Telecom Regulatory Authority of India

Mobile Number Portability

Consultation Paper No. 7/2005

COMMENTS OF VERISIGN, INC

including VeriSign India Pvt Ltd

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1. Introduction

These comments are responsive to Telecom Regulatory Authority of India's Mobile Number Portability Consultation Paper No. 7/2005 of July 22, 2005.[1]

For more than a decade, VeriSign has provided an array of large-scale, ultra-high availability, trusted intelligent infrastructures that enables signalling, security, identity management, directory, financial transaction, and fraud management capabilities for just about any kind of network based business and consumer services – whether it be traditional voice telephony Intelligent Network based services, VoIP, Internet, World Wide Web, Internet access, multimedia, next generation, or commerce. In this connection, VeriSign has pioneered the development of the largest independent SS7 Intelligent Network infrastructure in North America – supporting hundreds of telecom, wireless, and cable operators with an outsource solution to signalling, including number portability services. VeriSign has pioneered number portability and Next Generation Network service solutions for its carrier customers, and participates actively in key related government, industry, and standards forums in many countries and regions worldwide, including the International Telecommunication Union, the Internet Engineering Task Force (IETF) and the European Telecommunications Standards Institute (ETSI).

In the USA, VeriSign experts participate in industry groups including ongoing representation in the North American Numbering Council (NANC), Local Number Portability Working Group (LNPA-WG), Cellular Telecommunications Industry Association (CTIA), the Alliance for Telecommunications Industry Solutions (ATIS), among many others. Through this participation, VeriSign influences requirements

[1] *See* Telecom Regulatory Authority of India, *Consultation Paper on Mobile Number Portability*, New Delhi: July 22, 2005, Consultation Paper No. 7/2005 (hereinafter referred to as "*MNP Consultation*").

and provides expert industry leadership in number portability. VeriSign's continued contributions to the industry have been recognized with many prestigious awards and recognitions including:

- 2005 Frost and Sullivan Telecommunications Service Provider Company of the Year Award
- 2004 Frost & Sullivan Award for Market Leadership
- 2004 Award of Excellence and Best of Show - VeriSign Number Portability SOA On-Line Help recognized by the Society for Technical Communication

VeriSign's full suite of legacy or Next Generation number portability services delivers essential network and database capabilities to route calls to ported numbers, route text messages, and manage porting operations with *ease*, *speed*, *accuracy*, and *security*.

VeriSign operates through various divisions that have offices and staff in India and worldwide. This includes notably the VeriSign India Pvt Ltd development centre in Bangalore. The India Development Centre (IDC) undertakes end-to-end product engineering, design, development, testing and software lifecycle management for products and services running over IP-based and legacy telecommunication networks. The IDC specializes on products and services which are ultra reliable, available, scalable and secure provided to key clients in India including many of the largest banks and international airlines. The IDC has also partnered with several network operators in India.

2. General Comments

The consultative paper is impressive in its scope of treatment of Mobile Number Portability developments, as well as its foresight and innovation in moving forward at this time to create a "collective thinking process about number portability."

This initiative seems especially timely in light of the significant efforts worldwide in developing frameworks and capabilities to support Next Generation Networks.[2] India has a highly advantageous opportunity at this point in time to skip the costs of building a legacy number portability infrastructure, and instead implement a Next Generation Network (NGN) portability architecture that provides backward compatibility with legacy telecom systems. See Figure 1, below.

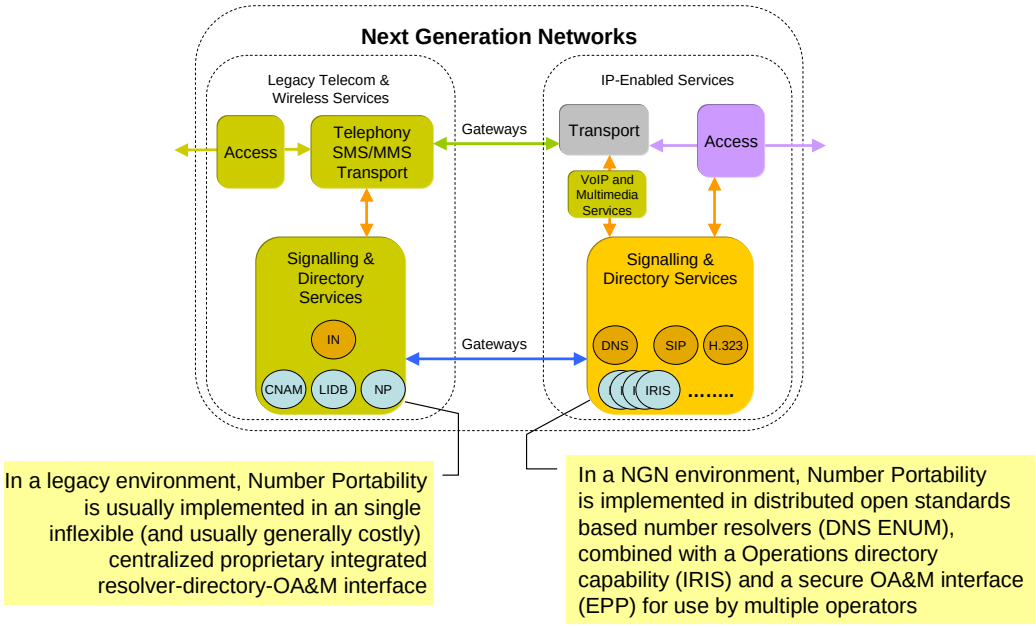

Figure 1. Integrated Next Generation and Legacy Number Portability Architecture

Critical NGN portability platforms are typically built on highly reliable, ultra high availability, distributed DNS infrastructure, combined with XML based IRIS directory services, and an EPP OA&M front end, with SS7 gateways. Because such distributed Next Generation systems use open standards and generic hardware platforms, they are potentially much lower in cost to implement and operate, more reliable and flexible, and - if properly architected and implemented - are capable of

[2] *See, e.g.*, Number Portability, VeriSign, *Proposed Modifications to NGN Release 1 Scope Document*, ITU-T Focus Group on Next Generation Networks, FGNGN-ID-01012, Geneva, 24 August 2005 at p. 3.

allowing for multiple competing providers of number portability services. India can use all the most recent approved ITU-T and IETF open standards and security technologies for accomplishing this. See Figure 2, below.

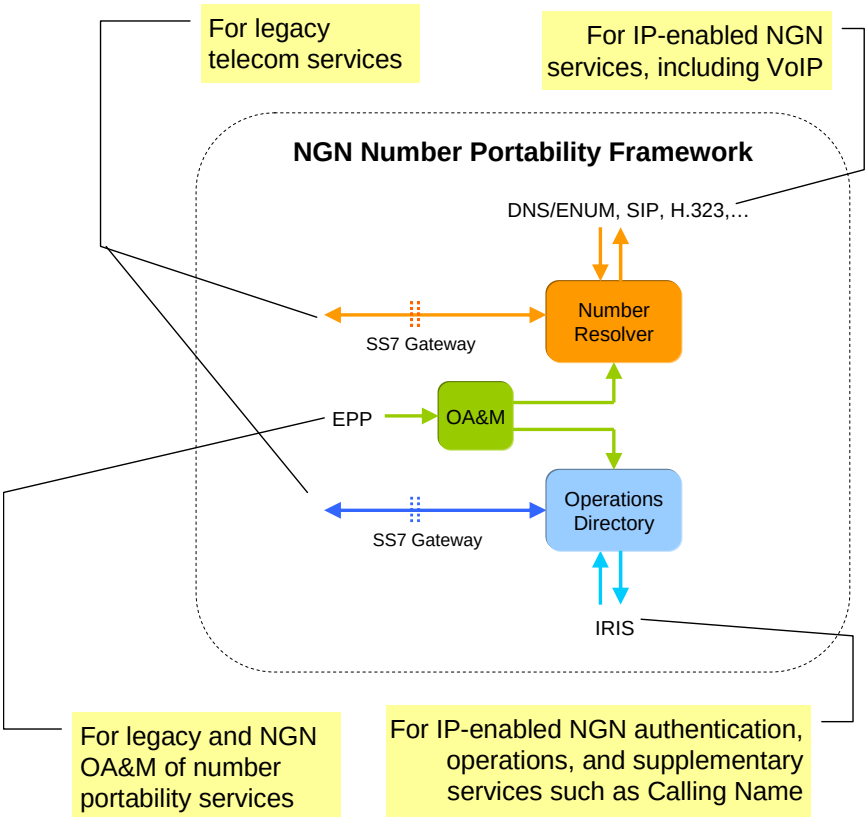

Figure 2. NGN-Legacy Number Portability Architecture Details

Each of these implementations – consisting of a NGN number resolver, operations directory, OA&M interface and legacy gateways - can be distributed in a tree architecture that mirrors the National Numbering Plan. The extent of caching for each individual number or block of numbers can be set independently. Such an implementation would also allow India to easily use its E.164 numbers for VoIP, multimedia messaging, or other innovative new NGN services as it makes they become deployed as part of the public infrastructure.

In a recently released assessment of alternative solutions for UK number portability the Office of Communications policy statement, the following conclusion was drawn after review of all comments:

Ofcom concludes that migration to Next Generation Networks (NGNs) is a timely opportunity to revisit the implementation of number portability and that the options for next generation number portability should be considered now, whilst NGNs are being planned. Ofcom will set out, in its next NGN consultation, an expectation that NGNs will enable a more robust approach to number portability (as part of the more general issue of resolving telephone numbers to IP addresses), which will address the current concerns regarding a single point of failure. Ofcom will be working with Industry to ensure that this is achieved in practice.[3]

3. Discussion Points

Question 1. What is the anticipated impact of number portability on customer satisfaction and increased competition between services and operators?

The entire portability process should be developed in such a way as to minimize customer service interruptions and ensure that customer receives the overall best service from both entities involved in the port. The process should also be fully transparent for customers. For example, a subscriber wishing to port away from a carrier should be advised of any early termination charges, loss of existing capabilities including emergency services for any length of time during or after the port process but should not be impacted by the technology chosen to implement portability.

The introduction of portability not only will increase competition, but also force operators to improve service. Marginal carriers - fearing the loss of subscribers – often improve their networks, customer relations, service offerings, and calling plans to retain current customers as well as to gain new customers.

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[3] *See An Assessment of alternative solutions for UK number portability Policy Statement,* **Ofcom**, *21 June 2005*

Question 2. The following technical options have been discussed in the consultation paper. Please indicate your preference with reasons:

a. All-Call-Query

If a purely legacy number portability infrastructure is pursued, a centralized database is the most desirable alternative. A more appropriate choice today is a distributed Next Generation alternative such as described in Sec. 2 above. The same basic conclusion was also reached and restated in the **Ofcom** assessment evaluation:

> The assessment, looking over a ten year period, showed that the costs of CDB solutions in the context of currently deployed circuit-switched network technology were likely to exceed the benefits. The most viable of the options covered by the assessment, a solution called All Call Query ("ACQ") where all calls are queried against a porting database and routed directly to the network serving the subscriber, was shown to carry a net cost of £200.6 million using core assumptions. Ofcom also highlighted that migration to Next Generation Networks ("NGNs") over a five to ten year time frame offered opportunities to migrate to a new solution to number portability. But investment now in legacy circuit-switched infrastructure risked assets becoming obsolete in only a few years time.[4]

b. Query-On-Release

In legacy implementations, the QoR method requires the donor switch (network) to be part of the call at least initially. The originating switch routes the call to the donor switch who internally verifies the dialed number has been ported and returns a release back to the originating switch. The originating switch then must perform a dip to determine the new serving network. This method ties up the donor switch facilities, circuits for a short period of time but uses additional resources none-the-less and it adds a small (1.3 second) but potentially significant delay in routing calls to ported numbers versus calls to non-ported numbers.

c. Onward Routing (Call Forwarding)

As most switches currently have the call forwarding capabilities, this approach would be a relatively inexpensive means of routing and a rather simple way to

[4] *See Ofcom, 21 June 2005*

implement. However, because this solution is not Intelligent Network based, the calls are routed relatively inefficiently over the network driving up call conveyance costs, inefficient use of transmission facilities as well as injecting additional time delays into the call. In this model the donor network remains in the call path for the duration of the call. This method however may be more efficient and cost effective where porting is not as extensive or in rural areas.

For those solutions that will require any new routing numbers, this presents an additional burden of creating, maintaining and distributing that information to all operators or at the least a possible re-issuance of the National Numbering Plan. Where that data is stored and who maintains that on a national level is an example of a function that can be managed by a 3rd party, independent clearing house.

d. Call-Drop-Back

As with the Query on Release method, Call-Drop-Back also adds a small (1.3 second) but potentially significant delay in routing calls to ported numbers versus calls to non-ported numbers. Including an additional element within the call path is not the most efficient use of signalling, transmission or switching resources. It also adds another point of possible failure and entity that would need to be identified if any troubleshooting was required. This method requires the donor switch to accommodate the correct recipient network information in the release back to the originator.

e. Any other solution

VeriSign suggests substantial consideration be given to implementing a NGN number portability infrastructure as described in Sec. 2 of our comments, above.

Question 3. In the past, some countries have followed the approach of implementation of a short-term solution, with parallel planning for a long-term solution. Several other countries have opted directly for a long-term solution. The issues associated with either approach are discussed in this paper. Please give your opinion, with reasons, on the path India should adopt.

As noted in our Comments Sec. 2, above, significant consideration should be given to a Next Generation infrastructure – certainly within any long-term timeframe. Such a solution would be substantially less costly, more flexible, and more robust than any other alternative.

Among the query options for legacy capabilities, it may be worth while exploring a short-term method such as OR initially while there are low porting volumes and progressing to the ACQ as more numbers are ported. However, the expense of changing methods mid-stream should be carefully examined as it will cause additional monetary burdens to some carriers. For instance using OR at the start will require operators to purchase their own internal databases for some period of time. When and if ACQ, with a centralized database, is initiated that operator owned database becomes obsolete and loss of capital and depreciation of equipment must be considered. Not only will the operator have a piece of equipment that may be unusable but he will then have to contribute to the centralized database. Moving from the OR to the ACQ with centralized database should also be examined for signalling changes, trunking upgrades or switch realignments which could prove costly.

Question 4. In case of a centralized database approach, who should be responsible for the setup, ownership, administration, and management of such a database? Should the administration and operation of a centralized database be assigned to a third party duly licensed by the licensor as another service provider (OSP) on the lines of a clearing-house, or should some other approach be adopted?

As noted in our Comments Sec. 2, above, substantial consideration should be given to a Next Generation infrastructure – which can be distributed or centralized to the extent desired by public policy and competitive considerations.

If a legacy approach is pursued, a centralized database seems the only reasonable choice based on multiple factors.

- A limited or reduced number of protocol or interfaces making communication between carriers simpler, not only for set-up and testing but ongoing maintenance
- Industry wide timeframes for data exchange and trouble shooting can be deployed through this method
- Ubiquitous methods of exchange, validation points, timing and data synchronization
- Centralized data gathering and reporting system
- Eliminates the need for cumbersome troubleshooting methods across operators
- If a particular carrier wanted to deploy an internal database with his customer numbers it could be feed from this centralized database over some common interface

In a legacy approach, the methods and procedures for updating the database and the shared costs to a centralized database must be established at the outset, and include:

- Operating and maintaining the required hardware and software
- Managing any regulatory or industry standards and requirements
- Performing and manage upgrade release testing on-going
- Providing 24/7 Data Center monitoring and troubleshooting support
- Maintain a complete LAB test environment

The manager of the centralized database must monitor all connections, platforms, and systems on a 24 x 7 basis from a national Network Surveillance Control Centre (NSCC) and/or Data Centre Operations Centre. These organizations should be a fully staffed network monitoring and surveillance centres located in geographically separate locations.

Solutions that would include each individual carrier creating and maintaining internal databases would result in several different iterations of the same thing most likely all with different interface specifications and very little standardization. In the long run is not cost effective particularly as carriers and nations move to next generation networks and the advanced services that the future holds for consumers and operators.

Question 5. How should the database updates between different operators be synchronized? Where could the central database be located?

As noted in our Comments Sec. 2, above, substantial consideration should be given to a Next Generation infrastructure – which as a DNS/IRIS based infrastructure is self-synchronized. Authoritative server platforms would support the various zones within the National Numbering Plan.

In a pure legacy implementation, a redundant centralize database would be used. In any implementation, a disaster recovery model should be required – that considered the potential for natural disasters and effected multiple locations and operations that are easily assessable by several routes for personnel and facilities.

Applications and communication associations monitoring is critical to the service and all communications paths, applications and hardware should be redundant

or duplicated in such a way as to alleviate to the highest degree acceptable any single point of failure.

Question 6. What should be the level of centralization (metro, circle, national) for a centralized database? Should this be a permanent arrangement, or be subject to later revision?

Here also, the choices are substantially affected by the pursuit of Next Generation or legacy infrastructures. In a Next Generation infrastructure, the authoritative server platforms automatically follow the national numbering plan, and any number of secondary servers can be established. The degree of physical centralization or distribution is national policy or operational choice dependent on cost, operators, complexity, and redundancy.

In a pure legacy infrastructure, the choices are much more difficult, although a centralized national database seems the most desirable option.

Question 7. How should NLDOs and ILDOs handle the routing of calls to support number portability?

In either Next Generation or legacy infrastructures, both national and international operators would query the number portability database as part of the call setup and completion process. In an IP-Enabled Next Generation infrastructure, portability is intrinsically a part of the number resolution and operational directory processes to discover the application server and termination points.

Question 8. Are the existing interconnection arrangements (such as signaling) between mobile-to-mobile, mobile-to-fixed networks sufficient to achieve number portability, or are any changes required?

Signalling interconnection agreements in general, and for number portability in particular, should ideally be set forth in a national regulatory framework. Such a framework was pioneered in the mid-80 by the Federal Communications Commission in the USA with the adoption of its *Computer III* policies.[5] Several core framework capability requirements were specified to maximize competition while protecting national security: open standardized interfaces, unbundled signalling service elements, and secure database reciprocity. These requirements seem even more important in a Next Generation environment.

In today's NGN environment, a number of other public policy considerations are also applicable to number portability infrastructures that include matters such as assistance to law enforcement to meet forensic investigatory requirements, critical infrastructure protection, and the like. These considerations are further discussed in contemporary ITU-T activity.[6]

Question 9. Are there any technical issues in the portability of services such as SMS, data, voicemail, or fax?

Ideally, all communication services should be supported by number portability features. Next Generation Number Portability infrastructures inherently transparently support all Next Generation services and applications. Applying these features to

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[5] *See Report and Order in the Matter of Amendment of Sections 64.702 of the Commission's Rules and Regulations (Third Computer Inquiry); and Policy and Rules Concerning Rates for Competitive Common Carrier Services and Facilities Authorizations Thereof; Communications Protocols under Section 64.702 of the Commission's Rules and Regulations*, in CC Docket No. 85-229, 16 June 1986.

[6] *See, e.g., Interworking Framework Among NGN Directories – Operational Requirements*, ITU-T Doc. COM 2 – D 12 (Feb 2005); *An NGN Directory Framework Overview - Supporting Critical Operational and Security Requirements*, ITU-T Doc. COM 13 – D 133 (May 2005); ETSI TC LI, *The E.FIND Framework and LI*, Doc. TC LI (2005) 08litd017 (Feb 2005); ETSI TC LI, *NGN Identifier Information Discovery for Lawful Access*, Doc. TC LI (2005) 09litd026 (Jun 2005).

legacy services would require necessary gateways; or with a legacy number portability implementation, independent number portability implementations.

Worldwide, two-way messaging traffic is growing at 47 percent annually, representing upwards of 10 percent of annual revenues for wireless carriers. Interoperability between carriers and devices, across disparate networks and technologies, is vital to realizing the vast revenue potential of mobile-to-mobile text messaging. Wireless carriers in the Americas are providing innovative messaging services with cutting-edge marketing programs, but they still face the challenge of interoperability between networks. This means their wireless subscribers can only exchange messages with subscribers within their own network, significantly limiting the potential number of messaging participants and ultimately, carriers' revenues.

Subscribers should be easily able to send and receive messages from friends, family, and colleagues outside of their network and regardless of operator network technology and with portability corrected data. Subscribers simply address these messages to the mobile number of the recipient—no complicated email addresses are necessary.

A system capable of handling the routing, messaging protocol conversions, and reformatting as well as performing a portability look-up necessary to complete the delivery between incompatible networks and provides billing information, reporting statistics, and other services to the participating carriers. In addition, there are several ancillary service capabilities of substantial interest to customers, operators and national authorities that include:

- Line Information Database Service (LIDB)
- Calling NAME Service (CNAM)
- Directory services
- Operator Services

- Caller ID
- Prepaid Services
- Roaming and Fraud Services
- Voice Mail Services
- Mobile Directory and Mobile Identification Number separation for CDMA and TDMA networks
- HLR/VLR upgrades to support portability as well as MDN/MIN separation
- Update of Message Processing Systems and Billing Exchange Roamer records

In a legacy Number Portability infrastructure, inclusion of these capabilities may be costly and difficult to implement. In Next Generation infrastructures, the implementations are significantly less costly and facilitated by common protocols.

Question 10. What problems do you foresee with the current National Numbering Plan in implementing number portability that may necessitate the modification of the existing National Numbering Plan?

As noted in other questions, above, a Next Generation Number Portability infrastructure simply mirrors the National Numbering Plan and evolves along with it. It is not apparent that any changes would be necessary to the Numbering Plan. A legacy Number Portability implementation would probably introduce complexities that may dictate changes to the Plan.

Question 11. Should number portability related charges be regulated? If not, then what measures will ensure that the portability charges are not set such as to discourage portability?

Because number portability is a national mandated capability with no effective marketplace mechanisms, the related charges should be subject to regulation.

One determining factor for the cost model for consideration is to first distinguish between the industry-wide set up costs and the operator specific costs and customer costs and which if any of these can be shared amongst providers in an

equitable manner, those borne by the subscriber or by each operator with some cost recovery mechanism to assist them in transitioning their networks to support number portability.

One possible model would include operators contributing funds or paying a share based on current subscriber lines each operator supports. An alternative may be to evaluate some type of investment sharing amongst operator. For instance if a centralized database of routing information is available all operators contribute to the upkeep and maintenance of that database.

Customers may share in the cost by paying minimal monthly fee and/or a fee to port to the recipient provider which would only apply to those that do in fact port their number to that new provider. An evaluation of what charges the customer is willing to bear for the opportunity to change providers may be required. The charge for a customer to port his number may be well below the cost of switching providers and adopting a new number when a comparison is done in terms of new stationary, business cards, lost calls. These issues are particularly troublesome to the Sales industry but also to all business segments.

However, consideration should be made to the possibility that mobile operators may increase termination charges adversely impacted the fixed line customers. With the introduction of mobile portability consumers cannot distinguish between different networks (typically using the number prefix) when placing a call. As a result if prices differ among networks the originating caller will not be aware of termination charges to mobile networks.

Question 12. What measures will ensure tariff transparency?

Some national Administrations in recent years have instituted "truth in billing" and "line item billing" requirements.[7] Such measures seem effective in ensuring a significant measure of transparency.

Question 13. Considering that the Indian market is a growing market and number portability offers the possibility of attracting customers by an efficient operator, should it be mandated that the cost of the number portability should be absorbed by recipient network?

Despite the method chosen for implementing number portability, each carrier and the industry will need to make some up-front investments in number portability systems. These investments will be necessary to participate in number portability as the recipient or donor, to maintain a centralized database (if applicable), and to route calls to ported numbers. It is not feasible that all of these costs would be borne by the recipient network as many of these costs are specific to each carrier or require a significant up-front investment even before the first number is ported in India.

For those costs that are specific to the provisioning of a number portability transaction it is feasible for the recipient network to absorb the cost if so mandated. Any such mandate should be determined by the appropriate regulatory body and/or their designated industry authority.

Question 14. Please share any additional information that you might have about number portability implementations in countries and jurisdictions around the world, and what we might learn from these experiences.

The United States regulatory body, the Federal Communications Commission (FCC) began in inquiry similar to the instant consultative paper in 1995.[8] Shortly

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[7] *See, e.g.,* USA, Federal Communications Commission, Dockets 96-146 and 98-170. *See esp.*, *Memorandum Opinion and Order in the Matter of Telephone Number Portability*, CC Docket No. 95-116, Document No. FCC 03-237, 7 Oct 2003.

afterwards, the USA Congress enacted the Communications Act of 1996 –mandating certain number portability requirements in statutory law.[9]

The FCC promulgated rules implementing the congressional directive. It initially declined to choose a particular technology for providing number portability, and established instead certain performance criteria that must be met.[10] Implementing the capabilities, however, proved very difficult and consumed many years of public rulemaking and advisory body activities. [11] Many aspects still remain problematic and unsatisfactory – particularly with respect to Next Generation infrastructure.

Some lessons learned during the USA implementation include:

- Definitive, well-considered regulatory decisions by the national regulatory authority that evolve with the technology
- A comprehensive test plan should be developed cooperatively to ensure that roll-out goes smoothly and with little or no technical impediments hinder the customer experience or cause any type of communication outages.
- All carriers should be required to perform some mandatory testing.
- Communications between all participants (vendors, service bureaus, providers, clearinghouses) is critical. A comprehensive contact list, updated regularly and posted nationally, will make this much easier.
- Training employees on all aspects of number portability prior to implementation will offset customer dissatisfaction and ensure quality service.

Question 15. Give your comments, with reasons, as to when number portability should be introduced in India?

There are many reasons why Number Portability should be introduced in India - most of which will likely be refuted by operators opposed to the burden of changing

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8 *See Notice of Proposed Rulemaking in the Matter of Telephone Number Portability*, CC Docket No. 95-116, 10 FCC Rcd 12350 (13 July 1995)

9 *See Telecommunications Act of 1996*, Pub. L. No. 104-104, 110 Stat. 56 (1996) (1996 Act).

10 *See First Report and Order and Further Notice of Proposed Rulemaking*, CC Docket No. 95-116, FCC 96-116 (2 Jul 1996).

11 *See*, USA, Federal Communications Commission, Dockets 95-116.

systems and networks to accommodate porting and potentially losing customers. Reasons to mandate include benefits to consumers, markets and regulatory.

Consumers benefit from the additional options for service as well as the improvement of services, addition of new services and the like that comes from competition. Operators are clearly driven to develop new loyalty strategies to obtain new and retain the current customer base. Competitors improve, update, change business models to gain additional market share through by improving business and becoming more customer focused. A need to differentiate service brings about improved network coverage area, revamped and expanded calling plans and advanced customer service.

In the regulatory arena, portability could provide National Numbering Plan administrators added flexibility in the assignment of numbers creating a more efficient plan. While churn amongst operators may not materialize initially, portability may improve number optimization, and allow for easier operator technology changes and facilitate network expansion.

Question 16. Should MNP be implemented progressively by service area or directly across the nation at one time?

The implementation alternatives depend on how portability is implemented and how networks are currently set-up and the technologies used. The choices are significantly different depending on whether Next Generation or Legacy number portability solutions are pursued.

In the North American market, wireless operators use CDMA, TDMA, IDEN and GSM technologies. Due to some MDN/MIN separation issues for CDMA and TDMA it was important that a ubiquitous deployment be initiated to ensure that loss of service, particularly emergency services, was not impacted. This was not the case

with GSM as the dialable number (MSISDN) and the registration number (IMSI) were already separate entities in those networks.

The issues of MIN/MDN separation presents an additional obligation for carriers to obtain a set of MINs that can be inventoried for a carrier(s) in order for each to have some supply for new customer assignments.

Question 17. What will be the effect, if any, on the different aspects of implementation if phased roll-out is adopted?

A phased in approach may allow carriers more flexibility in larger markets by allowing them to use funds for implementation more efficiently and cost effectively. The cost to providers to implement number portability will be significant not only in terms of the routing mechanism chosen, but also the impact to back-office systems such as the point of sale, billing, provisioning, customer care, emergency and inter-carriers communications system. Regardless of a progressive roll-out or mandatory national roll-out these systems will need to be upgraded most probably at the start of implementation. However a phased in approach would allow operators to upgrade switching systems at a slower pace depending on the technical solution chosen.

Consideration for impact to the fixed line carriers who may be forced to upgrade switches or networks in order to route calls from their customers to ported mobile numbers should be evaluated in any analysis of technology choices.