgaon or Faridabad cannot remain in touch with his office in Delhi once he goes out of the range of Delhi area. Thus, he may not find the system useful to him. Several companies have their offices located in the city and their factories located in the outskirts or satellite town of the city. Radio Trunking is not useful in their cases due to the service area limitation. Hence, the MTROA has been demanding inter-site connectivity within the same SDCA area and also with adjacent SDCA areas so that the satellite towns around Metros are connected with Metro sites.

3.2.3.4 The MTROA has pointed out that by allowing inter-site connectivity in metro areas and by increasing the service areas to cover the satellite towns, there would be no revenue loss to DOT/MTNL as calls from Metro cities to these satellite towns are

treated as local calls. Most of the calls on the PMRTS networks rarely exceed 30-40 seconds. Further, the MTROA points out that the inter-site connectivity could be allowed with the existing terms and conditions of the PMRTS License.

3.2.3.5 The issues to be addressed are:

- ?? Whether inter- site connectivity should be allowed between
  - ?? sites in contiguous service areas (satellite towns), especially in metro cities;
  - ?? different sites of the Operator in the same service area; and
  - ?? sites of other PMRTS Providers in the same service area?

- ?? The service area in metros should include satellite towns or not?

In the context of the present reference the above relates basically to viability of the operators as this is claimed to be one of the remedies for low customer base. It may thus be addressed as one of the means to improve the viability of the PMRTS operations. In final consolidation therefore it has been included in the issue, "What should be done to improve the viability of PMRTS operators?"

3.2.4 Highway Connectivity

As mentioned earlier, radio trunking is ideally suited for transport companies, courier companies, fleet operator's etc. However, in India, the PMRTS Operators are not able to tap this market due to the absence of highway connectivity. Also the system is of no use to these companies without highway connectivity as once the truck or delivery van moves out of the service area contact with it is lost and the companies will be unable to monitor it. For the system to be useful to this sector highway connectivity is a must and without which they cannot communicate with their cargo carriers.

Radio trunking networks dedicated for highways are available in Australia, Germany, UK, USA and even in Pakistan. In India, the National Highway Authority of India (NHAI) has proposed a linear radio communication link alongside major highways. For one such pilot project, the Delhi to Jaipur Highway, the tender document recently released by NHAI calls for such a radio communication system to be integrated with the SOS telephone system. PMRTS Operators could play a useful role in developing such a system once they are given the highway connectivity. This will involve including highways in the definition of area of operation and providing necessary interconnection between the operators.

The issue to be addressed is whether highway connectivity should be allowed to PMRTS operators?

In the context of the present reference the issue relates basically to viability of the operators as this is claimed to be a remedy for low customer base. It may thus be addressed as one of the means to improve the viability of the PMRTS operations. In final

consolidation therefore it has been included in the issue, "What should be done to improve the viability of PMRTS operators?"

3.2.5 Frequency Allocation:

Under the current dispensation, PMRTS operators are assigned five pairs of frequencies at a time. Once these are adequately loaded the next set of five frequency pairs are assigned by WPC. In practice, there is a delay of upto 4-6 weeks between the time an operator applies to DOT for channel expansion and the time the WPC assigns new frequencies. This results in a degradation of service for the customer. To mitigate the problems being faced due to allocation of 5 frequency pairs only at a time, which are – insensitivity to topography of service area viz. Mumbai leading to coverage falling short of customer expectations; service degradation till channels are added – **the MTROA demands issue of a minimum start up block of 20 channels per operator and subsequent issue of 10 channels at a time for expansion**.

3.2.6 Reduction of WPC Royalty:

Currently WPC fees are being charged from PMRTS Operators at a much higher rate (approx. Rs.1400 per subscriber), whereas CMTS Operators pay approx. Rs.100 per subscriber. PMRTS operators are being charged WPC Royalty charges as per the formula of 4800 X F + 1200 X (N- 2F) where F is number of frequency spots used and N is number of subscribers (stations or handsets). CMTS Operators were also being charged WPC fees by a similar formula. However, as per Department of Telecommunications (WPC Wing)'s Corrigendum No.R-110114/4/87-IR(PT) dated 4th November, 1997, the weighing factor "W", which is dependent on the number of subscribers, in the formula for WPC Royalty Charge for Cellular Mobile Telephone Services where W = 1000 for every thousand subscriber or part thereof, has been waived. However, the PMRTS Operators continue to pay WPC Royalty charges based also on the weighing factor of number of subscribers. Hence, the MTROA have been requesting the Government to reduce the WPC royalty charges on the line as was done in the case of CMTS Operators, with retrospective effect. Annexure II provides the details about the implications related to this issue. The present charges will be reduced by about Rs 100 per month per subscriber if the industry's above-mentioned demand on the issue of WPC Royalty is accepted.

3.2.7 Availability of frequency spectrum

As regards the availability of frequency spectrum, it may be seen that 300 frequency pairs are available in 800 and 300 MHz band taken together in addition to certain spots that may be available in 400 MHz band in different cities. These 300 frequency pairs can serve 27000 subscribers in each service area, taking into account a loading of 90 subscribers per channel. However, the number of subscribers in any service area is only a fraction of this, the highest being in Delhi about 3000. Further, over 10 licencees can be there with an average number of 2000 customers in a service area using the available

spectrum. Hence, considering the present subscriber base of the operators and gross market demand, the availability of frequency pairs does not appear to be a constraint for granting license for entry of new operators.

Spectrum is a limited and rather scarce resource. It has also to be considered that a too liberal licencing policy on a first come first served basis may also cause artificial restrictions on the competition because of allocated spectrum not being utilised adequately and efficiently. This may lead to a spectrum crunch. Non-availability of spectrum may eventually result in blocking of expansions, tendency of spectrum hoarding and non-start for new entrants. Suitable measures have therefore to be incorporated to take care of this aspect.

Further, the crucial issue is the viability of the PMRTS industry. It needs to be seen whether the new operator can penetrate the market and attract sufficient number of subscribers to achieve financial closure even when the present operators are finding it difficult to sustain and some of the licensees are yet to implement their license. Also a very large number of licenses were surrendered or cancelled due to non-implementation.

The industry has also contended that in contrast to consumer wireless service such as Cellular mobile or Radio paging or GMPCS, PMRTS is not used by retail customers, and hence is highly price sensitive. Pricing of PMRTS adds up to determine the price of a product/service, which in turn is consumed by consumers. Hence, it is highly desirable to keep the cost of this service low and also to keep the PMRTS industry viable. The financial viability of PMRTS operators in India is discussed in Chapter 4.

There appears to be some contradiction in regards to demands related to spectrum. It may be seen that the prime cause for the problems as indicated by the industry is low subscriber base. Five channels are being assigned to the operators in the beginning. Additional channels are also being made available in 4 to 6 weeks as per norms prescribed in the licence. With a low subscriber base many of the licencees have not been able to fully load even the initial 5 channels. The excessive allocation will definitely reduce the worries of the industry to some extent. This however may result in an inefficient overall spectrum utilisation. The resulting non-availability of spectrum may in long run restrict the competition artificially by restricting the growth of the efficient operators and by restricting new entrants. The issues for consultation related to spectrum are,

?? What are the suggestions in respect of WPC/spectrum frequency charges with reasons? As this relates to Viability in terms of present reference, it is addressed in "What should be done to improve the viability of PMRTS operators?" in the final consolidation of the issues for consultation in Chap 6.
?? Is there a need for any change in present spectrum allocation method being followed for PMRTS?

3.2.8 Reduction of customs duty on handsets

The Radio Trunking handsets are currently priced at around Rs.16, 000/-, whereas the cellular handsets are much cheaper in the market. This high cost of handsets, as mentioned earlier, is one of the impediments for market penetration. Apart from economy of scale, the industry has been attributing this high cost to the high import duty payable on PMRTS handsets. The handsets are either imported wholly or are assembled in India mostly using imported components with slight value addition in India. The Radio Trunking handsets currently attract a customs duty of (30% + 10% surcharge) + 16% CVD + 4% SAD. Thus, the total import duty works out to 53%. The trunking industry has been demanding lower customs duty on radio trunking handsets for market penetration to attain a sustainable level of subscriber base and also to make PMRTS terminals competitive in comparison to other service terminals. The issue for consultation is, "What measures are suggested for bringing down the price of handsets?"

This issue if addressed suitably will provide cheaper handsets and thus the necessity of subsidizing them will be reduced. This will improve the viability of the operators and may also help in improving the customer base. Hence it has been included in Chap 6 in,

What should be done to improve the viability of PMRTS operators?

3.2.9 Captive Licenses

Another problem expressed by the industry is the Government's Policy on private systems. Their apprehensions in this regard are as follows:

- ?? The Government is giving captive licenses to PSUs, big industrial houses etc. for their own systems at the cost of the public networks.
- ?? The captive licensees utilise spectrum inefficiently (average 10 subscribers per channel, compared to 70-90 for PMRTS) and they pay only spectrum fees to WPC, no license fees to DOT.
- ?? Large captive users duplicate the infrastructure already set up by public networks, that too when public networks offer very competitive services. Further, the captive licenses undermine the capacity of public networks to grow.
- ?? The large captive networks may be utilised by users other than the captive licensee – those which are ancillary in nature to the main user or those which complement their capability. As an example the industry has pointed out that the Airports Authority of India (AAI) has floated a tender for installing captive radio trunking systems at the Delhi and Mumbai airports and their tender specifications are identical to the systems that many public operators already have. It is likely that the AAI trunking system may have as their subscribers non AAI commercial users such as airlines, transport companies, courier companies etc. This will divert the traffic from public systems.

The industry has been demanding that captive licenses should be allowed only for security agencies. Wherever PMRTS Operator is there no captive licenses should be allowed to PSUs, industrial houses etc. In case the Government has to allow captive licenses to PSUs, industrial houses etc., the terms and conditions should be similar to that of other PMRTS Operators so that level playing field is ensured.

The policy of the Government on the issue of Captive Licences is as follows,

" **Captive networks** are those networks in which the equipments and the facilities are owned and operated by licencee itself for their own intra-organisational use. The third party ownership and provision of commercial service to any other user/organisation is not intended by the licensee setting up their captive/private network. Such networks are normally permitted to public utility organisations for their specialised requirements. PSTN access to such captive networks is also not permitted. WPC wing's licence for authorisation of use of radio frequencies are required to be obtained separately. The WPC licence fee and royalty charges are governed by prevalent rules."

It needs to be seen if the present system of granting captive licenses is obstructing the growth of PMRTS. Also, what should be the Government Policy in respect of captive licenses? Industry has contended that captive licences effect their business prospects and viability adversely.

The issues for consultation in the context of present reference are,

?? Should there be a difference in licence fee being charged from a captive user and a PMRTS operator?
?? What should be done to improve the viability of PMRTS operators?

3.2.10 Store and Forward Data

(v) The PMRTS system is capable of carrying only short data, but not high-speed data and the PMRTS License permits to carry only online data. However, most data transmission uses "store and forward" techniques and is not truly 'real time'. Typical Trunking applications like Fleet Management, GPS, AVL etc. have some data storage requirement. Hence, the PMRTS industry feel that store and forward type data should be allowed in Trunking. In this regard it is pointed out that this kind of restrictive clause is not there in any other license. The issue for consultation is

?? "Whether store and forward type data facility should be allowed in radio trunking?"

In the context of present reference the above issue ultimately relates to improving customer base by providing better facilities and thereby improving the viability of PMRTS operations. It is therefore included in "What should be done to improve the viability of PMRTS operators?" in the final consolidation of the issues for consultation in Chap 6.

CHAPTER -4

VIABILITY OF PMRTS OPERATORS IN INDIA

4.1 The PMRTS Operators largely commenced their operations in 1997-98. The industry estimate of capital expenditure required for initial setting up a PMRTS system with five channels is about Rs.1Crore. Incremental investment of about Rs.20 lakhs is required each time for adding five channels. These Figures are indicative only, as there had been some variations in various sets of calculations provided by the industry.

At the time of bidding for licences in 1995, the operators expected to break even in 3½ years with a subscriber base of 750 by the middle of the fourth year. However, the subscriber base of each operator is far below this mark. Also the operators expected average revenue of Rs.1200 per month from each radio, which is also not likely to be forthcoming in the present scenario.

4.2 Start up cost to have a PMRTS connection

Since PMRTS is used for group communication there should be at least two radio sets (handsets) in the group. The cost of the radio set to the subscriber varies depending upon the model and extent of subsidy borne by the PMRTS Service Provider. Average cost of a radio set is about Rs.16,000 (to be born by the customer). Apart from cost of radios, the customers have to pay a quarterly airtime charges @Rs.700 per month in advance i.e. Rs. 2100 on the start up. Some operators also charge activation charges that may be up to Rs.1000. Hence, the start up cost to have a PMRTS connection comes to Rs 18100 to 19100 per radio. This translates to Rs.36,200 to 38,200 for a group of 2 persons and will range from Rs.90,500 to Rs.95,500 for a group of five radio sets.

4.3 Tariff

No ceiling has been fixed by the TRAI for PMRTS tariff. For availing radio trunking services, subscribers are billed by the service providers on a monthly or quarterly basis. In most cases a flat fee is charged for an unlimited airtime, ranging between Rs.500-1050 per month. In some cases, clients with low usage are billed on a lower flat fee every month, with some minutes free and every additional minute billed at Rs.2 to 3 per minute. The average fee is around Rs.700 per month.

4.4 Investment and Revenue per service area

The industry claims that initial capital investment to set up a PMRTS system with five channels in a Metro city is around Rs.2 crores and in a Mini Metro city it is Rs.1 crore. Of this, the equipment cost is about Rs.60 to 80 lakhs. The remaining expenses are for

site setup, survey etc. which are comparatively cheaper for Mini Metros. In metros in addition, more than one site may be required to cover the entire area. The additional capital cost for adding five channels is around Rs.20 lakhs. These additional five channels can support up-to about 450 additional customers. In most of the service areas the service providers have installed either five or 10 channel system depending upon the number of subscribers they have. Thus the capital cost of a 10 channel system in a Metro city would be around Rs.22,000,000 and in a Mini Metro City it would be around Rs.12,000,000. The average revenue per radio (i.e. per connection) is around Rs.700 per month. The number of customers in such a system will be depending on traffic conditions also.

4.5 Financial Analysis:

4.5.1 For a snapshot on the financial viability of radio trunking industry, sample data of 19 PMRTS operators could be gathered, which has been analysed. Detailed operator-wise analysis of their financial statements is at **Annexure-V**. These operators constitute about 80 to 90 percent of the total licensees, who have implemented their projects, thereby constituting a fairly representative sample.

4.5.2 The market penetration of the operators is very low. It is seen that the average addition of subscribers during 1997-98 in the service areas (24 service areas where service had started) was 104, with the highest in a single service area at 811. The figure for 1998-99 was 171, with the highest in a single service area at 1284. This data covers 43 of the 66 licensed areas where service was started and operated by 15 of the 21 licensed companies. The average increase in number of subscribers per service area during 1998-99 is 179. The highest increase in subscriber base in a service area was 1284 and the lowest was (-)1. In a service area there are more than one service providers in general. A detailed statement showing the subscriber base of these operators as on 31.3.97, 31.3.98 and 31.3.99 increase in subscriber base during the year and percentage increase is at **Annexure-VI**. The related charts very clearly indicate the low subscriber base with most of the operators. This in turn increases cost of acquisition also wherein direct or indirect concessions have to be extended by the service provider resulting in further pressure on the bottom line.

4.5.3 The above reveals that all these operators have been incurring heavy losses on account of low market penetration. As mentioned earlier, the start up investment required for installing a system of five channel in Metro City is about Rs.2 crores and in a Mini Metro City about Rs.1 crore. The additional investment required for setting up five channel each is around Rs.20 lakhs. Based on these factors, an analysis of the minimum subscriber base required for a PMRTS Operators for breaking even has been done. The same is available at Annex.VII. From the above analysis, it is apparent that initial installation of PMRTS causes revenue losses. However additional installations above minimum initial installation are profitable. A breakeven can be achieved (without considering the impact of accumulated losses and customer acquisition cost) with around 2037 customers in metro areas (where two sites are required) and with around 1007 customers in other areas. Each area of operation has to be considered individually.

Looking to the subscriber bases as on 31.3.2000, only one company in only one metro area has a subscriber base of 3870 i.e. above the viability limits. All others in all the areas have a subscriber base of less than 1000. Looking to the growth of the customer base of individual company in any area, it seems that achieving breakeven is quite difficult under the present circumstances for most of them. In only 11 areas, the companies have over 500 customers. In the smaller cities, the situation is even worse.

4.5.4 Operating ratios of most of the operators are above 100%. Operating expenses of these operators, excluding license fee, interest and depreciation has been very high. Ratio of operating expense to the network revenue in 1998-99 had an average of 814.65%. There has been a steady increase in this average, which was 150.84% in 1996-97 and 643.48% in 1997-98. Only companies H and I had lower operating expense at 81.79% and 87.51% of the network revenue, respectively. Companies H & I had subscriber base of 150 and 267, respectively as on 31.3.99. The company with the highest subscriber base had operating ratio of 123.90 %.

4.5.5 The largest component of the operating expenses in 1998-99, excluding license fee, interest and depreciation, has been salaries & wages/ personnel expenses. The average of salaries & wages/ personnel expenses during 1998-99 was 27.86% of the operating expenses. The component of the salaries & wages and personnel expenses for companies H and I was 48.11% and 19.62%, respectively of the operating expenses.

4.5.6 The next largest component of the operating expenses in 1998-99 were lease rental, the average of which was 25.35% of the operating expenses. But for companies H & I, the component of the lease rental was o% and 36.42%, respectively of the operating expenses.

4.5.7 Network operating cost (including repairs and maintenance costs, spares, insurance and other items) had an average ratio of 9.96% of the operating expenses during 1998-99. But for companies H & I, the component of the network operating cost was 5.91% and 23.14% of the operating expenses respectively.

4.5.8 Administrative overheads constituted 12.89% of the operating costs in 1998-99.

4.5.9 Sales & Distribution Cost for the entire sample accounted for roughly 7.15% of the operating expenses on an average in 1998-99. But for companies H & I, the component of the sales & distribution cost was 0.89% and 6.74% respectively.

4.5.10 License fee and WPC charges for companies H and I during 1998-99 were 19.34% and 17.98% of the network revenue, respectively.

4.5.11 Further, a sensitivity analysis considering the financial model of a typical PMRTS service provider company operating in several cities is also given in Annexure VIII (source MTROA). The model assumes certain factors like putting initially 3 cells in the category A city in question, which causes an increased initial burden. At the same time, the interest on accumulated losses has not been accounted for.

4.6 **Impact of USO Levy:** It may also be kept in view, while considering the viability of PMRTS operations that Universal Service Obligation levy will have to be born by all the telecom service providers as envisaged in NTP-99. This will be a levy in addition to licence fee and is not being levied as yet. This issue is being dealt with concurrently by TRAI separately and all the stakeholders have already provided their views/comments. This will also have an impact on the financial viability of PMRTS operations.

4.7 The quantum of entry fee and the licence fee (revenue sharing) depend critically on the financial viability of the operations. The issues for consultation therefore in the present context are,

?? To what extent is the licence fee responsible for poor financial viability of PMRTS operations in India?

?? What should be done to improve the viability of PMRTS operators?

CHAPTER- 5

Licence Related Issues

Previous chapters provide details about PMRTS particularly in Indian reference. This chapter provides for the kind of issues that should be kept in view while considering the issues related to licencing.

5.1 Competition in the sector: Presently, the licencing facilitates unlimited competition in PMRTS. The status of radio trunking Industry in India has been discussed in Chapter 2. With a small subscriber base, the industry is struggling for any reasonable revenue. New investments are extremely limited. Digital PMRTS deployment has not yet started in India. The operators presently consider up-gradation to digital technology as unviable in the existing set up. Several licences have been surrendered. Many licences have not been implemented. All this causes bottlenecks in market making also. Further, the rapid technological developments leading to convergence are making many services loosing their distinct nature and becoming an by-product of some other service(s). Such developments may affect the viability of the PMRTS operation in future.

Spectrum availability for each operator is essential to facilitate the service provision. The present availability of spectrum seems to be adequate to serve the foreseeable demand. However, in case the licensees get the spectrum allocated and do not start the services, there can be a crunch on this limited but essential resource. In the absence of adequate safeguards, there can thus be an artificial blocking of competition by spectrum non-availability. This issue of artificial blocking of competition by spectrum non-availability has been dealt with in para 5.3 on entry fee.

In view of these, the issues for consultation include;

?? What should be the basis of selection for additional operators?
?? How the technological developments will affect, in future, the competition in PMRTS.

5.2 Licence Fee: NTP-99 provided for revenue sharing as the means of charging the recurring licence fee. It however did not specify the guidelines to ascertain its quantum. There are several ways in which this issue had been/can be considered. In case of limited competition, the licence fee can be used as a basis of selection of a new operator. With limited competition, there may still be scope for rental gains to the service providers, which can justify levying of licence fee for the purpose of mopping up rents. Licence fee can also be a means for augmenting the state's budgetary resources. It may

also be argued that in a service like PMRTS (which generally is an intermediate input for the efficient operation of various public utility services or a commercial activity), the cost increase in service resulting from licence fee may manifest in a several times increased burden on the end user. Also, the financial viability of the industry has also to be considered while considering the issue of licence fee. PMRTS operators are paying a licence fee presently. Captive users however are given licences with zero licence fee. The PMRTS operators have requested for same licence fee to be charged from both. In addition, regarding the licence fee from new entrants, the fee charged/chargeable from the existing licencees can also be a influencing factor from the angle of providing the level playing field to all. Further, in some areas, if the spread of the service is considered essential, it may require some incentives. Reduced licence fee in such areas can also act as an incentive.

The issues for consultation that are related to licence fee include;

?? What should be the percentage of revenue to be shared by a PMRTS licencee with the licensor.
?? What should be the licence fee for extended licence period of licence in respect of existing PMRTS licencees?
?? What relationship should the licence fee for new licences bear with the fees paid by other existing licencees.
?? Should the licence fee be the same in all the service areas?
?? Should there be a difference in licence fee being charged from a captive user and a PMRTS operator?

5.3 <u>Entry Fee</u>: Stipulation of an entry fee seems desirable for the purpose of keeping non serious players away and also by way of an assurance that the licencee has the financial ability to obtain financial closure of his business plan and would be in a position to initiate the roll out. Such stipulation is very important in limited competition where a non serious player can render intended competition (as envisaged by the policy of licencing) ineffective. This ultimately may result in a loss to consumers. Also a non-serious operator may get related allocations e.g. spectrum allocations that may be blocked unproductively. In PMRTS, presently, the competition is unlimited. However, several licences are remaining unimplemented. Also sometimes existing operators may get placed adversely (vis a vis a new licencee), unduly, because of the past historical reasons. Entry fee can be used for such adjustments also to create a level playing field between the existing and the new operators.
In the above context, the issues for consultation include the following;

?? Should there be an entry fee for a new PMRTS licencee?
?? What should be the basis of determining the entry fee?
?? What should be the amount of entry fee?
?? Should the entry fee be same in all service areas?

?? Is there a need to include some additional safeguards in the licence to avoid artificial restrictions on competition by blocking of spectrum by non-serious licencees? If so what should form such safeguards?
?? Should the entry fee have any relation with the licence fee already paid by the existing operators?

5.4 Revenue: Annual licence fee as a revenue sharing percentage is to be determined with reference to the Gross Revenue. The definition of the "Gross Revenue" for the purpose of calculating the licence fee, will have to be the same as in the case of other Telecom services where too the licence fee is to be based on gross revenue. Normally the word gross indicates that it includes something, which could have been subtracted. "Gross Revenue of the service provider would, therefore, consists of all revenues accruing to the licencee by way of operations of providing PMRTS services as mandated under the licence. All this may not constitute licencee's own income. It is only rational that service providers should not be forced to share revenues that they do not retain. Licence fee as a percentage of revenue sharing should, therefore be based on "Revenue" to be derived from gross revenue. Its definition should be simple and easily auditable to minimise manipulations.

The issue for consultation is;

?? What should be definition of revenue for the purpose of licence fee i.e. percentage to be shared with the licensor.
?? What components of the gross revenue should not be included in revenue as above and the reasons therefor?

5.5 Flexibility of Licence: The basic terms and conditions on which new PMRTS licences would be issued need to address the requirement of flexibility resulting from the dynamic nature of Telecom Technologies. In line with the emerging trend of convergence in the provision of Telecom services, it may be desirable to provide some flexibility in the terms of licence so that the licencee is not unnecessarily constrained or finds himself legally barred when Technological changes force a change in his service provision as well. The issue for consultation is;

?? Is it desirable to provide adequate flexibility in respect of the licenced PMRTS services and thereby avoid foreclosure of future options of adopting or adapting to newer technologies.

CHAPTER-6

ISSUES FOR CONSULTATION

In the light of the references from the DoT, the discussions in the preceding Chapters of this Paper the following issues are posed for consultations before formulating TRAI's recommendations in the matter. Responses detailing the reasons will be highly appreciated:

A. Level of Competition and Selection Criteria :

(i) What should be the selection criteria for entry of new operators?

(ii) Does the existing spectrum availability pose any restriction on the entry of new operators?

(iii) How the technological developments will affect, in future, the competition in PMRTS? How should it be reflected in the policy of PMRTS licencing?

B) Entry Fee:

(iv) Should there be an entry fee for a new PMRTS licencee?

(v) What should be the basis of determining the entry fee?

(vi) What should be the amount of entry fee?

(vii) Should the entry fee be same in all service areas?

(viii) Is there a need to include some additional safeguards in the licence to avoid artificial restrictions on competition by blocking of spectrum by non serious licencees? If so what should form such safeguards?

(ix) Should the entry fee have any relation with the licence fee already paid by the existing operators?

C) Licence Fee (Revenue Sharing):

(x) What should be the percentage of revenue to be shared by a new PMRTS licencee with the licensor.

(xi) What should be the licence fee for extended licence period of licence in respect of existing PMRTS licencees?

(xii) What relationship should the licence fee for new licences bear with the fees paid by other existing licencees.

(xiii) Should the licence fee be the same in all the service areas?

(xiv) Should there be a difference in licence fee being charged from a captive user and a PMRTS operator?

(xv) What should be definition of revenue for the purpose of licence fee i.e. percentage to be shared with the licensor.

(xvi) What components of the gross revenue should not be included in revenue as above and the reasons therefor?

(xvii) To what extent is the licence fee responsible for poor financial viability of PMRTS operations in India?

D) Miscellaneous:

(xviii) What should be done to improve the financial viability of PMRTS operators?

(xix) Is it desirable to provide flexibility in respect of the licenced PMRTS services and thereby avoid foreclosure of future options of adopting or adapting to newer technologies. If so what should be such flexibility.

(xx) Is there a need for any change in present spectrum allocation method being followed for PMRTS?

ANNEXURE-I

Government of India
Ministry of Communications
Department of Telecommunications
(VAS CELL)
Sanchar Bhawan, 20-Ashoka Road, New Delhi-1

No.311-79/99-VAS Dated 28th April, 1999

To

The Secretary
Telecom Regulatory Authority of India,
Jawahar Vyapar Bhawan,
Janpath,
New Delhi.

Subject: Recommendation of TRAI on the issue of fresh licences for Public Mobile Radio Trunking Service Providers (PMRTSPs).

The New Telecom Policy, 1999 (NTP-99) announced on 26.3.1999 envisages that the entry of additional Public Mobile Radio Trunking Service Providers (PMRTSPs) in the country may be decided on the basis of recommendations of the TRAI. The policy also envisages that the PMRTSPs shall pay one time entry fee and license fee based on a share of revenue. The basis for determining the entry fee, percentage of revenue to be shared with the licensor, defining revenue for the purpose, the basis for selection of additional operators and the appropriate level of license fee for the extended period of license in respect of the existing licensees, inter-alia, are issues on which TRAI's recommendations are required in a time bound manner. TRAI may also give its views on any other issue considered relevant.

2. As per the existing arrangements, PMRTS licenses have been issued on non-exclusive basis without any limit on number of operators in a service area as well as number of licenses that can be obtained by any single operator. The service area has been defined as the geographical area covered within 30 Kms radius from the base station site or city limit whichever is bigger. At present, 96 licenses granted to 21 companies for 43 cities are current. More details are given in the table at Annexure-I. These licenses were granted starting from Oct.1995 for a period of five years. The license period is extendible by one year or more at a time as per the existing licensing conditions. Therefore, the licenses in all these cases will need to be extended from the existing period of five years to 20 years at the first instance in terms of NTP-99.

3. As regards radio frequency spectrum for PMRTSPs, details are given at Annexure-II. A copy of the tender document and sample license agreement as applicable to the existing licensees had earlier been forwarded to the TRAI.

4. It is requested that recommendations of the TRAI for issue of fresh licenses to PMRTSPs through out the country keeping in view the number of operators already existing in certain service areas, availability of frequency spectrum including constraints of frequency re-use in adjacent service areas and the objectives of the NTP-99 may be provided at the earliest.

5. A copy of NTP-99 had earlier been forwarded to TRAI vide letter No.1-20/99-Regln. dated 5.4.1999. However, a copy is enclosed for ready reference.

6. It would be appreciated if TRAI can indicate the time by which it would be possible for TRAI to make available the requisite recommendations.

Yours faithfully,

Sd/-
(J.R. GUPTA)
Dy. Director General (VAS)

Encl: As above

Annexure I of Annexure-I

STATEMENT OF CURRENT PMRTS LICENCES AS ON 22.4.1999

1. Name of city	No. of licences	No. of companies	Services started	Service not started
1. Ahmedabad	4	4	3	1
2. Amritsar	2	2	0	2
3. Bangalore	5	5	5	0
4. Belapur	1	1	1	0
5. Bhopal	2	2	2	0
6. Bhubaneshwar	2	2	0	2
7. Calcutta	4	4	2	2
8. Chennai	6	6	5	1
9. Chandigarh	2	2	1	1
10. Cochin	2	2	0	2
11. Combatore	2	2	1	1
12. Delhi	8	8	5	3
13. Dhanbad	1	1	1	0
14. Faridabad	2	2	1	1
15. Ghaziabad	1	1	0	1
16. Gurgaon	2	2	0	2
17. Guwahati	1	1	0	1
18. Hyderabad	4	4	4	0
19. Indore	2	2	2	0
20.Jaipur	1	1	1	0
21.Jallandhar	1	1	1	0
22.Jamnagar	1	1	1	0
23. Jammu	1	1	0	1
24. Kakinada	1	1	1	0
25. Kanpur	1	1	0	1
26. Kotagiri	1	1	1	0
27. Kodiakanal	1	1	1	0
28. Ludhiana	1	1	1	0
29. Madurai	1	1	1	0
30. Meerut	1	1	0	1
31. Mumbai	7	7	4	3

32. Nagpur	1	1	1	0
33. Panipat	1	1	0	1
34. Patna	1	1	0	1
35. Pune	5	5	4	1
36. Shimla	1	1	0	1
37. Surant	4	4	3	1
38. Trivandrum	1	1	0	1
39. Vadodara	4	4	4	0
40. Vashi	2	2	1	1
41. Vijayawada	1	1	0	1
42. Vishakhapatnam	3	3	3	0
43. Yercaud	1	1	1	0
Total: Cities = 43	96	96	62	34

ANNEXURE-II OF ANNEXURE-I

AVAILABILITY OF FREQUENCY SPECTRUM FOR PMRTS OPERATORS:

The PMRTS licences were granted in three different frequency bands i.e. 300 MHz, 400 MHz and 800 MHz. The availability of frequency spectrum in these bands for PMRTS are given below:-

1.0 800 MHz: PMRTS Systems are available in the following sub bands in 800 MHz.

806 – 821 MHz and 851-866 MHz

Other than PMRTS, technologies like CT2 and other Voice/Data Communications systems exploit the stated sub-bands.

1.1 Frequency spectrum of 6 + 6 MHz in the above Sub band i.e. 813-819 MHz and 858-864 MHz is allocated to PMRTS in India.

1.2 The PMRTS System in 800 MHz Band operate with a duplex spacing i.e. TX-RX separation of 45 MHz, the adjacent channel spacing being 25 KHz . As such 240 RX-TX frequency pairs are available presently for PMRTS in 800 MHz Band.

2.0 300 MHz: The PMRTS Systems operate in the sub-band 336-360 MHz. This band also caters to general users.

2.1 Frequency spectrum of 2+2 MHz in the sub band i.e. 348-350 MHz is allocated to PMRTS in India.

2.2 The PMRTS Systems in 300 MHz Band operate with a duplex spacing i.e. TX-RX separation of 10 MHz, the adjacent channel spacing being 12.5 KHz. As such 160 RX-TX frequency pairs are available presently for PMRTS in 300 MHz Band.

3.0 400 MHz: The PMRTS systems have been considered for allocation of frequencies in 405-470 MHz sub band subject to successful coordination on case by case basis. DOT is major user in this band and DOT's UHF Systems in this band work in many cities. No clear frequency spots are available in this band throughout the country and it is subject to coordination in each city on case to case basis.

3.1 The PMRTS Systems in 400 MHz Band operate with a duplex spacing i.e. TX-RX separation of 10 MHz, the adjacent channel spacing being 12.5 KHz. The availability of frequencies in 400 MHz has to be coordinated in each city throughout the country.

4.0 Availability of clear frequency spots for PMRTS in the country and the possible growth of the service:

From the foregoing, it may be seen that 300 frequency pairs are available in 800 and 300 MHz band taken together in addition to certain spots that may be available in 400 MHz band in different cities (although its availability is not uniform and certain).

As per existing PMRTS licence agreement, a loading of 90 subscribers per channel has been envisaged (although actual loading in Indian conditions may be a little lower). Thus as many as 300 X 90 = 27,000 subscribers can be served by PMRTS operators in 800 and 300 MHz in each Service Area.

5.0 While working out the number of operators that may be given licences in a particular service area apart from commercial viability of the projects, the constraint of frequency reuse in adjacent Service Areas need to be kept in view to avoid of problems of interference.

ANNEXURE-III

STATEMENT OF PMRTS LICENCES AS ON 31.3.2000

S.No.	Name of city	No. of Licences	No. of companies	Service started	Service not started
1	Ahmedabad	4	4	4	0
2	Amritsar	1	1	0	1
3	Bangalore	5	5	5	0
4	Belapur	1	1	1	0
5	Bhopal	2	2	2	0
6	Calcutta	4	4	2	2
7	Chennai	6	6	5	1
8	Chandigarh	2	2	1	1
9	Cochin	1	1	0	1
10	Coimbatore	1	1	1	0
11	Delhi	7	7	6	1
12	Dhanbad	1	1	1	0
13	Faridabad	2	2	1	1
14	Ghaziabad	1	1	0	1
15	Gurgaon	2	2	1	1
16	Hyderabad	4	4	4	0
17	Indore	2	2	2	0
18	Jaipur	1	1	1	0
19	Jallandhar	1	1	1	0
20	Jamnagar	1	1	1	0
21	Jammu	1	1	0	1
22	Kakinada	1	1	1	0
23	Kanpur	1	1	0	1
24	Kotagiri	1	1	1	0
25	Kodaikanal	1	1	1	0
26	Ludhiana	1	1	1	0
27	Madurai	1	1	1	0
28	Meerut	1	1	1	0
29	Mumbai	7	7	4	3

30	Nagpur	1	1	1	0
31	Panipat	1	1	0	1
32	Pune	5	5	4	1
33	Shimla	1	1	0	1
34	Surat	4	4	4	0
35	Vadodara	4	4	4	0
36	Vashi	2	2	2	0
37	Vijayawada	1	1	0	1
38	Visakhapatnam	3	3	3	0
39	Yercaud	1	1	1	0
TOTAL: Cities=39		87	21	68	19

(Source: DOT)

ANNEXURE-IV

INTERNATIONAL STATUS ON INTERCONNECTION

Argentina — Allowed.

Australia — Interconnection with the PSTN is allowed. The ACA reports that under Australia's very recently liberated telecommunications industry, there is unlikely to be any restrictions or limits, at least in the regulatory approach to how much or what percentage of time units may be interconnected. With a completely open market and no restrictions on the number of carriers, the ACA reports that "artificial limits on interconnect seem to have no public benefit at all".

Belarus — Allowed.

Belgium — Allowed for an annual fee of BEF 60,000 (US$ 1,950).

Bangladesh — Allowed.

Brazil — The legislation passed on April 8, 1997 indicates that Commercial Trunked Radio Operators are allowed to interconnect with the public telecommunications networks once a contract between the two parties has been finalized. These networks must allow interconnection on an unbiased and equal basis to trunking operators.

That statute also stipulated that the amount of public network numbers assigned to Commercial Trunked Radio Operators may be no more than 50 percent of all stations starting up in each of the stages planned in the service availability schedule. Further more, out going traffic to the public telecommunications network may be no more than one-third of the total intra-network and outgoing traffic. The Ministry of Communications will "check" this provision every three months to ensure that it is being followed.

Cambodia: — Interconnection to the public switched telephone network (PSTN) is allowed, but the amount of time that units are interconnected must not exceed 40 percent.

Canada: Radio Policy #005 issued in 1985 indicated that dispatch type mobile systems may interconnect with the public switched telephone network (PSTN) while other commercial radio systems may not. However, in 1995 that policy was reviewed and rescinded, thereby allowing all commercial Trunked Radio systems to be interconnected.

Chile: SUBTEL indicates that interconnection to the public switched telephone network (PSTN) is allowed. However, Resolution 575, passed in August 1993 prohibits systems on the 400 MHz band from interconnecting to the PSTN.

China: Allowed.

Colombia: Allowed.

Costa Rica: Interconnection is allowed but limited to 18 miliherlang.

Dominican Republic: Interconnection to the PSTN is allowed. However, the terms of interconnection must be negotiated between the commercial Trunked Radio operator and CODETEL.

Ecuador: Interconnection to the public switched telephone network (PSTN) is not allowed by as long as EMETEL, the Government owned telephone company, has the exclusive, but temporary, right to provide basic telephone services. This temporary right will expire in 2000.

El Salvador: Interconnection to the Public Switched Telephone Network (PSTN) is allowed. One of the responsibilities of the new regulatory entity will be to arbitrate disputes on Interconnection changes to ensure a reasonable price. In theory, the cost would be equal to long run marginal cost, including replacement value and profit.

Estonia: Interconnection to the Public Switched Telephone Network (PSTN) is allowed although there is no law in place to specifically permit it. If allowed, the permission to provide interconnect service is included in the license agreement for providing commercial Trunked Radio service. Therefore, any technical limitations or time limits would be included in the license.

Finland: Allowed Technical requirements are given by the Telecommunications Administration Center in the operator license.

France : Interconnection to the Public Switched Telephone Network (PSTN) is allowed but only using the infrastructure equipment of the network operators, Commercial Trunked Radio networks also may interconnect with other commercial Trunked Radio systems.

Guatemala: The new telecommunications law states that interconnection to the Public Switched Telephone Network (PSTN) is allowed and is to be freely negotiated by the parties. Any operator is also obligated to give nondiscriminatory access to an operator who requests it for a price. All operators have the right to nondiscriminatory conditions. The parties have 4-0 days from the day after the request has been received to reach an agreement on the price and terms of access to any essential resource. The term of negotiation may be extended by mutual agreement of the parties.

Germany : Interconnection to DBP Telekom, the monopoly telephone service provider is allowed. However, operators will be charged the same amount for interconnected calls as DBP Telekom charges for a wireline telephone call.

Guyana: Interconnection is allowed but it must be negotiated between the operator and the telephone company.

Honduras: Interconnection to the Public Switched Telephone Network (PSTN) is allowed if the service intended to be provided is primarily wireless dispatch communications. In small cases, not more than 20 percent of the subscribers per channel may have access to the public telephone network.

Hongkong: Allowed

India: Not allowed

Indonesia: Allowed

Israel; Not allowed.

Ivory Cost: Not allowed.

Japan: Type One Systems are allowed to interconnect with other Type One or type Two system, pending authorisation from the MPT. To obtain such authorisation, the operator must give the MPT a copy of the agreement reached between the two carriers and documentation showing that the rates are set according to cost.

Jordan: The TRC indicates that the purpose of Trunking services should be to provide dispatch and interconnected telecommunication services. However, the TRC acknowledges that in order to capitalize on the capabilities of some technologies, interconnection may be desirable. The TRC stipulates that the total airtime used for interconnected traffic, whether to the PSTN or other telecommunications networks, should constitute a small proportion (a maximum of 20 percent) of the total airtime used by the service.

Latvia: Interconnection to the PSTN is allowed on the basis of mutual agreement with the PSTN operator, Lattelcom SIA.

Lithuania: Not allowed.

Moldova: Commercial trunked radio operators may interconnect to PSTN for local calls only. International and inter-city calls are not allowed.

Mexico : Interconnection to the Public Switched Telephone Network (PSTN) is allowed, that an agreement between the operator and the public telecommunications provider has been executed.

New Zealand: Allowed

Nicaragua: Allowed

Panama: Interconnection to the Public Switched Telephone Network (PSTN) is allowed. However, if operators want to interconnect their systems with other networks they first need to obtain permission from that network operator.

Peru: Allowed Interconnection is accomplished through an interconnection contract. The parties are free to dictate the terms of the contract. Regulations state that the time period to negotiate between the parities is 60 days after being contacted with the request for interconnection. If within 60 days no agreement is reached, OSIPTEL, can intervene to expedite a mandate of interconnection with technical and economic norms and other necessary characteristics. Technically, all operators must adopt an open network architecture that guarantees interoperability of the networks. The operators of the networks set the technical characteristics of interconnection.

Philippines: Allowed. There are no technical or time restrictions. The law allowing interconnection is Executive Order No. 59 and Republic Act 7925.

Poland: Allowed

Portugal: Interconnection to the Public Switched Telephone Network (PSTN) is allowed with written approval from the national telephone network provider. However, each incoming and outgoing call to the fixed telephone system is limited to a maximum of one minute, after which operators must automatically cancel calls. In additional, operators are forbidden to transmit calls which originate and terminate in the fixed telephone system.

Romania: Interconnection to the PSTN is allowed without limits. However, units may only be interconnected for 50 percent of the time in systems with closed user groups which have a minimum of five users.

Russia: Allowed

Singapore: Allowed

Slovakia: Allowed without limitations.

South Africa: Different Licensees are not permitted interconnection their systems. However, the Postmaster General may permit interconnection of a Trunked Radio System with the PSTN for purposes of limited and essential communication between Trunked Radio users and users of the PSTN.

Spain: Allowed

Sri Lanka: Allowed

Sweden: Allowed with limited duration

Switzerland: Interconnection to the PSTN is allowed without limitations.

Trinidad: Allowed

Taiwan: Interconnection to the PSTN is allowed only after prior approval from the regulator.

Tajikistan: Allowed without restriction.

Thailand: Allowed.

Turkey: Interconnection is not allowed.

Uganda: Interconnection is allowed, but the terms and procedures for interconnection are decided through negotiations with the PSTNM operators.

UK: Allowed

USA: Full interconnection of Commercial Trunked Radio systems with the (PSTN) (Public Switched Telephone Network) has been allowed since 1982. There is no restriction on interconnection and LECs must provide equal interconnection to any requesting carrier at any technically feasible point on their networks. They must also compensate wireless carriers for traffic terminating on their networks.

Uzbekistan: Interconnection is decided by agreement between the City Telephone Network and the company. The regulator allows it without restriction.

Venezuela: Operators may interconnect to the Public Switched Telephone Network (PSTN) and other telecommunications networks as long as they have established an interconnection contract, which is authorised by the Ministry.

(Source: International Wireless Telecommunications Association, Through MTROA)