Telecom Regulatory Authority of India

(TRAI)

National Numbering Plan – a revised approach suggested by TRAI for achieving greater transparency and efficiency

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Preface

Telecommunications sector in the country is undergoing a transformation brought about by rapid growth and technological developments. New paradigms are emerging as telecommunications, IT and broadcasting industries converge. Being conscious of the fact that some of these developments would have a profound impact on the National Numbering Plan, the Authority constituted an internal Research Team to suggest a revised approach to the numbering plan for achieving greater transparency and efficiency.

The following issues have been analyzed in the Research Paper in detail:

1. Measures that can be taken for optimal utilization of numbers, short codes and IN SCP Codes
2. Pricing of numbers
3. Long term suitability of numbering plan keeping in view the growth of traditional and development of IP networks
4. Impact of Mobile Number Portability (MNP) and Carrier Selection on the numbering plan
5. Review of SDCA based Numbering Scheme

The research paper has been placed on the TRAI's website (www.trai.gov.in). Written comments on the issues raised in the paper may please be furnished to Principal Advisor (FN), TRAI by 20th March, 2009. The comments may be sent in writing and also preferably be sent in electronic form e-mail: srofn@trai.gov.in, lavgupta@gmail.com, Tel.: 011-23216930, Fax: 011-23235270

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EXECUTIVE SUMMARY

The numbering plan in telecom sectors for a country is an important 'fundamental plan' that requires careful and judicious reviews to constantly meet the country's requirements as the telecommunications network grows and new developmental challenges surface. The planners take into consideration the requirement of expansion of existing services, introduction of new services and also projected future demands including contingency plans.

Telecommunications sector is undergoing a transformation accompanied with rapid technological changes. New paradigms are emerging as telecommunications, IT and broadcasting industries converge. To make most of the situation, many operators are migrating to converged network architectures for the provision of existing and new services. Advancement in telecommunications technology has brought about possibilities of new revenue streams for operators and better, faster and cheaper services for the consumer. It is becoming increasingly possible to deliver any service on any device, anytime, anywhere. To achieve this ubiquity, an often-overlooked resource, the number resource, is used to uniquely identify and differentiate among the end users. Migration to IP based network is adding additional complexities and these needs to be suitably addressed.

Numbering and Electronic Addressing do not merely concern telecommunications service providers. They are also a matter of great importance to Internet Service Providers, Broadcasters, Information Technology companies, Content Providers, end users as well as governments and regulators. The availability of numbering resource for telecommunications services, akin to spectrum for wireless services, is finite and scarce. The utilization of available numbering space is highly accelerated by introduction of new services and expansion of existing

services. Substantial revision of the numbering plan is complex, time consuming and expensive. It therefore makes sense to use the resources sensibly in a managed and controlled manner.

The purpose of this research paper is to analyze the changes that affect the national numbering plan and to identify the ways in which numbering arrangement and allocation policy might be altered for more efficient utilization.

The first chapter provides a discussion of the existing Numbering Scheme and need for a review. The second chapter contains the analysis of the numbering issues and the conclusion of the Research Team constituted by TRAI.

CHAPTER 1

Introduction

1.0 General

The **National Numbering Plan (NNP**) provides a set of rules and guidelines for the use and assignment of numbers to telephone services delivered over the Public Networks. The Plan also describes the assignment of numbers to international services, trunk service, emergency services and special services such as voice mail and Intelligent Network (IN) services. The structure of the national number generally complies with the relevant International Telecommunication Union Standard Sector (ITU-T) Recommendations.

2.0 Revisions of National Numbering Plan

2.1 National Fundamental Plan (1993)

The National Numbering Plan is one of the Fundamental Plans along with Switching, Routing, Transmission, Charging and Synchronization Plans. A major review of numbering plan was done in 1993. This plan was formulated at a time when there was no competition in the basic telecommunication services, the competition in cellular mobile services had just started, paging services were in a stage of infancy and Internet services were not available in the country. It could cater to the needs of existing and new services for another few years. During this period either the Government or its public sector undertakings were mainly providing the telecom services. Management of the number allocation was, therefore, not complex.

2.2 National Numbering Plan (2003)

With the introduction of a large number of new telecommunication services and opening up of the entire telecom sector for private participation, it was felt necessary to rationalize and review the existing National Numbering Plan to make it futuristic and flexible so that it could cater to the numbering needs for about next 30 years in respect of the existing and likely new services. Keeping this in view, the new Numbering Plan (NNP 2003) was formulated for a projected forecast of 50% tele-density by the year 2030. This made numbering space available for 750 million telephone connections in the country comprising the anticipated number of 300 million basic and 450 million cellular mobile connections.

It was hoped that the new National Numbering Plan (NNP2003) will be able to meet the challenges of multi-operator, multi-service environment and will be flexible enough to allow for scalability for next 30 years without any change in its basic structure.

The main objectives for drawing up the plan were to:

- Plan, as far as possible, in conformity with relevant ITU standards
- Meet the challenges of the changing telecom environment.
- Reserve numbering capacity to meet the undefined future needs.
- Support effective competition by fair access to numbering resources.
- Meet subscriber needs for a meaningful and user-friendly scheme.
- Standardize number length wherever practical.
- Keep the changes in the existing scheme to the minimum.

2.3 Modifications to NNP 2003

2.3.1 Modifications based on TRAI's Recommendations

Taking into consideration the evolving needs of the telecommunications sector, the Authority had recommended the following two modifications to NNP 2003 during March and April 2006 and was accepted by the licensor.

1. Permitting usage of strings containing #, $, £ etc. for accessing High Speed Data Services in Wireless Networks (8th March 2006)

2. Permitting usage of * and # in provisioning of value added intra-network services like USSD (Unstructured Supplementary Service Data) by Access Providers (13th April 2006)

2.3.2 Modification to NNP 2003 by Licensor

The licensor has modified some of the definitions as given below:

i) Redefinition of Category IV of the Special Services

With the amendment dated 06.09.2007, the earlier restriction in use of codes listed therein by the Access Provider to provide any service of their choice 'in their own network' (Note f to the Annexure IV) was removed and the amended note is as follows:

"f. Category-IV: These are the codes to be used by the Access Providers to provide any service of their choice"

ii) Modification in usage of Level 95

- With the amendment dated 07.05.2007, the use of sub level 95 was allowed for dialing from one SDCA to another SDCA outside the Licensed Service area of the Service Provider also provided the tariff is same as that of intra SDCA tariff (local call tariff). (Clause 2.5.3 of NNP 2003)

- With the amendment dated 05.06.2008, sub level 95 was also allowed as prefix for basic services inter and intra service area long distance calls, in addition to Sub level 0. (Clause 2.15 of NNP 2003)
- With the amendment dated 09.02.2009, it was decided not to use sublevel 95 for accessing long distance calls with effect from 23.02.2009.

2.4 NNP 2003 and relevant license conditions

The present license conditions pertaining to National Numbering Plan for different licenses *viz* Basic Service License, National Long Distance License, International Long Distance License, Cellular Mobile Telephone Service and Unified Access Service are given in *Annexure-1*.

3.0 Reasons to revisit NNP 2003

National Numbering Plan (NNP 2003) was designed to take care of the numbering requirements for about 30 years timeframe. However unprecedented growth of the mobile segment, rapid technological development and gradual migration from circuit switching to packet switching has placed telecommunication sector in a state of flux. To keep pace with the developments, the old rules cannot be automatically applied and it would be appropriate to be ready with the enabling guidelines, including changes in the numbering plan, well in advance before the actual transition takes place.

During the last few years, with many initiatives taken by the licensor as well as the regulator, there has been tremendous growth all around and particularly in the field of cellular mobile services. These services have already exceeded, in terms of number of connections, as compared to the traditional copper wire line fixed services. It may be observed that the telecommunication subscriber base in the country

reached 384.79 million and the overall tele-density reached 33.23% at the end of December 2008.

The technology boom experienced in the field of telecommunications and the readiness of the telecom sector in India for the introduction of new services/technologies like VoIP (Voice over Internet Protocol), Third Generation Networks (3G), Next generation Network (NGN), General Packet Radio Service (GPRS), Wireless Fidelity(WiFi), Wireless interoperability standards for Microwave Access (WiMax) etc., in conjunction with the liberalization of the telecommunications market, create new pressures on numbering resources. Broadly speaking, technologies of mobile telecommunications and Internet are going to set the contours of further technological progress in the current decade and the next.

Next Generation Networks represent the future evolution that will not only converge the fixed and mobile networks but would also enable delivery of high speed data and video on the same Internet Protocol (IP) network. NGN is expected to give fixed-line and mobile users completely seamless communication and to offer unrestricted access by users to different service providers in a multi-service, multi-protocol, multi-vendor environment.

Currently, the PSTN only uses numbers based on the ITU standard E.164 which is, in general, controlled by the licensor, while Internet can be accessed using an IP address, URI (Uniform Resource Identifier) such as e-mail address and domain names which are allocated by registries, operating under the co-ordination of ICANN (Internet Corporation for Assigned Names and Numbers) and overseen by national governments. As the NGN advances further, standardization of points, levels and protocols for interconnection between circuit-switched and packet-switched networks will become increasingly necessary. IETF has already defined ENUM (Electronic

NUMbering) as an integrated numbering scheme that facilitates mapping of traditional telephone numbers to IP addresses and other identifiers, *e.g.* SIP addresses.

The international experiences also reveals that it is very difficult to predict upcoming services and technologies with a good measure of certainty and numbering plans are being revised prematurely by many regulators around the world to create room for upcoming technologies and IP based nomadic services.

4.0 TRAI Research Team on National Numbering Plan

4.1 Constitution of the Research Team

The Authority, keeping in view the need of urgent requirement for review of national numbering plan due to the recent developments taking place in the telecom sector and also on the request from a few service providers, constituted an internal Research Team to suggest a revised approach to the numbering plan.

4.2 Numbering issues for review

The Research Team was asked to examine the following numbering issues:

1. Measures that can be taken for optimal utilization of numbers, short codes and IN SCP Codes

2. Pricing of numbers

3. Long term suitability of numbering plan keeping in view the growth of traditional and development of IP networks

4. Impact of Mobile Number Portability (MNP) and Carrier Selection on the numbering plan

5. Review of SDCA based Numbering Scheme

CHAPTER 2

Analysis of Numbering Plan Issues

The issues listed in para 4.2 of chapter 1 were analyzed by the Research Team in detail. The analysis and the conclusions endorsed by the Authority have been given below:

1.0 Issue 1: Measures for optimal utilization of numbers, short codes and IN SCP Codes

1.1 Present practice for allocation of numbers in India

At present ten digits numbering scheme excluding '0' has been adopted in fixed and mobile telephones. For fixed line the STD code of the SDCA is included in ten digits. However, for local dialing the number of digits to be dialed varies with the capacity of the SDCA. For mobile it is ten digits even for local dialing.

The present practice of number allocation to fixed and mobile service providers is as follows:

1.1.1 For fixed line services

The service providers have been given pre-defined levels that decide the amount of numbering resources they have. The levels allocated to different service providers is as shown below:

1. BSNL/MTNL – Complete Level 2
2. Reliance Communications – Complete Level 3
3. Bharti Airtel - Complete Level 4
4. Shyam/HFCL – Sublevels of Level 5

5. Tata Teleservices – Complete Level 6
6. M/s Datacom - Sublevels of Level 7

For 2, 3 digit SDCA code exchanges a block of 1,00,000 numbers and for 4 digit SDCA code exchanges a block of 10,000 numbers are allocated. The service providers are also allowed to uses these allocated numbers in more than one circle. Additional numbers are allocated to requesting service providers after they demonstrate 80% utilization of already allocated numbers.

1.1.2 For mobile services:

Level 9 is earmarked for mobile services. Mobile service providers are initially allocated 1 million numbers in a service area and additional numbers are allocated without any charge, as and when requested by service providers, after demonstrating 60% utilization. M/s BSNL has been allotted complete level '94' for their mobile services. M/s Reliance Communications Ltd and M/s Tata Teleservices Ltd were initially allotted some sub-levels of '93' and '92' respectively for migration from limited mobility to full mobility in CDMA network. Later on almost complete '93' level has been allotted to M/s Reliance Communications Ltd and '92' level to M/s Tata Teleservices Ltd.

1.2 Analysis of the issue

In examining this issue the Research Team has also taken into consideration the discussions held in the meetings of the committee constituted by the DOT to review mobile network codes and numbering levels and also the report of NGN-eCO set up by TRAI (available on www.trai.gov.in)

During the discussion it was observed that numbering resources has not been efficiently utilized as the numbering space meant for 600 million subscribers has already exhausted even before reaching 250 million mobile subscribers.

To carry out a comprehensive examination, the Research Team sought information from Department of Telecommunications and also the service providers relating to allocation of blocks of MSC/SCP codes, blocks of numbers and also their utilization of these numbers for working out the efficiency of utilization of numbering resources.
Using the information furnished by the service providers regarding MSC codes allocated and HLR figures, service provider wise, circle wise percentage of utilization of numbering resources have been estimated by the Research Team. Table 1 below provides the percentage Utilization of numbers allocated to some of the Service Providers as on July 2008.

Table 1: Percentage Utilization of numbers allocated to Service Providers*

Service Provider	**MSC Codes Allocated**	**Total Capacity (Millions)**	**HLR (Millions)**	**% Utilization**
Spice Communications Karnataka	98440-9 99640-9 97430-9	3	1.63	54.33
BPL Mobile- Mumbai	98210-9 98700-9 97730-9	3	1.51	50.33
HFCL Infotel-Punjab	98770-4	0.5	0.23	46
MTNL- Delhi	98680-9 99680-9	2	1.41	70.5
MTNL-Mumbai	98690-9 99690-9 97570-4	2.5	2.01	80.4
Shyam Telelink-Rajastan	98750-2	0.25	0.11	44
BSNL Bihar	300-319 700-739	6	1.68	28
BSNL HP	180-189	2	0.52	26

	590-599			
BSNL Karnataka	480-499 800-859	8	1.79	22.37
BSNL Kolkata	320-339 770-799	5	1.04	20.8
BSNL NE	020-029 360-369	2	0.59	29.5
BSNL Chennai	440-459 980-999	3	0.94	31.33
BSNL UP (East)	150-159 500-559	7	4.36	62.28
Bharti Airtel AP	98490-9 98660-9 99490-9 99890-9 99080-9 99630-9 99590-9 97010-9 90000-9 91770-9	10	8.39	83
Bharti Airtel Assam	99540-9 99570-9	2	1.30	65
Bharti Airtel J&K	99060-9 97970-9	2	1.17	58.5
Reliance AP	46,47,48,90 to 99	13	3.43	26.38
Reliance Bihar	04,08,34	3	1.92	64
Reliance Kolkata	30,31,39	3	1.37	45.66
Reliance Chennai	40,80,81,82, 83,84,85	7	1.05	15
Reliance Delhi	10,11,12,13, 50	5	2.28	45.6
Reliance Gujarat	27,28,74,75, 76,77	6	2.2	36.66
Reliance HP	18	1	0.14	14
Reliance Karnataka	41,42,43,79	4	2.1	52.5
Reliance Maharastra	25,26,70,71, 72,73	6	2.76	46
Reliance MP	00,01.02,03, 29	5	2.45	49
Reliance UP(East)	05,07,35,36	4	2.86	71.5

* Based on the data provided by the service providers. M/s Tata Teleservices, M/s Vodafone and M/s Idea Cellular have not provided the data

It is observed that, in most of the circles, the utilization of numbers by the service providers is well below 60% and in a very few circles it was

more than 60%. Despite low usage some of the service providers have asked for more levels in some of the service areas.

Presently, the following mechanism is adopted by DoT to allot new number blocks to mobile service providers. Each service provider has to request DoT, in the prescribed proforma (given vide DOT circular no 842-582/2005-VAS/12 dated 29th August 2005), demonstrating 60% of utilization of allotted numbers in a given service area. The following details are called for from the requesting service provider for allotting new blocks/series of MSISDN.

Table 2: Details of CMTS subscribers

Sl.No.	**Type of subscribers**	**No. of Subscribers**
1.	Total IMSI/s in HLR **(A)**	
2.	Less: (**B**=a+b+c+d+e)	
a.	Test/Service Cards	
b.	Employees (includes cards given to Business Associates)	
c.	Stock in Hand/in Distribution Channels (Active Card)	
d.	Subscriber Retention Period Expired	
e.	Service Suspended pending disconnections	
3.	Subscriber Base (**A-B**)	

Once the service providers demonstrate that the total subscriber base (Sl. 3 in Table 2 above) in a given service area exceed 60% of the existing allocated numbers, new block of numbers are allotted to the service providers.

The Research Team also took note of the fact that to achieve the target of 500 million telephones by 2010, the service providers would have to provide additionally about 150 million telephones during this period.

It is also noted that the requirement of numbers/SIMs in an area is dependent not only on the growth but also the number of retailers and distributors in that service area. Information collected by TRAI revealed that about 22.18%, 23.4 % and 24.81% numbers are in the channel or are used for internal service purposes during September, October and November 2008 respectively. The difference between International Mobile Subscriber Identifier [IMSI] and Home Location register [HLR] figures of different service providers during September, October and November 2008 are placed at *Annexure-2*. It may be seen that it varies from service provider to service provider with the average figure of 23.4%. This aspect should be taken into account while deciding the initial and subsequent allocations. The Research Team is of the opinion that the service providers should have enough numbers for a 3 month-period and also to cover the time taken to process allocation of new block of numbers. Taking into account the growth factor and numbers that would be in the channel and not energized or used for internal purposes by the service provider, it is felt that the present practice of allotting new block(s) of numbers to the existing service providers after demonstrating 60% utilization of numbers may be continued. However, in case of new service providers, it is recommended that new blocks of numbers may be allotted after demonstrating 50% utilization of numbers, at least for initial one or two allocations, so that they can build up appropriate level of numbers in stock and to have continuity of service.

To understand the justification for recommending allocation of new block of numbers after 50% utilization, to new service providers, consider the following situation. A service provider in a given service area gives about 2.5 lakh connections in a month. Considering 25% of allocated numbers (SIMs) to be in the distribution channel the service provider would be able to replenish the channel 2 times before his numbering resource drops to 50%. This will happen in 2 months time.

After the 3rd month the service provider would have only 2.5 lakh numbers in hand. If allocation is delayed by more than a month then the situation will become precarious for the service provider. Thus it is recommended that allocation of fresh block to new service providers be made after energizing 50% of the numbers.

The Research Team also observed that in case of fixed telephone services, the number levels allocated to the service providers are quite underutilized. This is due to the earlier practice of allocating a compete level to individual service provider. From Table 3 below it can be seen that most of the service providers have resources of about 10 million numbers per circle but they do not have these many connections even in whole of India. DoT should review such cases on priority where full levels have been allocated and utilization is very low to work out the possibility of allocating unused sub levels in already allocated levels to new service providers so that the resources are better utilized. In this way level like '7' can be freed for new services as was earlier stipulated in National Numbering Plan 2003.

Table-3 gives the subscriber base of fixed lines of all Service providers as on 31.10.2007 and 31.10.2008. The six levels i.e. Level 2, Level 3, Level 4, Level 5, Level 6 and Level 7 have been allocated to fixed line services and each level may caters to theoretically 10 million subscribers. As each level can be reused in all 23 telecom service areas but the total fixed line subscribers in the country is around 39 million only. It may also be noted that the same level can be repeated in different SDCAs but the available numbers will depend on size of STD code. DoT may like to review such cases where full levels have been allocated and utilization is very low to work out the possibility of allocating unused sub levels in already allocated levels to new service providers so that the resources are better utilized.

Table 3 Subscriber base of fixed line

Sl. No.	Service Provider	As on 31.10.07	As on 31.10.08
1	BSNL	32,024,619	29,933,780
2	MTNL	3,614,748	3,559,092
3	Bharti Airtel	2,106,122	2,549,043
4	HFCL	159,260	153,168
5	Shyam	158,315	148,804
6	Tata (TTL)	625,866	836,819
7	Reliance (RCL)	724,645	1,038,859
		39,413,575	**38,219,565**

The Research Team has also taken note of the fact that recently, DoT has allocated Level 7 to a new service provider for provision of Basic Telephone Services under its UAS License in its various service areas. The Research Team observed that it would have been more appropriate if instead of allocating the Level 7, the service providers had been accommodated in some other vacant sub-levels other than Level 7 so that the Level 7 could have been utilized for some new services like IP telephony etc. This should be done even now as the service provider has not yet started the service and they may be allocated vacant sub levels, without dislocating their deployment plans. It is also worth mentioning here that as per NNP 2003 the Level 7 is reserved for new services. Further, as said earlier, it is desirable to work out a plan of reorganization of existing fixed line numbering scheme to get at least two to three levels spared from allocated levels 2 to 6 for future use. Some of these levels can be used for mobile service. This will avoid moving to 11 digits numbering scheme for mobile service for the next few years.

Presently the short codes are allotted by the service providers subject to guidelines of DoT, which mandate provision of short code starting with level 5 and of minimum 5 digits. For any Value Added Service provider or content provider having a common short code across

networks of different telecom service providers is difficult if the value added/content provider has to approach each telecom service provider individually. **The problem would be in availability of the same code through different service providers and the time that this process would take. Also the VAS provider is not able to brand his product/content properly if the same short code is not available with all the access service providers. This needs to be addressed by DoT.**

With regard to SCP codes, the 3 digit SCP codes (ranging from 000 to 999) are allocated by DoT to service providers for their IN platforms. The Research Team collected the zone wise list of SCP codes allotted from DoT. From the list it is observed that DoT has allotted 243 codes out of available1000 codes. These allocations are quite in excess of the anticipated requirements. The Research Team feels that it is sufficient that SCP codes be allocated to each IN platform and not circle/ service provider /MSC wise. Further, it has also been stated by DoT that the some excess SCP codes that were allocated inadvertently have been withdrawn. **It appears that there are no well-defined guidelines for allocation of SCP codes. Hence DoT may make clear guidelines for allocating SCP codes**

1.3 Conclusions of the Research Team

The Research team observed that presently the CMTS and UAS licenses are furnishing subscriber base information in the format prescribed by DoT vide circular no 842-582/2005-VAS/12 dated 29th August 2005. The Research Team deliberated on various possible mechanisms available to have a good monitoring system for effective utilization of numbering issues taking into accounts the international experiences and observed that the following measures may be considered:

1.3.1 All service providers making use of numbering resources may be asked to submit an annual detailed "Numbering Return" to the licensor. The licensor may carry out the numbering audit of usage of numbers by service providers based on these returns. The following information is suggested to be part of the Numbering Return:

- Allocated number resources
- Current use of the allocation
- Numbers for internal use (Test/Service Cards, Employees(including cards given to Business associates)
- Numbers under quarantine (disconnected numbers)
- Numbers suspended pending disconnections
- Details of numbers set aside for planned growth, customer orders or other usage, with explanations
- In case of Mobile Service Providers, Number of SIMs in distribution network with retailers and distributor networks
- A three year forecast of demand within significant ranges
- Utilization of short codes and IN SCP codes
- Details number ported inward and outward
- Any other information requested by the Licensor.

This information is to be supplied in a standard format to be specified by the Licensor to enable for qualitative and quantitative analysis.

1.3.2 In case of fixed line services, based on the qualitative and quantitative utilization audit, DOT may like to allow usage of unused sub levels in already allocated levels to new service providers for more efficient utilization.

In case of mobile services, the new number blocks for 'existing service providers', the present practice of allocating new numbers after

demonstrating 60% utilization may be continued and for 'new service providers', new blocks to be allotted after demonstrating 50% for initial one or two allocations, in order to give room for sufficient inventories of numbers the service providers have to maintain with their retailers and distribution network to have continuity in the services. In case of fixed line services, the new number blocks should be allocated after the service provider demonstrated 80% of utilization and allocation of free sublevels of allocated full levels may be examined.

Further it may also be noted that the proposed mobile number portability in the country simplifies numbering plan administration just as number portability allows individual customer numbers to be transferred from one service provider to another, blocks of unassigned numbers can be transferred between service providers since the purity of levels allocated is precluded because of migration of subscribers from one service provider to another.

1.3.3 As 'Short codes' are a scarce resource, and with the increase in Value added Services, these short codes to be used with at utmost care. It is understood that TRAI in its draft recommendations dated 14.01.2009 on 'Growth in Value Added Services and Regulatory Issues' is considering a specific proposal on this issue. Therefore the Research Team has not elaborated more on this issue.

1.3.4 The SCP codes have been indiscriminately allocated along with MSC codes to service providers but only one SCP code is required for each IN platform. The Research Team concludes that DoT may review and withdraw excess codes and may make clear guidelines for allocating SCP codes, addressing the following points in consultation with the stakeholders:

- Initial allocation of one SCP Code for one IN Platform

- Criteria for allocating additional SCP code for an IN Platform

2.0 Issue 2: Pricing of numbers allocated to the operators

2.1 Present practice of pricing of numbers in India

At present the service providers do not pay for the numbering resources allocated to them. The Research Team discussed and debated this issue in detail.

2.2 Analysis of the issue

New number blocks are assigned to service providers without any charge, as and when requested by them, after showing 60% utilization in case of mobile service and 80% utilization in case of fixed line service. It is observed by the TRAI Research Team from web-sites and paper reports that most of the service providers charge their subscribers for allocating preferred numbers or 'vanity numbers'. Some service providers even resort to auction of numbers for higher revenue.

The Research Team felt that charging the numbers allocated to operators may be used as a tool to encourage efficient use of numbering resources.

The Research Team took note of the practices followed internationally regarding charging of numbers. It is observed that most regulators in Europe put a modest charge on numbers. In Australia, the "rights of use" of numbers have been defined and are not seen in conflict with the numbers as a whole remaining a national resource. The annual charge for an ordinary phone number in Australia is around AUS $1. Ofcom in its consultation paper during 2006 proposed to introduce charges of up to 10 pence per number per year after 2007. This is based on rough calculations of the "cost" of a number (based on the

cost of the 1995 National Code Change and the number of numbers it created), but at the same time is subject to adjustment to ensure it achieves the primary aims of disciplining the use of numbers without cramping growth.

The Table 4 below gives the number allocation fees in some European countries.

Table 4: Examples of number allocation fees in European Countries

Country	**Annual charge for ordinary phone number (in euro cents)**
Belgium	1.34
Bulgaria	10
Czech Rep	3
Denmark	25.71
Estonia	153
Finland	34
France	2
Greece	2.5
Hungary	27
Italy	1.1
Lithuania	5
Luxembourg	12
Netherlands	0.16
Poland	7
Slovakia	5
Slovenia	11

In Hong Kong, OFTA recognizes that the telephone numbers are a finite resource and to encourage efficient use of telecommunications numbers by the licensees, it propose to impose an annual fee of $3 for each telecommunications number allocated to unified carrier licensee, whether or not the number has been assigned to end users. Under the current regime, fixed and mobile network operators may apply to OFTA for allocation of numbers free-of-charge. They actually hold

many more numbers than the number of customers. OFTA had assessed that in the absence of proper measures to enhance the efficient use of numbers, 8-digit telecommunications numbers may be exhausted within 7 years, i.e. by 2015. By cautious administration they have extended the life span of the numbering plan by 5 years.

Table 5 below gives approaches adopted to charge numbers across Europe and North America.

	Allocation Charge	Annual Charge	Based on admin costs	Based on allocative efficiency	No charges made
AUSTRALIA	✓				
BELGIUM	✓	✓			
BULGARIA	✓	✓	✓		
CANADA					✓
CROATIA		✓			
CYPRUS	✓	✓	✓		
CZECH REPUBLIC	✓	✓			
DENMARK		✓	✓	✓	
ESTONIA		✓			
FINLAND		✓			
FRANCE		✓	✓		
GERMANY	✓		✓	✓	
GREECE	✓	✓			
HUNGARY	✓	✓		✓	
IRELAND					✓
ITALY		✓			
LITHUANIA	✓	✓	✓		
LUXEMBOURG	✓	✓			
NETHERLANDS	✓	✓	✓		
NEW ZEALAND					✓
NORWAY		✓	✓		
POLAND		✓	✓		
SLOVAKIA	✓	✓			
SLOVENIA		✓			
SPAIN		✓	✓		
SWEDEN		✓		✓	
SWITZERLAND	✓	✓	✓		
UNITED STATES					✓

Table 5 Approaches adopted to charge numbers across Europe and North America

2.3 Conclusions of the Research Team

Present instances shows that some special numbers are sold to subscribers at a certain price by service providers. It may be advisable to realize revenue by charging of numbers, though a portion of this is anyway coming as percentage on AGR. The other objective of charging for numbers would be to encourage effective utilization of numbers by service providers.

It is apparent that numbers are an extremely valuable public resource. After the analysis of the international practices and the present state of utilization of numbers, the Research Team is of the view that charging a reasonable amount for each number allocated would encourage the service providers for a more efficient utilization of numbers. The following different forms of charging were considered:

- A one-time charge per number
- A one-time charge per block of numbers
- An annual charge per block of numbers
- An annual charge per *active* number
- An annual charge per *allocated* number

However, considering all the aspects, the Research Team is of the opinion that the **service providers may be asked to pay the licensor one time charge of Rs. 5.00 for mobile number and Rs. 1.00 for fixed number held by them for numbers already held and for future allocations.** Once this regime comes into force the service providers may be permitted to obtain numbers in smaller blocks based on their actual requirements subject to a minimum block size decided by DOT. Resale should not be permitted. No adjustments are proposed in case the subscribers migrate from one service provider to another once MNP has been introduced. One reason for this is that

the customer is migrating because of inefficiency of the donor operator and the second that the flow, though not equal, would be either way.

3.0 Issue 3: Long term suitability of numbering plan keeping in view the growth of traditional and development of IP networks

3.1 Background

Next Generation Network (NGN) is a powerful platform to provide different services like Voice, Video and Data. The increasing competition in telecom network and subscriber's desire to have new application based services has generated considerable interest amongst service providers to migrate to NGN environment. The NGN platform will enable the telecom providers to provide a new range of services.

NGN deployment in India is still at an early stage, though the core networks are in the advance process of NGN transition and the market is ready for IP based core network competition. On the other hand, NGN in the access and service layers is in its infancy with majority of operators typically in the commercial and technical evaluation phase.

NGN concept also implies many different types of "Convergence", each having its own addressing structures:

- PSTN/ISDN convergence with IP based networks.
- Fixed – Mobile convergence (FMC)
- Broadcast (Cable) – Telecommunications convergence
- Web based services convergence.

The convergence towards Next Generation Networks also requires that customers of different market players, using different network technologies, can communicate with each other and access resources

on another market player's network. This requires the inter-working of different Naming, Addressing and Numbering systems.

The Research Team has also taken note of the discussions held in the DoT's committee on coexistence of 10 and 11 digits numbering scheme and thereby continuing with existing 10 digits SDCA based numbering for fixed line and 11 digits numbering for mobile services.

It was observed by DoT committee that by sparing level 7 and 8 from STD codes (used for fixed lines) and allotting them to mobile services will yield 2000 millions new mobile connections. Considering the present growth rate of 15 million wireless connections per month, these new 2000 millions numbers would cater for next 10 to 11 years to come there by delaying of shift to 11 digits mobile numbering schemes. The situation will improve if some levels can be refarmed as mentioned by the research team in para 1

It was also observed that by changing mobile numbering scheme from 10 digits to 11 digits by prefixing digit 9, the customers will have to dial one extra code and problems may be faced for implementation of this scheme in E-10B exchanges and those C-DOT exchanges which do not support CCS7 signaling. However Additional 2000 million numbers will be available for mobile services.

3.2 Conclusions of the Research Team

It is observed that NGN Expert Committee (NGN-eCO) constituted under the chairmanship of Secretary, TRAI by co-opting experts from DoT, TEC, C-DOT, Service Providers, Vendors and Academicians to study and suggest NGN awareness building program and a timetable for NGN migration in the country, has given its recommendations.

Currently a consultation paper on 'Licensing issues related to Next Generation Networks' has been issued by TRAI on 27.01.2009 and a consultation paper on 'Interconnection issues related to Next Generation Networks' may also be issued soon. Based on the outcome of these consultation processes suitable intervention will be made by TRAI and Recommendations/regulations are likely to be send/issued.

Further it is not known whether DoT has taken a final decision on 11 digit numbering issue for mobile services. It is presumed that any such decision would be based on the analysis of cost implications on the service providers. However, once it is judiciously implemented it would support fast expansion of mobile network.

4.0 Issue 4: Impact of Carrier Selection and Number Portability on Numbering Scheme

4.1 Background

From the recent consultation on Carrier Selection held with the stakeholders on 27th June 2008, it emerged that Carrier Selection in the traditional sense as envisaged in the earlier direction would not be practicable in the changed scenario. Implementation of advanced IN platforms in the access providers' networks has thrown up a similar possibility in long distance network and with it opportunity of providing choice of carriers to consumers through calling cards. This option was widely favoured by the stakeholders. Hence TRAI made recommendations on 20th August 2008 to pave way for introduction of calling cards by NLD/ILD operators.

Mobile Number Portability (MNP) allows Mobile subscribers to change their service provider while retaining their subscriber number. Portability benefits subscribers and increases the level of competition

between service providers, rewarding those operators having better customer service, network coverage, and service quality. Keeping in view the growth of telecom services in India, TRAI recommended implementation of Mobile Number Portability in phased manner to enhance competition among service providers in the Mobile sector and also to improve quality of service and satisfaction of the Mobile Subscribers.

4.2 Conclusions of the Research Team

The Research Team observed that though the primary reason for number portability is to help competition by allowing users to keep their telephone numbers when moving, number portability mechanisms also might be used to assist numbering plan administration. Methods for capacity shortage relied upon number portability may be less disruptive (for users and service providers) than methods based on splits, overlays or increasing the NSN. (This is because number portability methods are concerned with using existing numbers more efficiently, instead of creating new numbers.)

Also the Number portability simplifies numbering plan administration and just as number portability allows individual customer numbers to be transferred from one service provider to another, blocks of unassigned numbers can be transferred between service providers.

Hence the Research Team is of the view that the introduction of MNP in the country would help competition and simplify numbering plan administration.

The Research Team observed that the issues that would arise with the introduction of MNP like the charges paid by service provider in case his subscriber changing the service provider, reversion of numbers to

the original service provider who paid for the number once the connection is surrendered, the methodology to account for the disturbed purity of the levels allocated to service providers, numbers allocated in case of Merger and Acquisitions happen between operators, and any requirement of full automation of numbers allocation process to service providers for easy management has to be considered by DoT.

It has been mentioned in para 2.3 purity of numbers may not be maintainable in case of MNP. As there would be movement among all service providers it would simplify administration of pricing of numbers if there is no inter-operator compensation on account of charges paid for the numbers. On surrender of connection by the subscriber the number should revert back to the original service provider who paid for the number. DoT may revisit these issues after implementing the proposed number portability in the country.

5.0 Issue 5: Review of SDCA based Numbering Scheme

5.1 Background

The National Numbering Plan 2003 is a Short Distance Charging Area (SDCA) based linked numbering scheme. This SDCA based numbering was implemented in India at the time when large switches were not available and all the operators had to deploy small switches in the SDCAs, which led to a traditional hierarchical numbering and routing.

5.2 Analysis of the issue

This issue was discussed in length in the DoT's committee. One of the options considered was to change SDCA based numbering to LDCA based numbering for fixed line services. In this case STD codes of all

SDCAs will be changed to 2/3 digit which would allow to spare code 7 and 8 for new mobile connections. However, it has been observed that in this option, the STD codes of large numbers of SDCAs will have to be changed and which will cause public inconvenience and the SDCAs having 6 digit numbering will have to be changed to 7 by prefixing a digit which would further cause public inconvenience. BSNL has also argued that any change in fixed line or in SDCA code only would affect most of their subscribers and therefore, it would be non-level playing field with the mobile service providers. Presently, it may be appropriate to retain existing numbering scheme for fixed lines.

Detailed discussions were also done by the Research Team on the issue of SDCA based numbering scheme which involves many technical, commercial and implementation issues such as problems with smaller exchanges /standalone exchanges, inherent routing issues, huge expenses involved in upgrading, changing of all subscriber numbers.

5.3 Conclusions of the Research Team

After elaborate discussions the Research Team feels that in the long run there is a requirement of more numbering space, however keeping in view the limitations of legacy network, routing, cost of carriage etc., the immediate shifting may not be desirable. However as the service providers induct class 4 and class 5 IP switches in their networks and NGN is progressively implemented then it would be appropriate that DoT sets a time bound gliding path for moving towards LDCA based numbering scheme for fixed line after making a detailed cost benefit analysis for implementation of this scheme.

Annexure-1

NNP 2003 AND RELEVANT LICENSE CONDITIONS

The present license conditions pertaining to National Numbering Plan of different licenses are as given below:

1.1 National Long Distance License

16. NETWORK STANDARDS

16.1 The LICENCEE will ensure adherence to the National Fundamental Plan (Fundamental Plan) and technical standards as prescribed, from time to time, by the Department of Telecommunications in this respect.

[9. FUNDAMENTAL PLAN: Fundamental plan include Numbering Plan, Traffic Routing and Switching Plan and Transmission Plan issued by Department of Telecom as amended from time to time.]

1.2 Basic Service License / International Long Distance License

16. NETWORK STANDARDS

16.1 The LICENSEE shall ensure adherence to the National FUNDAMENTAL PLAN (describing numbering and routing plan as well as transmission plan) issued by Department of Telecom and technical standards as prescribed by LICENSOR or TRAI, from time to time. For providing choice of International Long Distance Operator, the equipment shall support the selection facilities such as dynamic selection or pre-selection as per prevailing regulation, direction, order or determination issued by LICENSOR or TRAI on the subject.

[12. "FUNDAMENTAL PLAN" include any prevalent Numbering Plan, Traffic Routing and Switching Plan and Transmission Plan issued by Department of Telecom.]

1.3 Cellular Mobile Telephone Service

24.2 Number Plan: The Numbering Plan at the PSTN Interface shall be as per ITU-T recommendations. The Numbering Plan for the Service will be as per existing numbering plan, which is as follows:

Digits Dialed	***Description***	***No. of digits***
98	*Access Code*	*2*
+		
XYZ	*Mobile Switch Code*	*3*
+		
ABCDE	*Subscriber numbers*	*5*

24.9 The system shall conform to fundamental plans of DOT.

1.4 Unified Access Service

2.2 (c) (i) In respect of subscriber availing limited mobility facility, the mobility shall be restricted to the local area i.e. Short Distance Charging Area (SDCA) in which the subscriber is registered. While deploying such systems, the LICENSEE has to follow the SDCA based linked numbering plan in accordance with the National Numbering Plan of the respective SDCA within which the service is provided and it should not be possible to authenticate and work with the subscriber terminal equipment in SDCAs other than the one in which it is registered. ----------The Licensee must ensure that the mobility in case of such limited mobile service/ facility remains restricted to SDCA.

23.3 The LICENSEE shall ensure adherence to the National FUNDAMENTAL PLAN (Which includes National Numbering, routing and Transmission plan issued by Department of Telecommunications and technical standards as prescribed by LICENSOR or TRAI, from time to time. In case of providing choice of Long Distance Operator, the equipment shall support the selection facilities such as dynamic call-by-call selection and pre-selection as per prevailing regulation, direction, order or determination issued by LICENSOR or TRAI on the subject.

23.4 The Numbering Plan for the Unified Access Services will be as per applicable National Numbering plan. The Licensor reserves the right to modify the National Fundamental plan or its part thereof such as Numbering Plan, Routing Plan, and Transmission Plan etc.

Annexure-2

Table showing difference between IMIS and HLR figures during September, October and November 2008 for various service providers

Difference between IMSI and HLR during September 2008

Service Provider	IMSI	HLR	Difference	%age
Bharti	114058819	77479215	36579604	32.07
RTL	11869013	9206127	2662886	22.44
RCL	51495020	46839758	4655262	9.04
Vodafone	68279198	54624809	13654389	20.00
BSNL GSM	49005958	39166943	9839015	20.08
Idea	46654832	30380163	16274669	34.88
Tata	29709459	29333049	376410	1.27
Aircel	16337021	13878243	2458778	15.05
Spice	5176816	3599744	1577072	30.46
MTNL GSM	3735326	3677782	57544	1.54
MTNL Mumbai WLL(M)	72985	61764	11221	15.37
BPL	1814871	1663904	150967	8.32
HFCL WLL(M)	417772	302157	115615	27.67
Shyam WLL(M)	46320	46320	0	0.00
Total	**398673410**	**310259978**	**88413432**	**22.18**

Difference between IMSI and HLR during October 2008

Service Provider	IMSI	HLR	Difference	%age
Bharti	118152020	80199747	37952273	32.12
RTL	12447702	9582695	2865007	23.02
RCL	52786788	48221761	4565027	8.65
Vodafone	71621230	56703506	14917724	20.83
Idea	49571920	31582937	17988983	36.29
Tata	30516416	30160303	356113	1.17
Aircel	19392832	14659298	4733534	24.41
Spice	5318937	3637129	1681808	31.62
MTNL GSM Mumbai	2035198	1996499	38699	1.90
MTNL Mumbai WLL(M)	73956	61727	12229	16.54
BPL	1903710	1807902	95808	5.03
HFCL WLL(M)	413673	317009	96664	23.37
Total	**364234382**	**278930513**	**85303869**	**23.42**

Difference between IMSI and HLR during November 2008

Service Provider	IMSI	HLR	Difference	%age
Bharti	120588549	82920593	37667956	31.24
RTL	12996100	9963697	3032403	23.33
RCL	54941155	49606097	5335058	9.71
Vodafone	79315215	58764164	20551051	25.91
Idea	50831507	32809720	18021787	35.45
Tata	31313257	31014086	299171	0.96
Aircel	24315846	15375258	8940588	36.77
Spice	5416571	3705894	1710677	31.58
MTNL GSM Delhi	1798293	1790085	8208	0.46
MTNL Mumbai (GSM+WLL(M))	2141900	2092805	49095	2.29
BPL	1970297	1882324	87973	4.46
HFCL WLL(M)	413096	322544	90552	21.92
Total	**386041786**	**290247267**	**95794519**	**24.81**

Annexure-3

Abbreviations Used

Abbreviation	**Meaning**
3G	Third Generation Network
CMSP	Cellular Mobile Service Provider
DNS	Domain Name System
ENUM	Electronic NUMbering
GPRS	General Packet Radio Service
HLR	Home Location Register
IMSI	International Mobile Subscriber Indentifier
IN	Intelligent Network
IP	Internet Protocol
LDCA	Long Distance Charging Area
MNP	Mobile Number Portability
MSC	Mobile Switching Center
NGN	Next Generation Network
NGN-eCO	Next Generation Network expert Committee
NNP	National Numbering Plan
NSN	National Significant Number
PoI	Point of Interconnect
PSTN	Public Switched Telephone Network
SCP	Service Control Point
SDCA	Short Distance Charging Area
SIP	Session Initiation Protocol
UASL	Unified Access Service License
URI	Uniform Resource Identifier
USSD	Unstructured Supplementary Service Data
VoIP	Voice over Internet protocol
WiFi	Wireless Fidelity
WiMAX	Worldwide Interoperability for Microwave Access