



**Telcordia's Comments on the
Telecom Regulatory Authority of India (TRAI)
Consultation Paper No. 02/2010**

Efficient Utilization of Numbering Resources

February 19, 2010

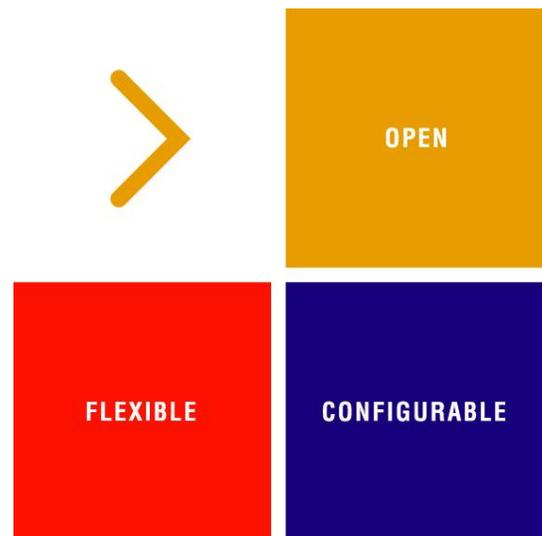


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1 Introduction

Telcordia Technologies Inc. respectfully submits this document in response to a request for comments issued by The Telecom Regulatory Authority of India (TRAI), Consultation Paper No. 02/2010 Efficient Utilization of Numbering Resources released on January 20, 2010.

As a global provider of telecommunications solutions, Telcordia Technologies Inc. (Telcordia) has extensive experience in number management solutions and system design, industry implementation, deployment, operations, and administrative experience.

As a neutral 3rd party, Telcordia looks forward to the opportunity to work with TRAI and the operators in India to implement an efficient number management solution best suited to the current and evolving telecommunications market in India.

1.1 About Telcordia

With its corporate headquarters at the Raritan River Software Systems Center, One Telcordia Drive, Piscataway, New Jersey, U.S.A., and via its subsidiary in India, Teclordia India, Telcordia helps communications companies around the world navigate today's dynamic telecommunications environment by providing flexible, standards-based software and services for IP, wireline, wireless, and cable, helping these companies aggressively reduce costs by consolidating complex operations while growing their networks and service offerings to generate new revenue.

Telcordia is driven by an operating philosophy known as Elementive™. It is a philosophy of openness and flexibility that permeates everything from our product strategies to our partnerships, to the way we treat our longtime and new customers. Elementive embraces change.

The Elementive approach fuses an unparalleled commitment to help our customers be more nimble, more cost effective, and more profitable with years of innovative telecom experience. It's a driving force in core systems that are opening up to allow our customers more flexibility in how they maintain and grow their networks. Elementive is also embodied in next-generation mobility, cable, and wireline solutions that are based on open standards and flexible pricing models, allowing our customers to build networks, create services, and streamline operations in their own way, and with lower up-front investment. Elementive is the backdrop for research and professional services that help customers leverage current infrastructure and exploit new technologies to create big opportunities.

Telcordia primarily serves the wireline, mobile, cable, government, and equipment supplier markets with a robust portfolio that includes:

- Operations support systems
- Network services software

- Consulting and testing services
- Research services

We bring our experience to bear on products that touch nearly every corner of telecommunications, from the infrastructure upon which the U.S. telephone network is built, to the rapidly expanding IP and mobile markets. In fact, many of the world's leading service providers routinely turn to Telcordia for wireline and wireless network design and engineering; business process, operations, and regulatory consulting services; testing and disaster recovery; network security; hosted solutions; routing administration; product support; generic requirements; and much more. We have successfully deployed systems worldwide that incorporate all current network technologies — as well as emerging technologies for multiservice provisioning platforms, and control plane and Internet protocol-based networks. Our software handles all the U.S. toll-free traffic with 85 percent market share of wireless number portability in the U.S., and we are rapidly expanding our global presence.

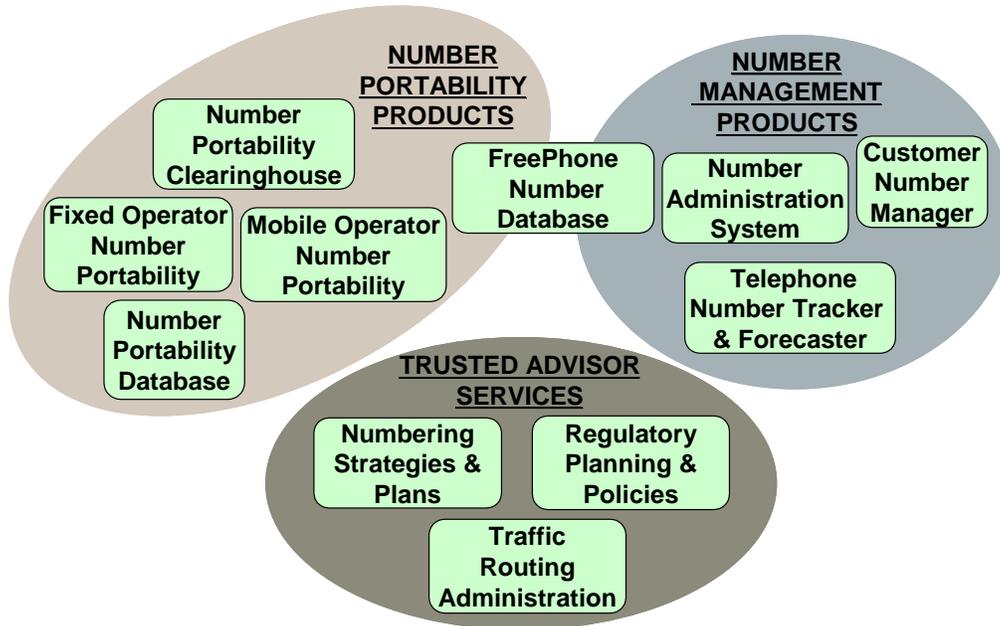
Telcordia has generated more than 800 patents and has developed a rich history as an agent of change in the telecommunications industry. Our research has led to ADSL, ATM, Frame Relay, SONET, AIN, ISDN, and many other industry breakthroughs. Our Software Systems organization has been certified to the ISO 9001 standard and registered to the TL 9000 quality standard for the telecommunications industry.

Over the years we have acquired several subsidiaries and holdings. These companies reflect our philosophy of providing unparalleled customer products and services.

For further details please visit <http://www.telcordia.com>.

2 Telcordia Global Numbering Products & Services

Telcordia has served regulators and service providers with a full range of Number Number Management and Number Portability products and Trusted Advisor services in the numbering arena.



Freephone Number Management and Number Portability (U.S. and Canada)

Telcordia invented and developed the *Telcordia Service Management System (SMS)/800®* system, a large mission-critical and centralized system that manages and ports toll-free numbers in the U.S. and Canada. Since 1989 Telcordia has provided the business management, application software and billing software and operations for the SMS/800®, which processes and manages over 30,000,000 toll-free (Freephone) portable numbers. Every toll-free call in the U.S. depends upon Telcordia software. All Freephone calls placed in the U.S. each day, regardless of carrier, depend upon Telcordia-developed intelligent network software. This presently equates to 250,000,000 calls each day. Since its inception, billions of Freephone calls have been processed without a service interruption by SMS/800®.

Beyond developing the network architecture, signalling requirements and operations plans for the portable Freephone service, Telcordia project-managed the introduction of this service with all industry players, including local carriers, long distance carriers, manufacturers, service providers, and the U.S. Federal Communications Commission (FCC).

Industry requests for information regarding many Freephone SMS activities (e.g., directory assistance capabilities, area code splits, and report generation) are routinely directed to Telcordia Subject Matter Experts.

Telcordia designed and deployed the Telcordia™ Number Pooling Administration System, was the first automated system in support of the number optimization in the U.S. that was designed to assign telephone numbers to service providers in blocks of 1,000 instead of 10,000 permitting those areas to extend the life of their numbering resources and preventing unnecessary number exhaust in those areas while it was the administrator.

Telcordia designed and deployed the Telcordia™ Telephone Number Tracker & Forecaster, a decision-support system that provides utilization, forecasting, and historical views of number usage. This system was designed to support the automated tracking and utilization reporting that were instituted in the U.S. in response to the Number Resource Optimization orders that implemented various number efficiency measures. This system allowed services providers to comply with the additional data requirements of the U.S. government in an efficient manner with little impact on their back office systems. This system is used to report on the use of as much as 67% of the telephone numbers assigned in the U.S.

Telcordia designed and deployed the Telcordia™ Customer Number Manager, an open, and scalable system that makes number management easy for operators by automatically creating and maintaining number inventories, searching inventoried blocks of available numbers when customer orders are received, maintaining number assignment integrity in a Number Portability environment, managing number activation and deactivation, and monitoring available number inventory for pending exhaust.

3 Telcordia Numbering Experience

Telcordia's experience in the telecommunications industry has kept Telcordia at the forefront of Number Management, Number Portability, and emerging numbering technologies. Telcordia maintains leadership and an active presence and influence in the number management and number portability industry, specifically the ATIS Industry Numbering Committee (for which Telcordia is the Chairman) the U.S. Federal Communications Commission North American Numbering Council (NANC) and its Future of Numbering Working Group (for which Telcordia is the Co-Chairman) it's Local Number Portability Administration (LNPA) Working Group and at the ITU-T Study Group 2. Telcordia also participated in the European Telecommunications Standards Institute (ETSI) and its future of number portability activity..

3.1 Telcordia Experience in Number Management and Planning

Telcordia is a leading supplier of software and services that support number administration for fixed and mobile operators. These functions are vital to the efficient assignment, inventory and management of numbers and codes that are central to operators.

Telcordia served as the North American Numbering Plan Administrator (NANPA) from 1984 to 1997. The NANPA was responsible for oversight and assignment of the U.S. numbering resources in World Zone 1. Telcordia's term as the NANPA included one of the most contentious and volatile periods of the North American telecommunications industry, the evolution to a fully competitive environment with its numerous numbering plan impacts, among them Carrier Identification Codes, the development and implementation of many resource Assignment Guidelines, and the creation of the Industry Numbering Committee (INC).

Telcordia served as the Number Pooling Administrator, Telcordia served as the Pooling Administrator in 13 states from 1998-2000 permitting those areas to extend the life of their numbering resources and preventing unnecessary number exhaust in those areas while it was the administrator.

Telcordia administers the International Mobile Subscriber Identity (IMSI, ITU-T E.212) in the U.S. This function has been with Telcordia since 1998 when transferred from the U.S. Department of State, under an agreement with the Cellular Telecommunications Industry Association (CTIA) that represents wireless operators in the U.S. Telcordia staff actively participated in the development of the IMSI Assignment Guidelines. Telcordia chairs the IMSI Oversight Council.

Telcordia administers the ANSI SS7 Point Codes and Multi-location Business Group Identifiers in countries served by the North American Numbering Plan

(NANP), under a contract with the Alliance for Telecommunications Industry Solutions (ATIS). Telcordia has administered these resources since their development.

Telcordia has served as the Traffic Routing Administrator, since it's creation in 1984 as part of the breakup of the original AT&T. It manages and coordinates for our clients the exchange of routing and rating information for every telephone number in the NANP.

Telcordia staff members have provided consulting services to many foreign national regulatory authorities on national numbering plan design, administration, and management. These clients have benefited from the years and diversity of numbering plan expertise and experience resident in Telcordia staff. Among them:

- **The Bahamas, Public Utilities Commission**

Telcordia developed an Administrative Report that contained the main responsibilities, tools, and procedures necessary to perform the NNP Administrator function in the Bahamas. Telcordia examined the current assignment and use of the Bahamian NNP resources to provide an analysis and recommendation for the Administrative Report regarding the best method by which to achieve resource optimization. Telcordia developed draft assignment guidelines for each of the national numbering resources under the PUC's purview. Based on the issues identified, Telcordia drafted a Public Consultation Document for the PUC.

- **Brazil, Agencia Nacional de Telecomunicações (ANATEL)**

Telcordia provided technical support to ANATEL on a numbering and dialing plan review, transition impacts and aspects of the new NNP, a customer education program regarding the implementation of the new NNP, a proposal for the formation of an industry numbering council, and issues associated with the development of an RFP for an administrator for the Brazilian numbering plan.

- **Guatemala, Superintendencia de Telecomunicaciones de Guatemala (SIT)**

Telcordia provided technical support to SIT so that the activities related to the management of the NNP were in accordance with the needs of an open telecommunications market. Telcordia reviewed and analyzed the Guatemalan NNP to identify the resources that Telcordia thought in need of centralized administration. Telcordia recommended the main aspects necessary for the suitable management of the identified numbering resources, and trained SIT personnel on all aspects of managing and administering the NNP. Telcordia identified areas in the Guatemalan NNP in which the numbering resources could be more efficiently utilized.

- **Jamaica, Office of Utilities Regulation (OUR)**

Telcordia examined the existing numbering allocations and assignments and recommended a forward-looking plan, which incorporated number resource optimization, conservation and Number Portability. Telcordia identified the functions associated with a numbering resource administrative unit within the OUR, designed the procedures for conducting those functions, and provided draft rules for number administration pursuant to Section 8 of the Telecommunications Act of 2000. Telcordia developed, trained and implemented a numbering resource administrative unit within the OUR. Telcordia initiated contact with the telecommunications industry and documented the rules and responsibilities for a Jamaican Telecommunications

Industry Numbering Forum that would deliberate and advise the OUR on the views of industry.

- ***Netherlands Antilles, St. Maarten Telephone Company N.V.***
To prepare for Netherlands Antilles' admittance to the NANP, the Netherlands Antilles telecommunications sector had to agree to a detailed transition plan. Telcordia developed a detailed transition plan to solicit the support of the Netherlands Antilles' Ministry of Communications (MOC) for admittance into the NANP. Telcordia developed a transition plan that would be used by the network operators to describe how they will evolve from their current E.164 Country Code - "599" - to a Numbering Plan Area (NPA) Code assigned from within the NANP, Country Code "1." The transition plan also detailed how the Netherlands Antilles will evolve their current format of the NNP to the 10-digit format of the NANP.

- ***Panama, Entre Regulador de los Servicio Publicos (ERSP)***
Telcordia reviewed the existing Panamanian numbering plan, proposed several alternatives based on the stated needs of the network operators, customers, and ERSP. Telcordia worked with the ERSP to recommend a revised numbering and dialing plan that met the needs of the Panamanian telecommunications sector. Telcordia also provided a transition plan on how to evolve to the new Panamanian NNP.

- ***South Africa, Department of Communication (DoC)***
Telcordia assisted the DoC in identifying the key issues that the government needed regarding its numbering policy direction. Telcordia drafted an individual policy for each issue identified. Telcordia helped ensure that the policy conformed to all relevant legal requirements and the recently released Telecommunications Act. Telcordia assisted the DoC in finalizing each policy and issued the associated policy direction.

Telcordia staff have participated in and held leadership positions in many of the U.S. and international numbering forums, among them:

- Chairman of the ATIS Industry Numbering Committee (INC)
 - Chairman of the INC Number Plan Area Sub-Committee
 - Designed Thousands-Block Number Pooling and related guidelines
 - Determined consensus NANP Expansion Plan
- Chairman of the NANC Future of Numbering WG
- Speaker U.S. FCC Future of Numbering Panel
- Chairman of NANC Number Resource Optimization WG
- Chairman of the ATIS IMSI Oversight Council
- Chairman IFAST
- ITU-T Study Group 2 Question 1/2 on Numbering/Routing
- Secretary IETF DRINKS

3.2 Telcordia Contacts

If you have any questions about this proposal, please contact:

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4 Telcordia Response to Consultation Issues

Telcordia offers the following generic observations about the descriptions of the options as defined in Consultation Paper No. 02/2010.

Telcordia believes that, based on experiences in other countries, in most cases implementation of number resource optimization measures that are reasonable in scope and that can be automated for large service providers are more cost effective and bring about immediate relief in the short term and allow for more efficient introduction of extra digits in the long term so that changes to the number plan, and the significant systems and international routing changes that they require can be delayed or avoided all together. In particular, Telcordia believes that adding an 11th digit (either via the dialing plan or the numbering plan) is not recommended, as discussed in the response to Questions 2 and 3 below. Rather number resource optimization measures in combination with an integrated numbering plan area design will provide adequate resources with less effort than adding digits for mobile at lower long term costs.

In the short term, Telcordia concurs with the TRAI and it's plan to provide for the immediate needs of mobile operators by opening sub-levels of the "7" range for assignment to mobile operators. In addition, as discussed in more detail in response to the questions, the TRAI should consider undertaking other number optimization measures in the near term including having all service providers immediately begin protecting from further assignment any relatively "clean" blocks of numbers in their inventories where the blocks are either blocks of 100,000 consecutive numbers or 10,000 consecutive numbers in preparation for reassignment of clean or lightly contaminated blocks in an integrated numbering plan. The TRAI could also consider requiring flexible sequential number assignment where a service provider must use all the numbers in an open/unprotected block before using numbers in a protected block with exceptions where this can not meet an end-users customers need. Additionally, Telcordia suggests that the TRAI adopt a number reporting mechanism with standardized definitions that can be automated for large carriers. These measures should provide enough time to fully develop and transition to an integrated area number plan as the best long term option as outlined in the response to Question 5 below.

In addition, Telcordia offers the following specific responses to the 9 Questions outlined in the consultation paper.

4.1 Question 1: Do you believe that 10 digit numbering scheme should be continued? If yes, then what method(s) do you suggest to make adequate resources available for next five years i.e. up to December 2014 and beyond?

It is Telcordia's and the U.S. industry's experience that number resource optimization measures can have significant impact on the life of a national numbering plan. In 1999 the North American Numbering Plan (NANP) was forecasted to exhaust between 2006 and 2012¹.requiring the addition of digits or implementation of resource optimization alternatives.. A study ws undertaken by the U.S industry and that study determined that it would be much more costly to expand the numbering plan than to implement significant number resource optimization measures including the use of the number portability database system to implement thousands-block pooling rather than adding digits to the national numbering plan².

Those number optimization measures were ordered to be implemented in 2000 and now the NANP exhaust forecast is beyond 2039³. Clearly the optimization measure were effective by any measure.

The U.S. implemented a number of the measures being considered by the TRAI and Telcordia's comments below will outline in some detail the experience with those implementations and how they could resolve the immediate need for numbering resources while preparing for a more efficient future impelementing a number plan that will be prepared for future converged services and making certain that any future number plan additions will be into an efficient numbering environment.

In order to avoid the significant cost, effort and confusion of adding additional digits to the number plan, the TRAI should consider implementation of at least the following number resource optimization measures in order to keep telephone numbers available on an equitable basis for current and future telecommunications services in India:

In the short term the TRAI should

- Institute additional number resource optimization measure including:
 - resource forecast and reporting program for both near term and longer term resource analysis as discussed below in the response to Question 7.
 - sequential block numbering program and require service providers to protect all blocks of numbers not currently assigned to end-user customers as discussed below in response to Question 6.
 - Require service provider to protect clean or lightly contaminated blocks from further assignment for potential transition to an integrated number plan

¹ See see < <http://fjallfoss.fcc.gov/ecfs/document/view?id=6007545294>> at paragraph 32 and June 2000 NANPA report to the NANC NANP Exhaust Analysis at < http://www.nanc-chair.org/docs/Jun/june00_nanpa_report.doc>

² Such estimates were placed between 50 and 150 billion U.S. dollar in 1999 see < <http://fjallfoss.fcc.gov/ecfs/document/view?id=6007545294>> p. 5 footnote 8.

³ See the October 2009 NANP Exhaust Analysis at <http://www.nanpa.com/pdf/NRUF/October_2009_NANP_Exhaust_Analysis.pdf>

In the long term:

- Institute either a full or partial integrated service area schema for number assignment as discussed below in the response to Question 5

Finally, the conversion of the India Number Plan to a full or partial (distinguishing services or areas on more than one digit) integrated area number plan, as detailed in the response to Question 5 below, would allow for much more efficient use of the resource by service providers. If up to 75% utilization can be achieved more than 6 billion telephone numbers would be available for fixed, mobile or converged services; at only 50% utilization 4 billion numbers would still be available providing enough capacity for the expected continued growth in any platform whether fixed, mobile, ip, converged or some future service offering. While the effort associated with this conversion is significant, it will impact all sectors equitably; it will make numbers available for the foreseeable future for all current and allows room for future services. It has the additional advantage of being compatible with converged service platforms and will not likely need revised for future yet to be determined services.

4.2 Question 2: Comment on the advantages and disadvantages of accessing intra service mobile from the fixed line by dialing '0' for generating more number resource for mobile services?

The primary advantage to accessing mobile via use of the prefix "0" is that it would theoretically free the entire number range of approximately 8 billion numbers for mobile services.

There are several disadvantages to this plan, however. It de facto make mobile numbers an 11-digit telephone number with the addition of "0" at the beginning of the TN. Since the exact same ten-digit TN could be given to a wireline station as to a wireline device, it would be necessary to treat the mobile TNs as 11-digit TNs for all inter-Carrier and internal back office purposes as well as for many, if not all, network signaling purposes. For example, the only way to distinguish in either a number portability clearinghouse or an intercarrier billing clearing house between the same wireline and wireless TN would be to include the "0" as part of the TN. Since the billing is derived from the Calling Party Number field or the Called Party Number SS7 or wireless signaling field in the signaling message, it would be necessary to include the 11th digit in the TN, and it would not merely be a dialing convention for fixed-mobile calls. In fact the "0" would even need to be included or added to Port Requests for number portability between mobile operators to distinguish between requests for the wireline version of the "same" TN.

This plan is the equivalent to adding a digit to all mobile TNs without publishing that addition as a number plan change. This could lead to confusion with international networks where the same phone number would look to be both a wireline and wireless phone number if the added "0" was not included as part of the unique phone number. For similar reasons, this plan could also lead customer confusion and misdialled calls because users would likely give out their 10-digit number still and recipients of that number may not write down or remember whether the number they were given was for a mobile or fixed line and would have to guess, and this would not be correct a statistically significant portion of the time and could lead to significant complaints for charges to misdialled telephone numbers.

In addition this plan would eliminate any geographic/service provider tariff distinctions within the telephone number itself since the same number could be assigned in both the fixed and mobile network.

Further, if the leading digit of "0" is used to access other network services in fixed lines, since this is a restricted digit today, those services may have to be cleared and migrated to another indicator digit.

Finally, having a different string length for mobile numbers than for fixed number will not prevent the need for change in fixed line networks, and will likely lead to confusion as the convergence between fixed, mobile and ip networks continues. Operators around the world are providing services that blend a TN between devices and services and as this convergence begins to occur in India, consumers may begin to use a TN as both

their fixed service when at home or the office and as mobile service when not in their offices or homes. This is true for any plan that add digits to mobile service TNs and not to fixed TNs or that continues with a distinct and easily recognizable separation between the plan for mobile and fixed services.

4.3 Question 3: Do you believe that the only solution to the number resource problem is to migrate to an 11 digit numbering scheme for mobile and retaining 10 digits numbering scheme for fixed line? What kind of problems do you foresee in having a mixed numbering scheme?

Telcordia does not believe that the only solution is migrating to 11 digits for mobile while retaining 10 digits for fixed either via adding a digit within the numbering plan or via use of a 0 as part of the dialing plan. The advantage of adding an “N” digit to mobiles that is not limited to “0” is that it provided for significant additional resources for mobile, as many as 10 billion numbers.

However, as outlined in the response to Question 2 above, adding “0” is really adding a single digit with the value of “0” to the mobile number plane. All of the disadvantages that apply to adding “0” as a digit to mobile as discussed in the response to Question 2, above apply to this question except that with this plan, “0” could continue to be used in the fixed line network for current purposes and switches could perform digit analysis on the entire TN length to determine if the call is to a mobile TN or a fixed TN. Such digit analysis is not a best practice since it adds to call processing time for all calls both fixed-fixed and mobile-mobile. Such delay consumes network resources and can diminish quality of service unnecessarily.

Clearly this solution is not the only solution, at least two other solutions exist. The first is to increase the efficiency of the use of the current number plan which has up to approximately 8 billion numbers available which even at only 50% utilization meets the projected needs for telephone numbers until XXXX at 12 million subscriber adds per year. The efficiency of the number plan can be significantly improved as outlined in the response to Question 1 above and Questions 6 below with a combination of new number assignment practices based on integrated or partially integrated service areas rather than by operator type will provide significant number resource efficiency advantages as discussed in the response to Question 5 below.

Finally, as with the response to Question 2, this plan does not mitigate the need for changes in fixed line networks and back office systems nor does it account for the convergence of fixed, mobile and IP services nonetheless any future services that operators may want to add.

4.4 Question 4: If your preference is 11 digit numbering scheme for mobile services then what comment on the advantages and disadvantages of such a scheme?

As noted above, Telcordia does not believe that an 11 digit scheme solely for mobile services is advantageous over the short term or the long term. While it would provide for significant capacity for expansion within the mobile market as noted above in the responses to Questions 2 and 3, those additions to capacity do not mitigate the need for changes in the fixed network, do not address the potential for future converged services or a transition to some future service.

4.5 Question 5: Comment on advantages and disadvantages of migrating to integrated service area based scheme for fixed and mobile. If this scheme is adopted what should be the time frame for migration?

As noted in the consultation paper, there are significant number resource optimizations advantaged to migration to an integrated service area numbering plan. The conversion of the India Number Plan to a full or partial (distinguishing services or areas on more than one digit) integrated area number plan would allow for much more efficient use of the resource by service providers.

Most jurisdictions worldwide have migrated to a numbering plan that does not significantly distinguish number range by carrier with the advent of competitive markets. With the implementation of number portability, the distinction between carriers vis-à-vis the assigned number range becomes gradually indistinguishable. There are some jurisdictions where for tariff reasons the distinction between mobile and fixed numbers is maintained. However, in those areas, the distinction can be made to more significant digits allowing the fixed line carriers and the mobile carriers to have number ranges that are much more flexibly managed. The TRAI has already begun this by allocating smaller blocks within the 9 and 8 ranges. This could be expanded to all mobile and fixed lines such that, for example, instead of single digits being set aside for mobile or fixed, a study could be undertaken to determine if the ranges are free that allow the distinction to be made to two, three or even more significant digits.

In the United States for example the primary level of geographic or service distinction is at the three digit National Destination Code (NDC) level. The first three digits of the numbering plan indicate either the largest geographic assignment area or service represented by the number. Each of these codes (called Number Plan Area Codes) contains approximately 8 million numbers. Most other countries have similar distinctions within their number plans at the NDC level. In most countries NDCs are not assigned directly to SPs, rather a smaller block of numbers within the NDC is assigned to an SP based on the geography/service identified by the NDC. Since the TRAI seems to permit any number to be used in any circle for fixed line service, the geographic designation may not be necessary, but if it is the distinction could be made at the assignment block level and an NDC level that has assignment blocks within it. In the U.S., as an example and NDC has up to 800⁴ available codes available for assignment to service providers. In India with service providers experiencing significant subscribership growth, block size may need to be greater at first, but blocks of 8 million certainly seem larger than needed. If the block size were 100,000 TNs rather than 10,000 TNs there would be up to 100 blocks available in each NDC for assignment to a fixed, mobile or future services operators. Tariff distinctions and service distinctions could still be made at the block assignment level.

The use of consistent block sizes to identify carriers and/or service areas would also be a benefit to telecommunication service providers and application service providers. Today, the number of digits that needs to be analyzed to determine the service provider and/or service type varies between 1 and 6 digits (for service provider being assign

⁴ The 0/1 digits are used for special purposes in the U.S. and so only 800 codes are available rather than 1000.

10,000 blocks of numbers). In a modified integrated plan all SPs would have consistent block sizes of either 10,000 or 100,000 numbers (as an example) and other service providers (domestic or international) and application providers would be able to develop and use a consistent database for translation of the TN to identify a carrier and service type.

An example of one way this could work is presented in the table below:

NXX-XX-XXXXX (N=any digit not 0 or 1)
N= 2 Range
NDCs = NXX= 200 to 299
Assignment Blocks NXX-XX= 200-00 to 299-99

In this example the service area could be defined at the NDC/NXX level and the service provider/service are identified at the Assignment Block/NXX-XX level. This gives a service provider a block of 100,000 numbers in each service area and of course multiple blocks could be assigned. This plan should be developed based on an actual study of current usage as outlined below to identify the appropriate NDC range and Assignment Block size.

Transition to this type of plan would require that the TRAI require that SPs protect unopened block of numbers that they have been previously assigned from any further assignment. TRAI might also consider requiring that internal use or administratively used numbers (e.g., temporary local numbers for mobile roamers) be consolidated into blocks where reasonable. It could then determine how many blocks of numbers are clean and can be used for further assignment. In addition, as has been done in the U.S., if there are many "lightly used" blocks, those blocks could be made available to new operators by leveraging the new number portability clearinghouse database and having a provider port a limited number of TNs to itself before returning the block to the administrator for further assignment. This has worked with significant success in the U.S. where blocks that are "contaminated" up to 10% are able to be returned to or reclaimed by the administrator for further assignment.

This plan could lead to significant utilization improvements. For example, if up to 75% utilization can be achieved, more than 6 billion telephone numbers would be available for fixed, mobile or converged services; at only 50% utilization, 4 billion numbers would still be available providing enough capacity for the expected continued growth in any platform whether fixed, mobile, ip, converged service or even some future service offering without the expense effort and potential confusion of adding a digit to the numbering plan allowing service providers to grow services without concern as to future number availability.

As is discussed above, such number resource optimization measures, because they do not change the length of the telephone number for fixed or mobile, does not have significant impact on the signaling network or the new number portability scheme. Only the analysis of the digits has to change rather than only analyzing 1-6 digits (on a

variable basis) as is done today, systems would have to analyze up to 5 digits consistently to determine the service, geographic area and/or service provider associated with the telephone number. In addition, this plan allows for transition to a consistent number of digits identifying a service and service provider while providing nearly full access to the 8 billion usable numbers within the numbering plan.

While this integrated plan would require effort to convert to, it actually suggest allowing for the most part, allowing SPs to retain the numbers currently assigned to them avoiding end user impacts while only donating unused or lightly used (and potentially porting back any assigned TNs) Assignment Blocks. In the U.S. the FCC found that avoiding adding digits via number optimization would result in a cost benefit to the U.S. industry of between 19 and 33 Billion U.S. Dollars⁵.As noted above, with the number resource optimizations in place in the U.S. the NANP exhaust date has moved from 2006 in 1999 to 2039 as of the current study.

In addition, as the TRAI notes that since the same number of digits are used and the distinction between mobile and fixed would now be made on a much finer basis within the numbering plan, it allows for the potential of porting of numbers between fixed line and mobile providers. There are some jurisdictions that do this today including the U.S. In addition, this scheme prepares India not only for the convergence between fixed, mobile and internet based services, but allows for additional future services to be added as needed without significant reconfiguration of the number plan.

Such an implementation would likely occur in stages with the block protection being implemented first, followed by a study of the inventory of blocks and then a time of 6-12 months to allow for system updates and tests to be made of the integrated number plan before turn up of the plan. Since subscribers would not be taking new numbers in this plan, consumer impacts should be minimal.

⁵ See U.S. Federal Communications Commission at p. 17
<<http://fjallfoss.fcc.gov/ecfs/document/view?id=6007545294>>

4.6 Question 6: Do the present criteria for allocation of the numbers ensure efficient utilization of numbering resources or would you suggest some other criteria?

The present criteria meets some of the best practices for efficient number utilization particularly requiring that a provider meeting an 80% percent utilization limit before being assigned new resources. Some of the additional measures in the Consultation Paper are also considered best practices and have led to improved number utilization in other jurisdictions. In addition, the TRAI could consider some other additional resource utilization options such as sequential block assignment requirements and some resource pooling (10 thousand block) leveraging the number portability clearing house databases that are being implemented.

Depending on the standard number allocation size determined in the full or partial integrated service area plan adopted (as outlined in response to Question 5) additional optimization measure could and should be adopted to help assure that service providers have the telephone numbers available to offer services to their customer for both current and future services.

As noted in response to Question 5 above, the TRAI should consider implementing a block protection rule and should also consider a flexible sequential number assignment rule. Blocks (size to be determined as part of the integrated number plan design e.g., 100k blocks or even 10k blocks) of consecutive numbers within a range that not assigned or currently utilized should be protected from further assignment until telephone numbers in blocks that are already utilized are exhausted. This leads to suggestion of a limited and flexible sequential number assignment rule (as has been adopted in other jurisdictions)⁶ where service provider are required to use all numbers within an assigned block before beginning to assign numbers from an unused but already assigned block in their inventory. If a customer of a service provider cannot use any available telephone number or range of numbers in an open block, the service provider could open the next block for that customer. Such an exception could be subject to audit by the administrator. If an unopened block is not used in a timely fashion (within 6 months or one year) as forecasted and shown on a subsequent annual report, it could be subject to being returned to the administrator for assignment to a new carrier.

In addition, if the annual report is showing that blocks within the assigned ranges are not being utilized efficiently it can consider pooling of those resources leveraging the new number portability clearing house databases.

⁶ Insert FCC reference

4.7 Question 7: With reference to para 3.3.1, comment on the need to file a numbering return to the numbering plan administrator for monitoring and ensuring efficient utilization of the numbers?

Collection of number utilization data from service providers and requiring forecasts both long term and short term are a number administration best practice. Such information collection is critical to number plan analysis and planning by the numbering administrator. It will also be critical to the understanding of the number ranges available for any redesigned integrated area number plan.

Such information collection can be designed so that it is relatively simple to provision for both smaller operators manually via spreadsheets and by larger carriers automatically via outputs of their number management or billing systems. A base set of definitions for number status should be defined for accurate reporting. Typically numbers are defined as: Assigned Numbers for numbers assigned to end users, Administrative/Internal Use Numbers for test numbers, temporary numbers for roamers in mobile etc, Available for those numbers available for assignment and Aging for numbers that have been disconnected and are in a period of waiting before they can be made available for assignment to a new subscriber. Some jurisdictions specify whether Administrative/Internal Use Numbers and Aging Numbers count as "utilized" for any percent utilized requirement for new number assignment. With a high utilization requirement of 80% such numbers may need to be considered utilized to allow service providers a reasonable inventory of numbers depending on the decision with regard to final block size.

4.8 Question 8: Give your views on pricing of numbering resources? If pricing is implemented, what should be the method adopted for such pricing?

Telcordia is largely neutral with regard to the pricing of numbering resources. The studies with regard to the impact on number utilization of such pricing scheme worldwide are extremely limited and inconclusive to date. Since telephone numbers are necessary for the provision of service, the best practice is that any pricing mechanism should not unduly burden new entrants to the market. Many jurisdictions seek to recover the cost of providing resource administration via a direct or indirect charge associated with the numbering resources (as noted in the Consultation Paper).

To the extent that charging for numbers is adopted as a number optimization methodology, the price needs to be very carefully considered such that it has the desired optimization effect (not already achieved by the implementation of other optimization measures and the percent utilization rule) without preventing new service entrance.

4.9 Question 9: If pricing is implemented should it be for all resources held by the service providers or only for future allocations?

If the goal of the pricing scheme is to enhance number utilization efficiency and the chosen number plan looks to protect unused blocks and seek return of those blocks for future assignment to other providers, then a mechanism that charges for number based on the total SP inventory would be more effective in that regard. Even if the only cost is to provide for allocation of the resource administration costs, recovering a maintenance fee on the embedded base of number inventory may incent the desired behavior.

4.10 Conclusion

In order to avoid the significant cost, effort and confusion of adding additional digits to the number plan, the TRAI should consider implementation of at least the following number resource optimization measures in order to keep telephone numbers available on an equitable basis for current and future telecommunications services in India:

In the short term the TRAI should:

- Institute additional number resource optimization measure including:
 - resource forecast and reporting program for both near term and longer term resource analysis using standardized definitions for number categories as discussed below in the response to Question 7.
 - sequential block numbering program and require service providers to protect all blocks of numbers not currently assigned to end-user customers as discussed below in response to Question 6.
 - Require service provider to protect clean or lightly contaminated blocks from further assignment for potential transition to an integrated number plan

In the long term:

- Institute either a full or partial integrated service area schema for number assignment as discussed below in the response to Question 5

Finally, the conversion of the India Number Plan to a full or partial (distinguishing services or areas on more than one digit) integrated area number plan, as detailed in the response to Question 5 below, would allow for much more efficient use of the resource by service providers. If up to 75% utilization can be achieved more than 6 billion telephone numbers would be available for fixed, mobile or converged services; at only 50% utilization 4 billion numbers would still be available providing enough capacity for the expected continued growth in any platform whether fixed, mobile, ip, converged or some future service offering. While the effort associated with this conversion is significant, it will impact all sectors equitably; it will make numbers available for the foreseeable future for all current and allows room for future services. It has the additional advantage of being compatible with converged service platforms and will not likely need revised for future yet to be determined services.